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in

E D U C A T I O N

SEMESTER-II

EDC-05

Educational Philosophy-02

Self-Learning Material



DIRECTORATE OF OPEN & DISTANCE LEARNING

UNIVERSITY OF KALYANI

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Director's Message

Satisfying the varied needs of distance learners, overcoming the obstacle of distance and reaching the unreached students are the threefold functions catered by Open and Distance Learning (ODL) systems. The onus lies on writers, editors, production professionals and other personnel involved in the process to overcome the challenges inherent to curriculum design and production of relevant Self Learning Materials (SLMs). At the University of Kalyani a dedicated team under the able guidance of the Hon'ble Vice-Chancellor has invested its best efforts, professionally and in keeping with the demands of Post Graduate CBCS Programmes in Distance Mode to devise a self-sufficient curriculum for each course offered by the Directorate of Open and Distance Learning (DODL), University of Kalyani.

Development of printed SLMs for students admitted to the DODL within a limited time to cater to the academic requirements of the Course as per standards set by Distance Education Bureau of the University Grants Commission, New Delhi, India under Open and Distance Mode UGC Regulations, 2017 had been our endeavour. We are happy to have achieved our goal.

Utmost care and precision have been ensured in the development of the SLMs, making them useful to the learners, besides avoiding errors as far as practicable. Further suggestions from the stakeholders in this would be welcome.

During the production-process of the SLMs, the team continuously received positive stimulations and feedback from Professor (Dr.) Sankar Kumar Ghosh, Hon'ble Vice-Chancellor, University of Kalyani, who kindly accorded directions, encouragements and suggestions, offered constructive criticism to develop it within proper requirements. We gracefully, acknowledge his inspiration and guidance.

Sincere gratitude is due to the respective chairpersons as well as each and every member of PGBOS (DODL), University of Kalyani. Heartfelt thanks is also due to the Course Writers-faculty members at the DODL, subject-experts serving at University Post Graduate departments and also to the authors and academicians whose academic contributions have enriched the SLMs. We humbly acknowledge their valuable academic contributions. I would especially like to convey gratitude to all other University dignitaries and personnel involved either at the conceptual or operational level of the DODL of University of Kalyani.

Their persistent and co-ordinated efforts have resulted in the compilation of comprehensive, learner-friendly, flexible texts that meet the curriculum requirements of the Post Graduate Programme through Distance Mode.

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Director
Directorate of Open and Distance Learning
University of Kalyani

SEMESTER-II		
EDC-05 : EDUCATIONAL PHILOSOPHY-2		
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SEMESTER-II**EDC-5****EDUCATIONAL PHILOSOPHY-2**

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EDC-05
EDUCATIONAL PHILOSOPHY-02
Block-1
Indian Schools of Philosophy
Unit-1
Charvaka Philosophy

CONTENT STRUCTURE

- 1.1.1 : Introduction**
- 1.1.2 : Objectives**
- 1.1.3 : Meaning and Concept of Charvaka Philosophy**
- 1.1.4 : Charvaka doctrine & core beliefs**
- 1.1.5 : Charvaka Theory of knowledge**
- 1.1.6 : Summing up**
- 1.1.7 : Suggested Readings**
- 1.1.8 : Assignments**

1.1.1 : INTRODUCTION

In this Unit we are going to discuss Charvaka philosophy, a distinct materialistic schools of Philosophy. Discussion on this schools of philosophy has laid emphasis on theory of knowledge keeping in mind the field of education in its the focus.

1.1.2 : OBJECTIVES

Learners will be able—

- To extract educational thoughts from Charvaka Philosophy.
- To the basic truths and sources of valid knowledge from Charvaka.
- To apply the concept of Charvaka Philosophy in educational systems.

1.1.3 : MEANING AND CONCEPT OF CHARVAKA PHILOSOPHY

Brhaspati is said to be the founder of the Carvaka philosophy. A few aphorisms and verses are attributed to him. A consistent and complete account of the Carvaka system is not found in any work written by a Carvaka thinker. It has to be reconstructed from the exposition of the doctrine by its Buddhist, Jaina, and Hindu critics.

Charvakas come into heterodox school of thought, they are hedonists i.e they believe in worldly pleasures. Charvaka consist of charu (acche) + vak (vachan) ie the words which are liked by most of the people. They have refuted inference as source of knowledge because for establishing the inference vyapti is needed.

According to them world is made up of four elements fire, earth, air, water. They have not considered aakash as the fifth Element because they don't have perception of that.

Perception is the only source of knowledge, what they perceive they believe in that only. They are materialistic in approach, they took sensory pleasure to an extreme. They do not believe in the God.

1.1.4 : CHARVAKA DOCTRINE & CORE BELIEFS

The earliest texts of the Charvaka were written around the 6th century BCE, but unfortunately, they have been lost. From what we can piece together, mainly through later works, these thinkers believed in a rigid materialistic perspective in which only things that could be perceived directly were thought to exist. Some of the key principles of this doctrine of materialism were :

1. All things are made of earth, air, fire and water.
2. That which cannot be perceived does not exist; to exist implies to be perceivable.
3. Heaven and hell are nothing but inventions. The only goal of humans is to enjoy pleasures and avoid pain.
4. Providing a good living for the priests is a sufficient explanation for the practice of religion.

The members of this school did not believe in ideas such as the soul, reincarnation, spirits, or gods. Religion, they said, is nothing but a fraud devised by clever men who want to take advantage of others. Soul or consciousness can be explained in natural terms as a side effect of having a healthy body: When the body dies, consciousness simply disappears. No existence other than the physical body exists for the Charvaka.

The attitude towards human conduct in the Charvaka school was a very flexible one: Right or wrong were seen as merely human conventions. The cosmos, they believed, was indifferent to

human behaviour. If this life is all there is, if there is no afterlife whatsoever, then we should live enjoying the physical life the best we can.

1.1.5 : CHARVAKA THEORY OF KNOWLEDGE

In Indian Philosophy the word 'Charvaka' means a materialist. The entire philosophy of the Charvaka may be said to depend logically on their epistemology or the theory of knowledge. The main problems of epistemology are : How far can we know reality? How does knowledge originate and develops. This last question involves the problem : What are the different sources of knowledge? This problem forms one of the chief topics of Indian epistemology. Knowledge of reality or valid cognition is called Prama and the source of such holds that perception is the only pramana or dependable source of knowledge. For establishing this position it criticizes the possibility of other sources of knowledge like inference and testimony which are regarded as valid pramanas by many philosophers. Let us now its basic tenets in the following sub-units.

Inference is not Certain

If inference is to be regarded as a Pramana, it must yield knowledge about which we can have no doubt and which must be true to reality. But inference cannot fulfil these conditions, because when we infer, for example, the existence of fire in a mountain from the perception of smoke in it, we take a leap in the dark, from the perceived smoke to the unperceived fire.

The Charvaka points out that this conception would be acceptable only if the major Premises, stating the invariable relation between the middle term (smoke) and the major (fire), were beyond doubt. But this invariable relation can be established only if we have a knowledge of all cases of smoke and presence of fire. This, however, is not possible, as we cannot perceive ever all the cases of smoke and fire existing now in different parts of the world, to speak nothing of those which existed in the past or will exist in the future. No invariable, universal relation can, therefore, be established by perception. Neither can it be said to be based on another inference, since the validity of that inference has to be similarly proved.

Uniformities of experience are explained by the inherent nature of things, which also may change in future. Unfailing character of all inference, it is only an accident, and a separable one, that we find only in some inferences.

Inference cannot be regarded, therefore, as a Pramana - a sure source of valid cognition.

Testimony is not a safe source of knowledge

The Charvaka says that testimony consists of words. So far as words are heard through our ears, they are perceived. Knowledge of words is, therefore, knowledge through perceptions and is

quite valid. But in so far as these words suggest or mean, things not within our perception and aim at giving us knowledge of those unperceived objects, they are not free from error and doubt. Very often we are misled by so called authority.

The Charvaka says that in so far as we depend on any authority, because we think it to be reliable, the knowledge obtained is really based on inference, because our belief is generated by a mental process like this. This authority should be accepted because it is reliable, and all reliable authority should be accepted. Being based on inference, knowledge derived from verbal testimony or authority is as precarious as inference. And as in the case of inference, so here we often act on knowledge derived from authority on the wrong belief that it is. Sometimes this belief accidentally leads to successful results, sometimes it does not. Therefore, all theory or testimony cannot be regarded as a safe and valid source of knowledge.

Thus, neither inference nor authority can be proved to be reliable, Perception must be regarded as the only valid source of knowledge (Prama).

1.1.6 : SUMMING UP

Charvakas come into heterodox school of thought, they are hedonists i.e they believe in worldly pleasures. According to them world is made up of four elements fire, earth, air, water. They have not considered aakash as the fifth Element because they don't have perception of that.

The Charvaka points out that this conception would be acceptable only if the major Premises, stating the invariable relation between the middle term (smoke) and the major (fire), were beyond doubt. But this invariable relation can be established only if we have a knowledge of all cases of smoke and presence of fire.

1.1.7 : SUGGESTED READINGS

- (1) Jadunath Sinha — Indian Philosophy, M. B. Publishers Pvt. Ltd., Delhi, 2000.
- (2) S. Radhakrishnan — Indian Philosophy.
- (3) M. Hiriyanna — Outlines of Indian Philosophy, M. B. Publishers Pvt. Ltd., Delhi, 2000.

1.1.8 : ASSIGNMENTS

1. Explain why is perception the only source of valid knowledge according to 'Charavaka' Philosophy.
2. Why Charvaka philosophy is materialistic philosophy?
3. What is the core beliefs of the Charvak philosophy?

Unit-2

Vaisheshika Philosophy

CONTENT STRUCTURE

1.2.1 : Introduction

1.2.2 : Objectives

1.2.3 : Meaning and Concept of Vaisheshika Philosophy.

1.2.4 : Vaisheshika Theory of knowledge

1.2.5 : Categories (Padartha) of Vaisheshika Philosophy

1.2.6 : Substance (Dravya) of Vaisheshika Philosophy

1.2.7 : Quality (Guna) of Vaisheshika Philosophy

1.2.8 : Summing up

1.2.9 : Suggested Readings

1.2.10 : Assignments

1.2.1 : INTRODUCTION

In this Unit we are going to discuss Vaisheshika Schools of Philosophy. Vaisheshika is one of the six orthodox schools of Hindu philosophy from ancient India. In its early stages, the Vaisheshika was an independent philosophy. We are also being discussed with their educational implications. Discussion on this school of philosophy has laid emphasis on theory of knowledge keeping in mind the field of education in its the focus.

1.2.2 : OBJECTIVES

Learners will be able—

- To extract educational thoughts from Vaisheshika Philosophy.
- The basic truths and sources of valid knowledge from Vaisheshika
- To apply the concept of Vaisheshika Philosophy in educational systems.

1.2.3 : MEANING AND CONCEPT OF VAISESIKA PHILOSOPHY

The term Vaisesika is derived from the term visesa. The Vaisesika system lays stress on particularity (visesa) of the eternal substances. Ether, space, time, souls, internal organs, and the atoms of earth, water, fire and air are eternal. Each of them has a particularity which is its distinctive feature. The Vaisesika emphasizes the plurality and distinctness of physical things and individual souls. Its special feature is the doctrine of atomism.

Kanada (300 B.C.), the author of the Vaisesika Sutra, is the founder of the Vaisesika system. It specializes in the philosophy of nature. Kanada speaks of the six categories: substance, quality, action or motion, community, particularity, and inherence. The later Vaisesikas clearly recognize non-existence as the seventh category. Kanada does not clearly mention God in the Vaisesika Sutra.

Prasastapada (400 A.D.), Sridhara (1000 A.D.) and Udayana (1000A.D.) discuss the theistic proofs, the nature of God, and His creation of the world out of the atoms and dissolution of it into them. The Vaisesika discusses the nature of the individual self, the proofs for its existence, the plurality of finite souls, and their bondage and liberation.

1.2.4 : VAISESIKA THEORY OF KNOWLEDGE

The Vaisesika system was founded by the sage Kanada also named Utuka. It is allied to the Nyaya system. They have the same end in view, namely, liberation of the individual self. According to Vaisesika, ignorance is the root cause of all pain and suffering and liberation which consists in their absolute cessation, is to be attained through a right knowledge of reality.

The Nyaya accepts four independent sources of knowledge, namely perception, inference, comparison and testimony, the Vaisesika recognizes only two, viz Perception and Inference.

(1) Perception : In logic perception is to be regarded as a form of true cognition. The perception of the table before me is due to the contact of my eye, with the table, and I am definite that the object is a table. The perception of a distant figure as either a man or a post is a doubtful and indefinite cognition, and therefore, not a true perception. The perception of a snake in a piece of rope is definite but false, and so it is different from valid perception.

Classification of Perception : There are different ways of classifying perception. First, we have the distinction between laukika or ordinary and alaukika or extraordinary perceptions.

Laukika perception when there is the usual sense - contact with objects present to sense. In alaukika perception, however, the object is such as is not ordinarily present to sense, but is conveyed to sense through an unusual medium.

Perception again is of two kinds, namely external and internal. The former is due to the external senses of sight hearing, touch, taste, and smell. The latter is brought about by the minds contact with the psychical states and processes. Thus, we have six kinds of laukika or ordinary perceptions, viz, the visual, auditory, tactual, gustatory, alfactory, and the internal or mental perception. Alaukika or extraordinary perception is of three kinds, viz, Samanyalaksana, Jnanalaksana and Yogaja.

According to Vaisesika there are six organs of knowledge of these five are external and one is internal. The five external senses are the organs of smell, taste, sight, touch, and hearing. Mind is the internal organ which perceives such qualities of the soul as Desire, Aversion, Striving or Willing, Pleasure, Pain and Cognition.

There are three kinds of extraordinary perceptions. The first is Samanyalaksana and the second is Jnanalaksana, and third is called Yogaja.

There are three modes of ordinary perception, namely nirvikalpaka or the indeterminate and Savikalpaka or the determinate. To these two we may add recognition.

The first is nirvikalpaka, which is cognition of things without any explicit interrelation or characterization.

The second is Savikalpaka, in which the object is judged as possessed of some character.

The third is pratyabhijha or recognition, which is the cognition of an object as what was cognized before.

(2) **Inference** : Inference is the process of knowledge something not by observation, but through the medium of a mark that is invariably related to it.

For example : “The hill is fiery, because it smokes and what ever smokes is fiery”. We pass from the Perception of smoke in the hill to the knowledge of the existence of fire in it, on the ground of our previous knowledge of the universal relation between smoke and fire.

As Dr. B. N. Seal puts it : “Amunana (Inference) is the process of ascertaining, not by Perception or direct observation, but through the instrumentality or medium of a mark, that a thing possesses a certain character.”

The Constituents of inference : Inference has three terms at least three propositions.

Paksa is the minor term, Sadhya the major term and Sadhana the middle term of anumana or inference.

The three steps and propositions in an inference are - the first step in inference is the apprehension of the hetu (Smoke) in the Paksa (hill), the second, recollection of the universal relation between hetu and Sadhya (smoke and fire) and the last is the cognition of the Sadhya (fire) as related to the Paksa (hill).

➤ **The grounds of inference :**

There are two conditions of an inference. In inference our knowledge of the Sadhya (fire) as related to the Paksa (hill) depends on the previous knowledge of the hetu (smoke) as connected with the Paksa on the one hand, and universally related to the Sadhya, on the other. We infer that there is fire in the hill, because we are that smoke is always accompanied by fire. It appears, therefore, that an inference has two conditions. The first is a cognition of the hetu or middle term (smoke) in the Paksa or minor term (the hill). The second is the relations of invariable concomitance between the middle and the major term.

Vyapti is the logical cognition of inference. There are two kinds of Vyapti, Vyapti is an invariable and unconditional relation of concomitance between the middle and the major term. According to the first classification, inference is of two kinds, namely, Svārtha and Parārtha.

1.2.5 : CATEGORIES (PADARTHA) OF VAISESIKA PHILOSOPHY

Padārtha literally means the meaning of a word. It is an object of knowledge, and capable of being named. It is knowable and nameable. It is an object of valid knowledge. Kanada brings all objects of valid knowledge under six categories.

They are substance (dravya), quality (guna), action or motion (karma), generality (samanya), particularity (visesa), and inherence (samavaya). Kanada does not mention non-existence or negation. The later Vaisesikas add the seventh category of non-existence. Sridhara, Udayana and Sivadiya recognize seven categories including non-existence.

Substance is the substratum of quality and action. A book is a substance. Its colour, extension, solidity, dimension' and the like are its qualities. Its motion is its action. Its qualities and motion subsist in it. Quality cannot subsist in itself, but it subsists in a substance, which is its substratum. Quality is comparatively permanent and passive, but action or motion is temporary and dynamic. The genus of man subsists in many individual persons.

It is a generality or community. An eternal substance has particularity which distinguishes it from other eternal substances. Space is one, eternal and ubiquitous substance. It has a particularity which distinguishes it from other eternal substances, time, ether and the like. Inherence is the inseparable relation between substance and quality, substance and action, a generality and an individual, an eternal substance and its particularity, and a composite substance and its component parts.

When a jar is destroyed, there is negation or non-existence of the jar. Substances the main category. All other categories depend on it for their existence. Substance is the substratum of quality, action, community, particularity and inherence.

The first six categories have existence, name ability and know ability. They are objects of the positive notion of being. They can be known without depending on their counter-entities, and expressed by names. They are capable of being known, though they exist independently of being known. The three categories of substance, quality and action-are related to being-hood (satta) which subsists in them.

The three categories of generality, particularity and inherence are related to themselves and devoid of relation to being-hood. They are neither causes nor effects. They are eternal and incapable of being expressed by the word 'object' They are non-spatial and timeless ontological entities. Substance, quality and action are causes capable of producing effects and liable to destruction. They exist in time and space.

1.2.6 : SUBSTANCE (DRAVYA) OF VAISESIKA PHILOSOPHY

Kanada defines a substance as an entity which has qualities and actions, and which is the inherent or material cause of an effect. A substance is the substrate of qualities and actions. It is not a mere collection of qualities and actions. It is not a mere aggregate of qualities as the Buddhist realist maintains.

Nor is it a mere complex of ideas as the Buddhist idealist maintains. It has a real, objective existence. It differs from its qualities and actions because it is their substrate. If it were not different from them, it would not be their substrate.

Qualities and actions are devoid of qualities and actions. They are not self-existent, but they exist in a substance. The relation between a substance and its qualities and actions is inherence. A substance is the material or inherent cause of its effect.

This characteristic distinguishes it from a quality and an action. But the conjunction of threads, which is a quality, is its non-inherent cause. The whole is not a mere aggregate of parts as the Buddhist realist maintains. It has an existence over and above that of its parts. They are its material cause; it inheres in them. The relation between a material cause and its product is inherence.

A substance has the genus of substance which inheres in it. Substances are eternal and non-eternal. Non-eternal substances consist of parts, and are produced by their combination, and destroyed by their separation. Composite substances are produced and destroyed by something different from themselves. They are non-eternal.

They are not self-subsistent and independent, but they subsist in their component parts. But simple and part-less substances like the atoms of earth, water, fire and air are eternal. They are neither produced nor destroyed. They are self-existent, independent and endowed with particularities. Space, time, ether and souls, which are incorporeal and ubiquitous, are eternal. Minds (manas) are atomic and eternal. They are neither produced nor destroyed.

1.2.7 : QUALITY (GUNA) OF VAISESIKA PHILOSOPHY

Kanada defines a quality as an entity inhering in a substance, and devoid of quality, which is not an unconditional cause of conjunction and disjunction. Prasastapada adds one more characteristic of a quality. He defines it as an entity related to the genus of quality, abiding in a substance, and devoid of quality and action.

A quality inheres in a substance, which is its substrate. It depends upon a substance for its subsistence. But it is not identical with a substance. If it were so, it would not be related to a substance as the content of a substrate.

A substance is the substrate of its quality, which is its content. Qualities in here in a substance. But sometimes a substance also inheres in another substance. A composite substance inheres in its component parts. So a quality is defined as- devoid of qualities.

A composite substance is not devoid of qualities. But a quality is devoid of qualities. An action or movement also inheres in a substance, and is devoid of quality. It is an unconditional cause of conjunction and disjunction. But a quality is not an unconditional cause of conjunction and disjunction. Hence a quality is different from an action.

A quality is devoid of action. A substance only has an action. A fan has motion; but its colour is devoid of motion. A quality has no motion, but it seems to be in motion because its substrate is in motion. A quality is devoid of quality. Number is the quality of a substance, but it is not a quality of its colours, odours, tastes and other qualities. A quality has a community, the genus of quality. A colour has the genus of colour.

A quality differs from community, particularity and inherence, which are devoid of community. It differs from a substance because it is devoid of quantities, while the latter is endowed with qualities.

It differs from an action, which is devoid of qualities, but which is an unconditional cause of conjunction and disjunction. A quality is not their unconditional cause. A quality exists through relation to being hood. The genus of quality subsists in a quality, but may possess an inferior community also. A colour possesses the genus of colour also.

1.2.8 : SUMMING UP

Kanada (300 B.C.), the author of the Vaisesika Sutra, is the founder of the Vaisesika system. It specializes in the philosophy of nature. Kanada speaks of the six categories: substance, quality, action or motion, community, particularity, and inherence. The Vaisesika discusses the nature of the individual self, the proofs for its existence, the plurality of finite souls, and their bondage and liberation.

According to Vaisesika there are six organs of knowledge of these five are external and one is internal. The five external senses are the organs of smell, taste, sight, touch, and hearing. Mind is the internal organ which perceives such qualities of the soul as Desire, Aversion, Striving or Willing, Pleasure, Pain and Cognition. There are three kinds of extraordinary perceptions. The first is Samanyalaksana and the second is Jnanalaksana, and third is called Yogaja. There are three modes of ordinary perception, namely nirvikalpaka or the indeterminate and Savikalpaka or the determinate. To these two we may add recognition.

Kanada defines a substance as an entity which has qualities and actions, and which is the inherent or material cause of an effect. A substance is the substrate of qualities and actions. It is not a mere collection of qualities and actions. It is not a mere aggregate of qualities as the Buddhist realist maintains. Nor is it a mere complex of ideas as the Buddhist idealist maintains. It has a real, objective existence. It differs from its qualities and actions because it is their substrate. If it were not different from them, it would not be their substrate.

Kanada defines a quality as an entity inhering in a substance, and devoid of quality, which is not an unconditional cause of conjunction and disjunction. Prasastapada adds one more characteristic of a quality. He defines it as an entity related to the genus of quality, abiding in a substance, and devoid of quality and action. A quality inheres in a substance, which is its substrate. It depends upon a substance for its subsistence. But it is not identical with a substance. If it were so, it would not be related to a substance as the content of a substrate. A substance is the substrate of its quality, which is its content. Qualities in here in a substance. But sometimes a substance also inheres in another substance. A composite substance inheres in its component parts. So a quality is defined as- devoid of qualities.

1.2.9 : SUGGESTED READINGS

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1.2.10 : ASSIGNMENTS

1. Mention different sources of valid knowledge according to Vaisesika Philosophy.
2. What do you mean the Vaisesika philosophy?
3. What is the main Categories (Padartha) of Vaisesika Philosophy?

Unit-3

Vedanta Philosophy

CONTENT STRUCTURE

1.3.1 : Introduction

1.3.2 : Objectives

1.3.3 : Meaning and Concept of Vedanta Philosophy

1.3.4 : The advaita vedanta of Samkara:

1.3.5 : The philosophy of visitadvaita : Theory of knowledge

1.3.6 : Summing up

1.3.7 : Suggested Readings

1.3.8 : Assignments

1.3.1 : INTRODUCTION

In this Unit we are going to discuss Vedanta philosophy. The Vedanta philosophy, as it is generally called at the present day, really comprises all the various sects that now exist in India. Thus there have been various interpretations beginning with the dualistic or Dvaita and ending with the non-dualistic or Advaita. The word Vedanta literally means the end of the Vedas. The Vedanta school is based on the Vedanta part of the Vedas, the Upanishads. The other schools are based on different parts of the Vedas other than the Upanishads.

The Vedantas or the Upanishads are so called because they are found at the end of the Vedas (anta meaning end). The other 5 schools of Hinduism are not well accepted today and it is the Vedanta school which has come to define Hinduism.

The Vedantas or the Upanishads define two main realities – Brahman, the Absolute reality, and the world, the relative reality. The world encompasses both the matter of the world, the non-living objects, and the souls, or consciousness. Discussion this school of philosophy has laid emphasis on theory of knowledge keeping in mind the field of education in its the focus.

1.3.2 : OBJECTIVES

Learners will be able—

- To extract educational thoughts from Vedanta Philosophy.
- To the basic truths and sources of valid knowledge from Vedanta
- To apply the concept of Vedanta Philosophy in educational systems.

1.3.3 : MEANING AND CONCEPT OF VEDANTA PHILOSOPHY

Vedanta is one of the six orthodox schools of Indian philosophy. It is also called Uttara Mimamsa, the 'latter enquiry' or 'higher enquiry'; and is often contrasted with Purva Mimamsa, the 'former enquiry' or 'primary enquiry'. Purva Mimamsa deals with the karmakāṇḍa or rituals part in the Vedas.

The Vedas are the religious scriptures of Hinduism. They are without doubt the oldest religious scriptures extant today in the world. All schools of Hindu philosophy are based on the Vedas. There are six schools of Hindu philosophy: Nyaya, Vaisheshika, Samkhya, Yoga, Purva Mimamsa and lastly, Vedanta.

Among these, the Vedanta school is based on the Vedanta part of the Vedas, the Upanishads. The other schools are based on different parts of the Vedas other than the Upanishads.

The Vedantas or the Upanishads are so called because they are found at the end of the Vedas (anta meaning end). The other 5 schools of Hinduism are not well accepted today and it is the Vedanta school which has come to define Hinduism.

The Vedantas or the Upanishads define two main realities – Brahman, the Absolute reality, and the world, the relative reality. The world encompasses both the matter of the world, the non-living objects, and the souls, or consciousness.

Based on the definition of the relation between these two, five different schools of Vedanta philosophy are now known today.

These five schools are :

Dvaita : the dualistic school, main exponent is Madhava.

Bheda Abheda or Dvaita Advaita : the founder is Nimbarka.

Vishista Advaita : the founder is Ramanuja

Shudh Advaita : the founder is Vallabha.

Kevala Advaita : the founder is Sankaracharya. Kevala Advaita is usually referred to simply as Advaita, and it is this school that is meant when people say 'Advaita'.

Bheda Abheda and Shudh Advaita are considered to be variations of the Vishista Advaita school of Ramanuja and these are taken as part of Vishista Advaita.

The five schools are like different stages on the philosophical path depending on the way they define the relation between Brahman and the world and the amount of reality they grant to the world.

The dualistic school is the first stage, in which the world and Brahman are said to be two entirely different entities, and both are equally real.

The qualified monism school is the middle stage, when the world and Brahman are both real but are not different entities, and bear the relation of part and whole, thus being both different and non-different.

The Advaita or non-dual school is the final stage, when the reality of the world is denied and Brahman is declared to be the only reality.

Bheda Abheda falls between dualism (Dvaita) and qualified monism (Vishista Advaita), since it emphasizes the difference in qualified monism more than the non-difference and thus tends towards dualism.

Shudh Advaita falls between qualified monism (Vishista Advaita) and non-duality (Advaita), since it emphasizes the non-difference in qualified monism, and thus tends towards Non-dualism.

1.3.4 : THE ADVAITA VEDANTA OF SAMKARA

Samkara distinguishes between the ontological reality and the empirical reality. The former is known by true knowledge (vidya) or higher knowledge (Para vidya). Brahmana is known by higher knowledge. It is trans-empirical subject-objectless consciousness. There is no distinction of the knower, the knowledge, and the known in it. It is not conditioned by space, time and causality which are empirical categories. The spatio-temporal world bound by causality is known by knower knowledge. It is known through the categories of space, time and causality by empirical knowledge. It involves the distinction of the knower and the known. True knowledge (vidya) is intuition (anubhava), which is super intellectual integral experience (samyag darsana). It is higher immediacy. False knowledge (avidya) is discursive, intellectual knowledge. It is categorized, empirical and fragmentary knowledge. Higher knowledge is absolute knowledge of identity. Lower knowledge is relative and pragmatic knowledge of different. Though they are opposed to each other, relative knowledge is a step to absolute knowledge. Intellect is a means to intuition.

Brahman is the Atman. It is the external, universal, foundational knowledge. It is the reality underlying the empirical world and the empirical selves. It cannot be known by sense-perception and intellectual knowledge. It can be known by higher knowledge or intuition. Lower knowledge is inadequate to grasp it.

The Atman is the reality (satya). The empirical world including the body, the senses, and the internal organs, which is not self (anatman), is logically unreal. But avidya impels the empirical self organism. It leads to confusion of the Atman with the not self the witness (visayin) with the known object (visaya). Confusion consists in super imposition of the self (anatman) on the transcendental self or Atman and super imposition of the Atman on the not self Avidhya is the false knowledge, of the self (Atman) in the mind body aggregate, which is not self Vidya is the true knowledge of the Atman as distinct from the mind body aggregate. The Atman is the witness of all. It illumines the internal organ, which is the object of self-consciousness. It is a known object or not self. It is super-imposed on the Atman. This confusion is false knowledge. It is the cause of agency and enjoyment. It is evident to all. It is beginningless, endless, and natural. It is endless in the sense, that it continues till true knowledge of the Atman is attained. False knowledge Atman with Brahman. The Atman or Brahman is known by empirical knowledge.

1.3.5 : THE PHILOSOPHY OF VISITADVAITA : THEORY OF KNOWLEDGE

Srinivasa defines valid knowledge as the knowledge which apprehends an object as it really exists, and which prompts fruitful activity. Knowledge accords with a real object, and initiates action which leads to its practical use. Perfect knowledge is co-herent. It is in harmony with the reality as an organic whole Ramanuja recognizes the realistic test of correspondence, the Pragmatic test of work ability, and the idealistic test of co-herence. These are the tests of truth. Pramana is the means of valid knowledge (Prama). Perception, Inference and Testimony are the true sources of knowledge.

Perception is the means of immediate valid knowledge. Perceptual knowledge is immediate. It is different from illusion which is produced by the sense organs. Perception is indeterminate (nirvikalpa) and determinate (savikalpaka). Indeterminate perception is perception of the first individual of a class, endowed with qualities and particular arrangement of parts. Determinate perception is perception of the second individual and the like, qualified by attributes and a particular configuration, which involves recollection. Indeterminate perception is a Presentative - representative process. Both apprehend qualified objects knowledge of an unqualified object is impossible. Perception, again, is sensuous or non-sensuous. Non sensuous perception is yogic intuition on intuition due to the graces of God. Perceptions as of the released souls, the eternally released souls, and God also are non-sensuous. Memory depends upon previous perception. It is knowledge produced by the sub-conscious impression of previous perception only. So it is not an independent source of knowledge. It is included in perception.

Inference is valid knowledge of a specific instance. A particular fire is inferred from the perfection of the smoke which is always pervaded by fire. The middle term is invariably accompanied by the major term. The major term is inseparable to co-relate of the middle term. Vyapti is the invariable concomitance of the middle term with the major term, not vitiated by conditions (Upadhi). For instance, wherever, there is smoke there is fire. Vyapti is known by observation of a large number of instances of their co-existence. The Nyaya syllogism consists of five numbers, proposition, reason, example, application and conclusion. Ramanuja maintains that the example or universal major premises and the application of minor or minor premise are enough for intelligent persons. All the five members are necessary for dull persons. Ramanuja recognizes the two kinds of inference, Kevalanuvayj, and Anvayavyalireki. He rejects Kevalavyalireki inference. He admits the five fallacies of Asiddha, Viruddha, Anaikanlika, Prakransama and Kalalyayopadishla.

Comparison (upamana) is the knowledge of a coiled cow or similar to a cow perceived already on the statement of a forester. It is included in inference, since it depends upon the knowledge of invariable concomitance between words and objects denoted by them. It is included in Perception, since recollection of similarly of a wild cow with a cow depends upon previous Perception of it. It is included in testimony since it is produced by the statement of a reliable person. So comparison is not on independent source of knowledge presumption also is included in inference. Testimony is either secular or scriptural. Secular testimony is knowledge produced by a sentence uttered by a reliable person. It is not vitiated by the defects of its cause and not reasoned by contradicting knowledge expectancy mutual fitness and proximity of the constituent word are necessary for a sentence scriptural testimony is knowledge of supersensible objects, produced by sentences which are not uttered by God at the beginning of each cycle. The entire Vedas are valid. Brahmana is not perceived. He cannot be proved or disproved by reason. He is proved by the Vedas only. They are the only source of our knowledge of supersensible objects reasons may be employed to confirm which in accord with the Vedas, are sources of valid knowledge, mid therefore authoritative. Both secular testimony and vedic testimony apprehend qualified objects possessed by distinctions.

All knowledge is true, and apprehends qualified objects are never apprehended. All knowledge apprehends the reality. Knowledge reveals a real object. It has intrinsic validity. It is valid in itself. Even illusions apprehends a real object Ramanuja advocates the doctrine of satkyat. A shell is perceived as silver. There is the elements of silver in a shell. So the perception is valid. But the element of silver is so scanty that it cannot be on object of practical use. So it is illusory. It is sublated by the knowledge of preponderance of the element of shell in it. Ramanuja harnesses the doctrine of quintuplication to the service of his theory of error or illusion. The fire elements of earth, water, fire, air, and other are present in various proposition in all material objects. This is the doctrine of

quintuplication, Dreams also are true. God creates dream objects for the enjoyment and suffering of individuals in accordance with their merits and demerits. Ramanuja explains away error.

The subject and predicate of a judgement are distinct. But a judgement affirms the identity of them, though they are distinct. It implies identity in difference identity is a relation. It requires two terms to be related to each other. If the subject and predicates are not distinct, they cannot be related to each other. If there is no difference between them, identity between them cannot be established to identify pre-supposed difference. Ramanuja maintains that every judgement implies the identity in and through difference. In the judgement 'the lotus is blue' the lotus and blueness are not identical, nor are they entirely different. The quality of blueness is attributed to the subject, lotus, which is given in sense - perception. The predicate blue qualifies and amplifies the meaning of the subject 'lotus'. The substance 'lotus' and the attribute 'blue' are different from each other. Yet there is inseparable relation between them. They subsist together. Every judgement is affirmation of reality which is identity in and through difference. It is not apprehension of identity devoid of difference. Samkara maintains that in the judgement 'that thou art' there is real identity between the subject and the predicate, but that there is apparent difference between them. But Ramanuja maintains that there is real identity as well as difference between them.

1.3.6 : SUMMING UP

The word Vedanta literally means the end of the Vedas. The Vedanta school is based on the Vedanta part of the Vedas, the Upanishads. The Vedantas or the Upanishads define two main realities – Brahman, the Absolute reality, and the world, the relative reality. The world encompasses both the matter of the world, the non-living objects, and the souls, or consciousness.

Samkara distinguishes between the ontological reality and the empirical reality. The former is known by true knowledge (vidya) or higher knowledge (Para vidya). Brahman is known by higher knowledge. Brahman is the Atman. It is the external, universal, foundational knowledge. It is the reality underlying the empirical world and the empirical selves. It cannot be known by sense-perception and intellectual knowledge. It can be known by higher knowledge or intuition. Lower knowledge is inadequate to grasp it. The Atman is the witness of all. It illumines the internal organ, which is the object of self-consciousness. It is a known object or not self. It is super-imposed on the Atman. This confusion is false knowledge. It is the cause of agency and enjoyment. It is evident to all. It is beginningless, endless, and natural. It is endless in the sense, that it continues till true knowledge of the Atman is attained. False knowledge Atman with Brahman. The Atman or Brahman is known by empirical knowledge.

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1.3.8 : ASSIGNMENTS

1. What is the concept of Vedanta philosophy ?
2. What is the Philosophy of visitadvaita ?
3. What is the advaita vedanta of Samkara ?

Block-2
Western Schools of Education
Unit-1
Existentialism

CONTENT STRUCTURE

2.1.1 : Introduction

2.1.2 : Objectives

2.1.3 : Meaning and Concept of Existentialism.

2.1.4 : Basic Characteristics of Existentialism.

2.1.5 : Educational Implication with reference to Aims, Contents and Methods of Teaching.

2.1.6 : Summing up

2.1.7 : Suggested Readings

2.1.8 : Assignments

2.1.1 : INTRODUCTION

In this unit will help you to acquainted with Existentialism school of western philosophy on various aspects of Education. Because of changing nature of knowledge and human urge for continuous search for truth, especially from the context of educational discourse, some other philosophical constructions did eventually appear in the West, each seemingly more close to Education and contributed to re-shaping educational encounters.

2.1.2 : OBJECTIVES

After going through this Unit, you will be able to :

- List out the exponents of Existentialism,
- List the characteristics of Existentialism
- Distinguish between Existentialism

- Analyze the curriculum of Existentialism
- Discuss methods of teaching of Existentialism
- Critically describe the contributions of Existentialism
- Indicate the weaknesses of Existentialism

2.1.3 : MEANING AND CONCEPT OF EXISTENTIALISM

This highly complex philosophical movement, referred to under the blanket name of ‘Existentialism’ ushered in as a reaction against the tragic sense created by the Second World War, wherein ‘man’ was reduced to nothingness and became victim to the science and technology, which he had created for his happiness became the instrument of his destruction. It is the revolt against the impersonal nature of the modern industrial and technological age, which has subordinated man to the machine. This philosophy, therefore, is built on the premise that man should exist with maximum happiness. There is nothing predetermined. Every man can shape his own destiny by the exercise of his ‘will’ and potentialities, which is his life. According to Fernando “Existentialism is a type of philosophy which endeavors to analyze the basic structures of human existence and calls individuals to an awareness of their existence in its essential freedom”. Some existentialist philosophers are Soren Kierkegaard (1813-1855), Martin Buber (1878-1965), Martin Heidegger (1889-1976), etc.

Existentialism is an attitude and outlook that emphasizes human existence, the qualities of individual persons rather than man in abstract or nature and the world in general. It is a belief in the primacy of existence - the inner, immediate experience of self-awareness. According to this man’s fundamental drive or urge should be “to exist” and to be recognized as individual and this helps him to gain a sense of meaning and significance in life. Existentialists take a stand that world of science and religion has created a lot of confusion in the man’s mind about his ‘authenticity’ and ‘real self’. They think that machine, which has been created by man has become his tyrant, the machine and technology which should have been the servant of man has become the master of man. Man has lost his pristine glory and status and has been drowned in a sea of impersonal forces.

Existentialism is, therefore, “essentially the philosophy of man and his attempt to reaffirm and regain the lost status of man in this advanced technological and mechanized society”. It wishes man to undertake a new analysis of the nature of man.

2.1.4 : BASIC CHARACTERISTICS OF EXISTENTIALISM

This is a difficult question to answer because existentialism is such a broad movement that stretches from the 19th-20th centuries. Moreover, philosophers who have completely different views

of the world such as Kierkegaard and Nietzsche can be called existential philosophers. With that stated, there seem to be a few common Characteristics are below :

1. Existentialism is a movement of protest basically against traditional philosophy. It is against Greek rationalism and Hegel's Absolute Idealism. It opposes naturalism that tries to explain life through cause and effect opposing the naturalistic view point.

Science, the existentialists say, has succeeded in destroying and suppressing the creativity of man, human values and personal freedom, human feelings and emotions. Therefore, existentialism criticizes the scientific culture prevailing in modern society. It urges all writers, artistes to be conscious of human freedom and rescue humanity from doom and despair.

2. Unlike the traditional philosophers who assert that man is essentially rational, the existentialists say that man is guided by passion and not by reason. They lay utmost importance on will to power, self consciousness, feelings and emotions, tastes, individual likes and dislikes.

3. Existential thinkers are alarmed by the alienation between man and nature. Modern man has discarded nature and has turned himself into a machine. He has reached such a state that in spite of realizing his helpless state and meaningless existence, he is unable to do anything about it. He is suffering from guilt, dread, anguish and despair. Some existential thinkers say that philosophy aims to realize the true meaning of human life, man's existence in order to free man from all his sufferings. Human life is known only through varied aspects of man's life; they may be, pain, sorrow and suffering or happiness, contentment and well-being. Therefore, existentialism lays importance on the authentic existence of man.

4. Existentialism is an investigation and analysis of the human dilemma or human predicament: the dilemma with regard to his situation and his prospects in the world. In fact, since the last century, man has expressed concern over his sense of alienation from and meaningless existence in this world. Man feels himself as an outsider in this world, where he must reside. During the 19th Century, some thinkers like Kierkegaard, Nietzsche and Dostoevsky and few others were continuously raising their voice against the lamentable condition of man in this world.

5. Existentialism asserts that "Existence precedes essence." Nothing can be above human existence. Human existence is the sole aim of all thought. It is above all qualities of things. Man's existence alone, as he lives with his physical experience, is what matters. His actual existence cannot be conceptualized. It is a matter of living and experiencing. The existentialists, therefore emphasize the primacy of human existence.

6. Existential philosophers have laid importance on human subjectivity. Existentialism rejects materialism and idealism. Truth is subjective and cannot be known apart from the subject's inner

feelings. The immediate feeling or apprehension of the individual reveals the truth. It cannot be expressed in proposition. It is a matter of experience.

7. Existentialism lays emphasis on the freedom of the individual. Man is free but he is dominated by sorrow, fear, pain, dread and guilt. These are “Angst of life”. Man should find out the cause of these emotions, feelings and sufferings. Nietzsche asserts that “Will to power” and “faith in self” will help us to be free from the “Angst of life”. Man has immense choices within his reach. He has to work upon them and also accept responsibility for them. A genuine or authentic self exists, accepts choices, takes decision and accepts responsibility for them. Existentialism, in fact, asserts that man should strive for such an existence that thrives even in the face of frustrations and the impersonality of modern civilization.

2.1.5 : EDUCATIONAL IMPLICATION WITH REFERENCE TO AIMS, CONTENTS AND METHODS OF TEACHING

Existentialism and Aims of Education :

Traditional philosophers consider questions about the nature of knowledge, truth and meaning, while the existentialists are concerned with how these things are educationally significant within the lived experience of individuals. Certain ‘shoulds’ and ‘musts’ as laid down of man’s life by existentialists become the aims of education. They feel that ‘man’ has lost his pristine glory and that must be revived through education. This world is meaningful only if man is meaningful. Education, therefore, must edify and enrich man’s mind so that it may be respectable in his own eyes and in the eyes of others, so that his ‘choice’ lead him to satisfaction and not to anguish or despair, through even these things are a necessary part of life. Education should help him to make him human, make him willing once again to stand alone, willing to withstand the pressures of history and culture and to chart the course of his life to recreate the ‘worthy image of man’.

Man should lead a good life, which the existentialists call ‘authentic life’. This is possible when each individual human being begins led by the choices of others. Education, therefore, must aim at developing that integrity in the students which is necessary in the task of not only making individual choices, but also feeling responsible, for those choices. Existentialists tell that a good education would encourage individual to discover personal self.

What is authentic man? Existentialists have a special connotation of the authentic man, they say, who is one who has permeation of his values and choices by clear awareness of his situation, especially regarding the fact of death. If a man considers death imminent, he leads authentic existence. Education should help his understanding and impress the individual to lead a good life with its noble

obligations. Education must teach him to accept death gracefully as natural phenomena and inspire him to do good things to earn the taste of 'noble death'.

The existentialists do not seem to favor mass education and wish 'the education of a few picked men for great and lasting work'. In the words of Gabriel Marcel, "only the individual may be truly educated, the masses can only be trained". They wish education to aim at striking anew the chord of individual liberty. Man must be free from moral relativism. He should be helped to square his conduct with his conscience. Education, according to them, should suggest ways and means to preserve the freedom of man, even if that freedom leads him to anguish and despair.

Existentialism and Curriculum :

Since the existentialists believe in the individual's freedom, they do not advocate any rigid curriculum. It is through curriculum that the student develops personal freedom and appropriate habits of mind. They say that curriculum represents a world of knowledge for the student to explore. Such knowledge should be mastered in order to provide solid content for making free analysis and criticism and to establish firm foundations for individual creative effort. However they recognize the 'individual differences' and wish to have diverse curricula suiting the needs, abilities and aptitudes of the individual. Curriculum should not primarily satisfy the immediate needs but also the ultimate needs also. It should be so designed that a student does have every experience that constitute his life. According to them function of education is not to hide the ugly and enhance the beautiful, nor to hide the latent evil and focus on all pervading good. The individual should be enabled to face squarely, 'the wastes of shock, confusion, struggle and failure' so that he knows them to be a part of life, which is compounded of growth and collapse, of Joy and Tragedy.

By the existentialists the central place is given to humanities, poetry, drama and novel because they exert the human impact in revealing man's inherent guilt, sin, suffering, tragedy, death, hate and love.

The existentialists give second place to the teaching of social science, as they lead the man to feel that he is nothing more than an object, about which conclusions have already been reached. They, however, wish to teach social science for inculcating moral obligation and for knowing the relationship of the individual to a group. They advocate the teaching of history in order to help the students to change the course of history and to mould the future.

They advocate the study of the world's religions so as to develop religious attitude freely within the student. He should not wander aimlessly in a spiritual vacuum but should formulate his own moral and religious convictions in the same way as he arrives at convictions on aesthetic materials and other values. Religion keeps him aware of death.

Realization of self-forms is the part of the curriculum. Self-examination and not social obedience is the first lesson. The child must be saved from his own unexamined self and from those who interfere with the free exercise of his moral decision. However, the student-in-situation making a choice may be the deciding factor in curriculum development and transaction.

Existentialism and Teaching Techniques :

Impressed by the Socratic method, which is based upon the concept of innate ideas and their implied subjectivity, the existentialists advocate this method in teaching. In Socratic method, the teacher poses ignorance and educes from the pupil, and appraises, aids and verifies the knowledge from them by means of skillfully directed questions. Free atmosphere encourages free and fearless questioning.

Although Socratic method includes ‘problem method’ the existentialists do not advocate ‘problem method’, which according to them is impersonal, unproductive and generally socially oriented and also concerned with the ‘immediate’. They, however, accept ‘problem method’ if the problem originates in the life of the one who has to work out the solutions. Their emphasis is on instructional techniques which appeal to feeling, emotion, creativity and deeper meaning of life. Effort is given to cultivate insight, fidelity, love and creative knowledge. Like Socrates, they advocate ‘personal reading’ as this provides the student freedom to inspire his ingenuity. They want that the urge to learn must develop from within, which is the essence of life. They reject the group method. They believe that every teacher should be a student and every student a teacher.

Critical Evaluation :

Existentialism developed as a reaction against the contemporary social, economic and political situation in which man has lost his self. This philosophy has widely influenced art and literature. In politics it has stood against war. Its followers are active pacifists. In the field of education the contribution of existentialism is as follows :

1. Total development: The existentialists have aimed at total development of personality through education. Education should aim at the whole man. It should aim at character formation and self-realization.
2. Subjective Knowledge: The existentialists rightly point out that subjective knowledge is even more important than objective knowledge. They rightly hold that truth is subjectivity. It is a human value and values are not facts. Reduction of values to facts has led to widespread loss of faith in values. Therefore, along with the teaching of science and mathematics, the humanities, art and literature should also be given suitable place in curriculum at every stage of education.

3. Importance of environment: The present industrial, economic, political and social environment is valueless. Therefore, it helps confusion and corruption, tensions and conflicts. The existentialists seek to provide an environment proper to self-development and self-consciousness. This environment in the school requires contribution from humanities, arts and literature. These will help in the development of individuality in the educand so that he may cease to become a cog in the social wheel.

In spite of the above mentioned contributions of existentialism its disadvantages are obvious since, as a philosophy it has never provided a balanced thought. Some of the existentialist theories, in spite of all their genius, verge upon pathological symptoms. Such is the philosophy of Kierkegaard, the father of modern existentialism. If truth is not objective, it is not merely subjective. Existentialist revolt against intellectualism has its merits but also its serious limitations. Existential methods may be useful in moral and religious education but it cannot work in the education of science and technology. Therefore, the following limitations of Existential philosophy of education may be noted :

1. Existential aim of education is as much one-sided as that of any other 'ism'.
2. Exclusive emphasis on humanities, art and literature is as much one-sided as emphasis upon science.
3. In their enthusiasm for self-realization, the existentialists forget that a very important aim of education is earning a living.
4. The existentialist method of teaching may be useful in moral and religious education but it will not work in the teaching of science and technology.
5. It is far from being satisfactory as a complete philosophy of education.

2.1.6 : SUMMING UP

Existentialism is a modern theory of man that asserts that this intellectual world knows little about man, who can be understood not in terms of metaphysics but in terms of his 'existence'. In existentialism, therefore interest is directed on the man his genuine or authentic self, his choices made with full responsibility of consequences and freedom. It describes and diagnoses human weakness, limitations and conflicts. They want the 'transcendence' of man, which means that he should become more and more authentic. Since existentialism is optimistic, it preaches the doctrine of action and emphasizes the concept of freedom, responsibility and choice, it has exerted an increasing appeal to the educator, who has been shown the new horizons.

2.1.7 : SUGGESTED READINGS

1. Khanna, S. D.; Saxena, V. R.; Lamba, T.P.; and Murthy, V. (2003): Doaba M.Ed. Guide, Doaba Publications; Nai Sarak, New Delhi, pp. 26-40.
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2.1.8 : ASSIGNMENTS

1. Mention the characteristics of the Existentialism.
2. Relate Existentialism and Curriculum.
3. Show Weaknesses and Limitations of Existentialism in Education.

Unit-2

Essentialism

CONTENT STRUCTURE

2.2.1 : Introduction

2.2.2 : Objectives

2.2.3 : Meaning and Concept of Essentialism.

2.2.4 : Basic Characteristics of Essentialism.

2.2.5 : Educational Implication with reference to Aims, Contents and Methods of Teaching.

2.2.6 : Summing up

2.2.7 : Suggested Readings

2.2.8 : Assignments

2.2.1 : INTRODUCTION

In this unit will help you to acquainted with Essentialism school of western philosophy on various aspects of Education. Because of changing nature of knowledge and human urge for continuous search for truth, especially from the context of educational discourse, some other philosophical constructions did eventually appear in the West, each seemingly more close to Education and contributed to re-shaping educational encounters.

2.2.2 : OBJECTIVES

After going through this Unit, you will be able to :

- List out the exponents of Essentialism,
- List the characteristics of Essentialism
- Distinguish between Essentialism
- Analyze the curriculum of Essentialism
- Discuss methods of teaching of Essentialism
- Critically describe the contributions of Essentialism
- Indicate the weaknesses of Essentialism

2.2.3 : MEANING AND CONCEPT OF ESSENTIALISM

A particular 'ism' has always develop under a circumstance, when its need was felt, so many 'isms' have so far originated in course of the time; "Essentialism" is one among them. In 1930, the Americans needed the essence of Essentialism. To gain more and more knowledge, is the chief target of Essentialism. It has great contribution toward, educational thoughts and practice. The chief exponents of Essentialism are Fredrick Breed, Isaac L. Kandel and William C. Bagley. To make the meaning of essentialism clear, we have considered the chief characteristics and its fundamental principles of education. Essentialists believe that there are some points of educational compass which are more or less fixed.

2.2.4 : BASIC CHARACTERISTICS OF ESSENTIALISM

1. In the first place, essentialist give much emphasis on the knowledge of educational psychology without which education cannot progress. So the first work is to know the nature of the child, who is the most important factor of the educational process.

2. The essentialists consider the well framed and useful curriculum, rather than the more number of subject matters, they feel that the child is not benefited by the general study of some subjects, so they blamed the stereotyped syllabus, so that the coming generations also will be acquired with the cultural wealth of the individual and society.

3. Essentialism does not describe the ultimate nature of education, because they believe in all philosophies and accept different views from various philosophies, which contradict with each other. It collects the essential nature of each philosophy and accepts that. It is a philosophical synthesis.

William C. Bagley an exponent of essentialism in education has opined,

1. Effort against Interest — Progressives have given the primary emphasis to interest while, the Essentialists would recognize clearly enough the motivating force of interest, but would maintain that many interests and practically all the higher and more nearly permanent interests grow out of efforts to learn that are not at the outset interesting or appealing in themselves.

2. Teacher against Learner Initiative — Progressive theory tends to regard teacher-initiative as at best a necessary evil while the Essentialist holds that adult responsibility for the guidance and direction of the immature is inherent in human nature — that it is, indeed, the real meaning of the prolonged period of necessary dependence upon the part of the human offspring for adult care and support.." The Essentialists would have the teachers responsible for a systematic program of studies and activities to develop the recognized essentials.

3. Race against Individual Experience — During the plastic period of necessary dependence the cultures of primitive people are relatively simple and can be transmitted by imitation or by coming-of-age ceremonies. More highly organized systems of education, however, become necessary with the development of more complicated cultures according to Essentialists.

4. Subjects against Activities — The Essentialists have always emphasized the prime significance of race-experience and especially of organized experience or culture — in common parlance, subject matter and recognized, of course, the importance of individual or personal experience as an indispensable basis for interpreting organized race-experience, but the former is a means to an end rather than an educational end in itself. The Progressives, on the other hand, have tended to set the “living present” against what they often call the “dead past”.

5. Logical against Psychological Organization — The Essentialists recognize, too, that the organization of experience in the form of subjects involves the use of large-scale concepts and meanings, and that a certain proportion of the members of each generation are unable to master these abstract concepts. For immature learners and for those who never grow up mentally, a relatively simple educational program limited in the earliest years of childhood to the most simple and concrete problems must suffice.

2.2.5 : Educational Implication with reference to Aims, Contents and Methods of Teaching

Fundamental Principles of Education :

The difficult procedure of learning : Essentialists state that the interest of the child should be taken into consideration. The child must be interested towards the easiest works. But this type of interest should be discarded. The child can only acquire knowledge by doing the difficult task first, which will create a sense of self-discipline among the children, which again, in turn will help them in controlling their thoughts and unique actions. The first principle of teaching is nothing can be taught, the teacher is not an instructor or a taskmaster in a guide and helper as Aurobindo, asserted.

Teacher as the center of educative activities : Essentialists consider the role of teacher as of great importance, so far as the access of the educational process is concerned. They desire the teacher to be ideal and good in character. The whole process of learning depends upon the activity and teaching procedure of the teacher. He has to make the little child acquainted with the situations and the problems of latter life. The teacher should be a man of experience because he has to guide the child, every moment. He is the real friend, philosopher and guide of the child. In this connection, W.W. Bruceman has said “Essentialism places teacher at the centre of the educational universe. This

teacher must have a liberal education, a deep understanding of the child's psychology and of the learning process and ability to impart facts and ideas to the younger generation, an application of the historical and philosophical foundations of education and a serious direction to his work."

School as a miniature community : They regard school as a miniature form of community as the schools reflect the ideals of community. The school makes the students acquainted with the community or the outer society. After coming into the school, the child is very much interested towards the outside events.

Systematized knowledge : They opine that the instruction should not be imparted to the child in a zigzag manner, because, as a result of which the child may develop an attitude of misinterpretation of facts. So in a logical and systematized process, the instruction should be imparted so that the child has a clear idea about the concerned facts.

Retention of traditional methods of discipline : The essentialists are of the opinion that the traditional method of discipline be whether the 'Problem solving Method' or 'learning by doing' alone is required for the men as activity and experience alone cannot solve the problem that arise in the life alone. So they do not fix any particular method, but do not suggested the traditional methods, accepting the essential characteristics of the modern method, so that the child is able to face the problematic situation in life and adjust himself in all fields.

Essentialism and the Curriculum :

Regarding the curriculum of the essentials Bagley has observed, "There can be little question as to the essentials. It is no accident that the arts of recording, computing, measuring have been among the concern of organized education. Every civilization has been founded upon these arts, and when they have lost the civilizations has collapsed. Now it is accidental that knowledge of the world, that lies beyond one's immediate experience, has been among the recognized essentials of the universal education and that at least a sparing acquaintance with man's past and especially with the story of one's country which earlier provided for the programme of the universal school. Investigation, invention and creative arts have added to our heritage. Health instruction is a basic phase of work in the tower schools. The elements of natural science have their due place. Neither the fine arts, nor the industrial arts should be neglected."

Criticism of Essentialism :

- Essentialism fixed the functions of the teacher, but besides guiding the students, the teacher has other role for the students, there the essentialists have neglected, other aspects.

- They opined that the difficult task should be given to the child first. The child's interest is neglected.

2.2.6 : SUMMING UP

The term essentialist first appeared in the book *An Introduction to the Philosophy of Education* which was written by Michael John Demiashkevich. In his book, Demiashkevich labels some specific educators (including William C. Bagley) as “essentialists.” Demiashkevich compared the essentialists to the different viewpoints of the Progressive Education Association. He described how the Progressives preached a “hedonistic doctrine of change” whereas the essentialists stressed the moral responsibility of man for his actions and looked toward permanent principles of behavior (Demiashkevich likened the arguments to those between the Socratics and the Sophists in Greek philosophy). In 1938 Bagley and other educators met together where Bagley gave a speech detailing the main points of the essentialism movement and attacking the public education in the United States. One point that Bagley noted was that students in the U.S. were not getting an education on the same levels as students in Europe who were the same age.

A recent branch has emerged within the essentialist school of thought called “neoessentialism.” Emerging in the eighties as a response to the essentialist ideals of the thirties as well as to the criticism of the fifties and the advocates for education in the seventies, neoessentialism was created to try to appease the problems facing the United States at the time. The most notable change within this school of thought is that it called for the creation of a new discipline, computer science.

Essentialists believe that there is a common core of knowledge that needs to be transmitted to students in a systematic, disciplined way. The emphasis in this conservative perspective is on intellectual and moral standards that schools should teach. The core of the curriculum is essential knowledge and skills and academic rigor. Although this educational philosophy is similar in some ways to Perennialism, Essentialists accept the idea that this core curriculum may change. Schooling should be practical, preparing students to become valuable members of society. It should focus on facts—the objective reality out there—and “the basics,” training students to read, write, speak, and compute clearly and logically. Schools should not try to set or influence policies. Students should be taught hard work, respect for authority, and discipline. Teachers are to help students keep their non-productive instincts in check, such as aggression or mindlessness.

2.2.7 : SUGGESTED READINGS

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2. Sharma, R. N. (2004) : Philosophy and Sociology of Education, Surajit Publications; Kamala Nagar, New Delhi, pp. 135-141, 142-149, 154-156.
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2.2.8 : ASSIGNMENTS

1. List down fundamental Principles of the Essentialism.
2. Relate Essentialism and Curriculum.
3. What is the educational implication of Essentialism ?

Unit-3

Humanism

CONTENT STRUCTURE

2.3.1 : Introduction

2.3.2 : Objectives

2.3.3 : Meaning and Concept of Humanism

2.3.4 : Basic Principles of Humanism

2.3.5 : Educational Implication with reference to Aims, Contents and Methods of Teaching

2.3.6 : Summing up

2.3.7 : Suggested Readings

2.3.8 : Assignments

2.3.1 : INTRODUCTION

In this unit will help you to acquainted with Humanism school of western philosophy on various aspects of Education. Because of changing nature of knowledge and human urge for continuous search for truth, especially from the context of educational discourse, some other philosophical constructions did eventually appear in the West, each seemingly more close to Education and contributed to re-shaping educational encounters.

2.3.2 : OBJECTIVES

After going through this Unit, you will be able to :

- List out the exponents of Humanism
- List the characteristics of Humanism
- Distinguish between Humanism
- Analyze the curriculum of Humanism
- Discuss methods of teaching of Humanism
- Critically describe the contributions of Humanism
- Indicate the weaknesses of Humanism

2.3.3 : MEANING AND CONCEPT OF HUMANISM

Humanism, a system of philosophical beliefs, that recognize man as the only worthy object of knowledge, has been the synthesis of ideas formulated by various great master thinkers like Socrates, Plato, Aristotle, Darwin, Maslow, etc. in the West and Buddha, Arabindo, Gandhiji, Tagore, etc. in the East.

The concept of humanism is derived not from the experimental sciences, nor from the mathematical statistics, but from the great minds and works in oriental as well as western history and literature. Humanism is a movement to gain for man in a proper recognition in the universe. The English word humanism has been derived from the Latin term “Homo” which means human being. Thus literally meaning of the word “Humanism” is the philosophy in which man occupies a central place. Etymological meaning, however, is not the sufficient meaning of a term; it includes its historical usage as well. Thus in order to understand the full implication of the term “Humanism” one must take into account of historical evolution. In the historical evolution whatever has been, found to be useful for human welfare, has been attached with the concept of humanism such as the idea of social welfare, scientific attitude, progress of democratic institutions. Humanism is a very old philosophy. It has been interpreted in various ways, such as - a reasonable balance in life, vivid interest in all sides of life, freedom from religiosity, responsiveness to all human passions, a philosophy which holds that man is the centre and measure of all activities. In terms of the humanist thought, man is an end and not a means.

The assumptions of humanism have distinctive connection with the conception of knowledge, truth and human values. Humanism believes that man’s intelligence and conscience separate him from other animals and it is education in which such separation can be judged and maintained. This discussion concentrates mainly on rational humanism.

2.3.4 : BASIC PRINCIPLES OF HUMANISM

Today the term “Humanism” is used to convey a philosophical belief, which believes in rendering service for the greater good of all humanity according to the demands of reason and democracy. Below, we mention the principal postulates of Humanism :

1. Humanism does not believe in supernaturalism. It regards nature as a system of constantly changing events.

2. Humanism believes in science and thinks that man, being a product of nature is a part of it.
3. Humanism considers that human thinking is a result of the interaction between the complex living organism and the environment.
4. Humanism thinks that man is competent to solve all his problems on the basis of his own reason and scientific method.
5. Humanism believes that man is the maker and master of his own destiny.
6. Humanism believes that man's happiness lies in this world. For the achievement of this happiness he should be free in this world to progress culturally, economically and ethically.

Humanism as a philosophy - is social in origin and development. Education must preserve civilization through a concern for absolute values, and for the intellectual basis on which civilization stands. Humanists suggest that this respect must be inculcated in the young through three main directions. These are —

- (1) Respect for language,
- (2) Respect for ancient cultures, and
- (3) Respect for intellectuals and for literary scholarship.

(1) Respect for Language

The language used and taught at home and school should not be a fluctuating one. Correct form of language, which is found in ancient languages like Greek, Latin, Sanskrit and others should be taught to the student. Education must stress the use of correct and appropriate vocabulary and sentence structure through grammar and composition.

(2) Respect for Ancient Cultures

Education should foster on admiration and understanding of ancient cultures, which have contributed to the growth of human civilization. It is in these cultures that man finds the origin of his humanistic background, and hence it is essential for him to re-discover it for himself.

(3) Respect for Intellectual and for Literary Scholarships

The younger generation must learn to respect the wisdom of the scholars as it relates to the more important field of human values. Intellectual through their vast knowledge and intellectual ability are in favorable position to set goals for the society. These intellectual leaders and scholars

must judge music, literature, religion and education. Society must learn to respect the wisdom of these scholars and it must realize that literary scholarship is on a higher intellectual.

2.3.5 : EDUCATIONAL IMPLICATION WITH REFERENCE TO AIMS, CONTENTS AND METHODS OF TEACHING

Aims and Ideal :

According to humanism education aims at man making. It attempts to be secular, rational and scientific. It aim at the realizing human values in the individual and society. According to it the education aims at complete development of human personality. It directs man to solve individual and social problems. Its purpose is to increase efficiency and happiness of human beings. It supports democratic philosophy of education since the values of liberty, equality and fraternity are fundamental human values. Thus, the educational institutions should be based upon democratic principles. It seeks to realize peace upon the earth. The humanist tendency is rationalist and integral. It is positivist since it supports meliorism. Science alone can provide more leisure for cultural development. The individual and society are intimately related. Therefore, the children should develop team spirit and co-operation through play way method. Community programmes should make community living easy and spontaneous. The society should be made conducive to all-round human progress.

Integration of other Tendencies

The humanist trend integrates psychological, sociological and eclectic tendencies in education. It makes human nature the basis of education. It emphasizes the value of individual differences in education. It makes education child-centered. While on the one hand the aim of education is the propagation of knowledge, social control, social development and preservation of social heritage, it also seeks to integrate all these. Thus, it is an integral approach to education. Its aim of education is integral. This aim of education is based upon integral psychology. Man according to the humanists, is a self having body as well as intellect. All these should be integrated.

Curriculum :

The humanist believes that in all educational endeavours the accent will be also social rather than only individualistic. This will imply more emphasis on the study of social studies, such as; sociology, politics and economic Ethics will be included in the curriculum in order to help the youth to imbibe broad humanist attitudes, which will imply loyalty to the social group and to mankind. The

teaching of Science and Scientific method is also greatly emphasized. The curriculum is both liberal and extensive.

Methods of Teaching :

The humanist method of teaching is based on educational psychology. The teacher educates according to the principles of child psychology, developmental psychology and educational psychology. Besides, the theoretical instruction methods for development of social virtues are emphasized.

Education is provided through the vernacular, since it encourages originality and creativity. National and international languages are also taught at higher stages since the humanist seeks to encourage human communications on national and international stage.

Essentials of Humanism :

The above discussion makes it clear that humanism is obviously against all types of super-naturalism or super-humanism. It cannot consider any man to be essentially greater than other human beings. In it the term human welfare means the welfare of ordinary human beings. It does not aim at superman but only at man. Its control standpoint is faith in the dignity of man. Since man is the creature of this earth, humanism is this - worldly and against all types of other - worldly theories. The humanist ethics is not governed by any religious faith other than faith in human dignity. So far as human welfare has been advanced by science, the humanist respects science but if science becomes an impediment in his progress he would not hesitate in criticizing it and fixing its limitations. The western humanists have been lagging behind in this particular function through today many Western thinkers have started pointing out to the evils and dangers of a cult of science. Since each human being is important for the humanist, humanism is against all distinctions among human beings on the basis of country, nation, race, class, caste, sex, religion, economic status, scholarship and abilities. As a humanism supports the idea of world citizenship. But as has been already pointed out, the concept of humanism does not negate other human loyalties but fulfils them because unity in diversity is the basis of the richness of the human culture.

Conclusion :

The above educational implications of humanism reveal that it is the best blue print for the planning of future education. It is the solid basis for development of values and culture. It is an integral approach to aims and ideals, means, curriculum and organization of education. In fact, humanism may be called the future philosophy of education acceptable and required everywhere.

2.3.6 : SUMMING UP

In nursing education, the philosophy of humanism has been the subject of much discourse. Many experts in the field see humanism as part of the natural change of nursing philosophy, which is able to better suit a multicultural population with varying needs.

While the humanistic philosophy seems to be a perfect fit for nursing education and caring centered care, it does have some critics with relevant concerns. Also, the educational model allows students to conduct the pace of their learning without objectives, which can result in the student lacking direction (Scanlon, 2006). Educators can consider implementing aspects of the humanistic philosophy into their curriculums because the collaborative relationship between student and teacher will help students mature to be confident and better able to collaborate with a multidisciplinary team (Bevis, 1993). Educators should consider utilizing this philosophy when dealing with graduate level students as well as mature adult learners where responsibility for learning and evaluation of outcomes lie within the person. We can expect to see this philosophy utilized frequently due to the “curriculum revolution” in nursing education as well as an increased emphasis on caring and empathy.

2.3.7 : SUGGESTED READINGS

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2.3.8 : ASSIGNMENTS

1. Describe the principles of the Humanism.
2. Relate Humanism and Curriculum.
3. Educational implication of Humanism.

Unit-4

Progressivism

CONTENT STRUCTURE

2.4.1 : Introduction

2.4.2 : Objectives

2.4.3 : Meaning and Concept of Progressivism

2.4.4 : Basic Principles of Progressivism

2.4.5 : Educational Implication with reference to Aims, Contents and Methods of Teaching

2.4.6 : Summing up

2.4.7 : Suggested Readings

2.4.8 : Assignments

2.4.1 : INTRODUCTION

In this unit will help you to acquainted with Progressivism school of western philosophy on various aspects of Education. Because of changing nature of knowledge and human urge for continuous search for truth, especially from the context of educational discourse, some other philosophical constructions did eventually appear in the West, each seemingly more close to Education and contributed to re-shaping educational encounters.

2.4.2 : OBJECTIVES

After going through this Unit, you will be able to :

- List out the exponents of Progressivism
- List the characteristics of Progressivism
- Distinguish between Progressivism
- Analyze the curriculum of Progressivism
- Discuss methods of teaching of Progressivism
- Critically describe the contributions of Progressivism
- Indicate the weaknesses of Progressivism

2.4.3 : MEANING AND CONCEPT OF PROGRESSIVISM

The single most influential Philosophy of education in America for well over a quarter of a century has been called progressivism. Progressivism is the educational expression of the “liberal road of culture”. It is grounded philosophically in Pragmatism, Instrumentalism, Experimentalism and developed primarily by three emancipating thinkers: Pierce, James and Dewey. Progressivism is a philosophy of transition between two great cultural configurations. It is a major rational blend of culture, i.e.

- (a) Shifting rapidly away from those ways of living, western culture has achieved in the past.
- (b) Shifting rapidly a new way of living that is still to be achieved in future.

Progressivism in education developed as a protest movement against essentialism and its domination of American Education. This protest started against the conservative nature of education. At the time of World War-II, progressivism had a powerful effect on each and every aspect of things in the society.

Historical background of Progressivism

Time is the more important factor, which can develop a new philosophical thought. After the First World War, the economic conditions of U.S.A. became worst. So at this bad time, the people had no liking towards education. To bring the situation in normal and to adjust the finance of the nation the “Progressive Education Association” was established in 1918. It made a plan to bring the educational system of the time before the First World War to that time. So it wanted “to exert the full force of the millions of members of the teaching professions and the millions of parents and citizens interested in the preservation of the idea increasingly articulate in improving schools and colleges”. As a result of events of the First World War the progressives made a new type of education to make the educational system new and interesting. In this connection Harold Rugg says, “the continuation of depressions - conditions, the spread of totalitarian thought, and the re-appearance of World War caused the progressives to turn to the possibilities of designing an education that would lead to the creation of a new society nearer to man’s dream and desires.”

Exponents of Progressivism

John Dewey was the chief exponent of progressivism. He was the first man who attempt with his best effort to make education “Progressive” after the dangerous event of 1st World War. Later on William Kilpatrick was influenced most by his ideas and ideals of education. He has helped greatly in “formulating its philosophy and developing its practices”. He has been successful in popularizing the movement both in classroom teachers and educational leaders. However, C. F.

Parker, G. Stanley Hall, J. Childs, B. Bode, G. Hullfish, etc. were other members of progressive movement in North America.

Progressive Education

Progressive education may be regarded as a direct outcome of the Pragmatism in Education. It has come as a protest against the formation of the day in the educational field. Some hold that the Progressive Education Movement is more of a philosophizing about education than a philosophy of education. The progressive education may be regarded both as a protest against standardization in education, regimentation of mind, mass methods of instruction and “determinism and mechanism of educational science.”

However, we can say that Progressive education was eclectic in its origin, in some of its aspects incurably romantic and even sentimental about childhood, and self-contradictory on numerous theoretical points. The thing is that progressives had in common, which has sufficient to hold them together for four decades, was a profound distaste for the traditional school and for many aspects of the society that supported that school.

2.4.4 : BASIC PRINCIPLES OF PROGRESSIVISM

“The Progressive Education Association” in Washington D.C. embraced the following Principles of Progressive Education :

- (a) Recognition of the child as a complete, dynamic and living organism.
- (b) Freedom to the child to development naturally.
- (c) Interest as the motive of work.
- (d) Scientific study of pupil development.
- (e) Greater attention to those affects child’s physical and personality development.
- (f) Teacher as a guide and not a taskmaster.
- (g) Close co-operation between the home and the school to meet the needs of children’s life.
- (h) Emphasis on learning by doing, — hands on projects, experiential learning.
- (i) Emphasis on integrated life-centric curriculum.
- (j) Education for social responsibility and democracy.
- (k) De-emphasis on textbook.
- (l) Emphasis on collaborative learning projects.
- (m) Assessment by evaluation of child’s projects and productions.

2.4.5 : EDUCATIONAL IMPLICATION WITH REFERENCE TO AIMS, CONTENTS AND METHODS OF TEACHING

Educational believes of Progressivism :

The term “Progressivism” will now be used more strictly to denote a cluster of harmonious and systematic believes about education, which rests upon another cluster of harmonious and systematic believes about philosophy denoted by such terms - Pragmatism, Instrumentalism and Experimentalism.

Progressivism as education and Pragmatism as Philosophy have been interwoven to an extraordinary extent through the work of Dewey.

Progressivism influenced each and every aspects of educational system. The fact can be very much clear if we examine the progressivism and its impact on the various aspects of educational system such as aims of education, curriculum, methods of teaching, teacher, school etc.

Aims of Education and Progressivism :

According to this philosophy, the main aim of education is “the development of significant human personalities as an end through the means of social democracy”. It emphasizes the importance of human personality.

Another aim of progressive education is co-operative social participation. The movement believes that these two aims are mutually exclusive, because respecting human personality will necessarily demand the organization of a co-operative social participation. So, Dewey laid more emphasis on both the individual and society.

Progressive educators’ stand for a personalistic philosophy of education is to work for an all-round development of the child. The advocates of progressive education stand for the education of the whole man, or “Whole personality” which includes all the physical, emotional, social and intellectual aspects of the individual. Thus the aim of education leaves nothing pertains to the sound development of personality in any way.

Progressivism and Curriculum :

The exponent of progressivism criticized vehemently the traditional system of education. The progressives are against bookish curriculum, which is fixed in advance. They are also against the arrangement of subject matters into watertight compartments. The progressive curriculum consists of experiences and not only teacher’s lectures on prescribed subjects. The progressives want a curriculum, which has experiences of actual living. The curriculum will “over all the aspects of daily

living-practical, social, moral, vocational, aesthetic and intellectual. Its purpose is to integrate the experiences of the child in such a way as to turn him into a significant personality, which has developed such modes of behaviour, which are individually satisfying and socially desirable. According to John Dewey, "Education must be conceived as a continuing reconstruction of experiences, that the process and the goal of education are one and something."

Progressivism mentions the subject matter like history, mathematics, general science, literature and English, etc. to be included in the curriculum. In assessing the accomplishments of progressivism H. Rugg finds five major types of effort to rebuild the curriculum.

These are —

- (a) Re-organization within a particular subject judging items about with little actual re-designing.
- (b) Co-relation of two or more bodies of subject matter.
- (c) Grouping together and integrating related subject-matters within the broad fields of knowledge.
- (d) "Core-curriculum" — a loosely used term to of learning experiences among common needs.
- (e) Experience centered curriculum dissolving subject matter lives and emphasizing units.

Progressivism and Methods of Teaching :

The progressive education believes in-group activities to which each member of the group extends his share. But these activities are to be so organized that by participation in them each member grows personally and socially. Dewey says that "the question of methods is ultimately reducible to the question of the order development of the child, the active side always precedes the passive. So progressivism gives more importance on the project method, which involves the active participation of the child in teaching learning. The child learns what he sees and does by his own efforts. This method is quite experimental and social one. Conference, consultation, planning and participation are emphasized as the techniques or the teaching procedures of this socialized method, which stimulate maximum learning.

The main principle underlying the progressive method is that active participation in various life activities can develop significant integrated personality. The progressive education regards learning as "one whole experience a single thing that branches and grows." Hence the "wholeness of method" is the basis of progressive learning.

So, according to the interest of the child, the teachers should provide opportunities for his fullest development.

Progressivism and the Teacher :

The promoters of progressive education have great faith in the teacher, as the most important agency of education. They believe that the teachers themselves must be significant personalities.

Progressive teacher is more than a guide and a fellow explorer in the education adventure than a taskmaster and iron-handed-rulers. Progressivist accepts naturalistic views on the teacher that the teacher shows the path of progress but the child has to accept his course of action.

Progressivism demands that the teacher must know his pupils fully well in order to guide their self-directed learning experiences. The teacher should try to create situations through which the pupils may learn to gain control of themselves and of the problems that confront them. Teacher should not interfere with the activities of the child rather he should advice him to progress him in the right track. He must encourage maximum give and take in and out of the classroom and willing to accept criticism of himself. He must with the co-operation of his pupils as well as his colleagues constantly to modify his plan of study. He, in short, should acquire the ethics of professionals' behaviour as a part of his nature, and should be skilled in democratic procedures.

2.4.6 : SUMMING UP

As an educational philosophy progressivism failed to keep its influence on education forever. Because progressivism in its extreme form is a "Utopian" concept. As a matter of fact, it is not a philosophy of education. The critics of progressive education say that the pupils of progressive classroom lack in discipline. However, in short, we can say that the progressivism is an approach and it pervades in all modern tendencies of education.

Progressivists believe that education should focus on the whole child, rather than on the content or the teacher. This educational philosophy stresses that students should test ideas by active experimentation. Learning is rooted in the questions of learners that arise through experiencing the world. It is active, not passive. The learner is a problem solver and thinker who makes meaning through his or her individual experience in the physical and cultural context. Effective teachers provide experiences so that students can learn by doing. Curriculum content is derived from student interests and questions. The scientific method is used by progressivist educators so that students can study matter and events systematically and first hand. The emphasis is on process-how one comes to know. The Progressive education philosophy was established in America from the mid 1920s through the mid 1950s. John Dewey was its foremost proponent. One of his tenets was that the school should improve the way of life of our citizens through experiencing freedom and democracy in schools. Shared decision making, planning of teachers with students, student-selected topics are all aspects. Books are tools, rather than authority.

2.4.7 : SUGGESTED READINGS

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2.4.8 : ASSIGNMENTS

1. Explain characteristics of the Progressivism.
2. Relate Progressivism and Curriculum.
3. Educational implication of Progressivism

Unit-5

Marxism

CONTENT STRUCTURE

2.5.1 : Introduction

2.5.2 : Objectives

2.5.3 : Meaning and Concept of Marxism

2.5.4 : Values of Marxism

2.5.5 : Educational Implication with reference to Aims, Contents and Methods of Teaching

2.5.6 : Summing up

2.5.7 : Suggested Readings

2.5.8 : Assignments

2.5.1 : INTRODUCTION

In this unit will help you to acquainted with Marxism school of western philosophy on various aspects of Education. Because of changing nature of knowledge and human urge for continuous search for truth, especially from the context of educational discourse, some other philosophical constructions did eventually appear in the West, each seemingly more close to Education and contributed to re-shaping educational encounters.

2.5.2 : OBJECTIVES

After going through this Unit, you will be able to :

- List out the exponents of Marxism
- List the characteristics of Marxism
- Distinguish between Marxism
- Analyze the curriculum of Marxism
- Discuss methods of teaching of Marxism
- Critically describe the contributions of Marxism
- Indicate the weaknesses of Marxism

2.5.3 : MEANING AND CONCEPT OF MARXISM

Marxist ideas about man and matter are generally known as Marxism. Marxism constitutes the general views about the world and the human society. Marxism grew as a protest against the idealist conception of man and the world as represented by Hegel (1770-1831). Hegel represented Dialectical Idealism. Marx was influenced by Hegelian dialectics, Dialectical Idealism is a fundamental and total philosophy of life. Marxism is on the one hand a social and political theory and on the other it is a scientific plan for complete social change and revolution. In recent years Marxism has brought tremendous changes in human thought and action throughout the globe. All other philosophies are not being complete without Marxist philosophy.

Hegel is an idealist philosopher. According to Hegelian concept all realities are nothing but manifestations of one single, unchangeable and absolute reality. It is a spiritual concept of reality. But Marxism is altogether different. Marx attaches importance to matter and not idea or spirit. Marx aimed at to end in spirituality. Hegel started from spirituality and ended in matter. Marx interpreted human history from reality to spirituality. Hegel started quite opposite to that idea. Hegel interpreted history from spirituality to reality. According to Marx, "History is the product of material existence". The Marxian conception of history is called Historical Materialism. Both Hegel and Marx applied dialectical concept of development. In their interpretations of history they stand in two opposite poles. Both of them recognize the existence of contradictions (thesis and antithesis) in the fields of 'matter' and 'spirit'.

2.5.4 : VALUES OF MARXISM

A Marxist is dedicated to the welfare of the state and the people. He is guided by certain values, which may be briefly stated :

- (a) To develop a respect for public for public property;
- (b) To develop a respect for authority;
- (c) Patriotism is an important Marxist value;
- (d) To develop a respect for parents, elderly people and all classes of laborers;
- (e) Common good occupies a position in Marxism;
- (f) In Marxist state there is no existence of private property;
- (g) Discipline in public life is another important value in Marxist philosophy;
- (h) Marxism attaches highest importance to the value of labour.

2.5.5 : EDUCATIONAL IMPLICATION WITH REFERENCE TO AIMS, CONTENTS AND METHODS OF TEACHING

Aims of education in Marxism :

Marxist education lays stress on introduction of ideas and practices. In Marxist state education aims at creating Marxist attitude and values. The state is to be strengthening through the creation of a class-less society. The proletariat will no doubt, dominant in the Marxist state. But education will not be limited to a handful of people. Marxism lays stress on providing education to all sections of the society, i.e., universal education. Equalization of educational opportunity is the Marxist educational goal. Social advancement is to be ensured through education. Education is considered as the greatest instrument of social change. Only intellectual education cannot achieve this goal. Hence in Marxist education emphasis is laid on vocational and technological education. All educants must know clearly the true character of social development. History and economics should be taught in proper perspective. The students must learn the fundamental principles of science. In Marxist education labour and work' are considered as integral parts. A workman cannot work properly unless he possesses a sound health. Hence physical education is considered as an important aim in Marxist education. Marxist education also aims at cultural and aesthetic development. Marxist education further aims at indoctrination in communist and socialist values. Marxist education aims at creating creative, productive and faithful citizenship. According to Lenin, education is an integral part of culture and education both are shaped by socio-economic conditions. But labour is basis and source of all cultural advancement. That is why Marxist education labour occupies an important place. In Marxist educational philosophy child is given the central position. Development of the child's mind is the ultimate aim. Education of the child depends to a great extent on the education of the mother. So Marxist education aims at women education. Communist Manifesto declares free, universal elementary education for all.

Educational objectives in Marxism :

1. No discrimination will be made in respect of educational opportunities. Education is to be given to all sections of the society irrespective of caste, creed, and sex, social and economic status.
2. Common education is to provide to be both men and women. Co-education is an accepted principle in Marxism.
3. Education will be universal and compulsory.
4. No discrimination is to be made among schools. Establishment of common school system is the cherished goal of Marxism.

5. Marxism advocates secular education in schools.
6. In Marxist system of education there will be only one agency-the state. Private agency is blamed in Marxist educational administration.

Curriculum in Marxism :

Marxist curriculum is based on Marxist educational aims, objectives and values set forth earlier.

The following are the special features of Marxist Curriculum :

1. Marxist philosophy and doctrines will be taught at all levels of education on compulsory basis. The students should be made conscious about class division, unequal distribution of wealth, exploitation of the working class by the capitalist class etc.
2. Those subjects are included in the curriculums, which tend to develop skill instead of abstract knowledge.
3. Marxism lays stress on respect for labour and as such work- experience is regarded as an integral part of education.
4. The curriculum includes the socially useful subjects such as science, mathematics, geography, life science, geology, astronomy etc. The history of communist movement and political economy should also be included in the curriculum.
5. At the primary level only mother tongue should be taught. But at the secondary level the curriculum should include foreign language.
6. Creative work co-curricular activities have been given an important place in Marxist Curriculum. These include physical exercise, music, painting, games and sports etc.

Methodology of Teaching in Marxism :

1. Emphasis is laid on practical aspect of education instead of theoretical aspect.
2. Marxist education is based on the principle of learning by doing. Students should work both in the agricultural farms and factories.
3. Education should not be confined within the four walls of the school. The natural environment and the community at large will also serve as great books and teacher.
4. Marxist education emphasizes learning through personal experience of the child.
5. It emphasizes group activity instead of individual activity. Marxist education intends to promote co-operative spirit, instead of competitive spirit among students.

Role of Teacher in Marxist Education :

The role of the teacher is significant and crucial in Marxist education. He must be fully equipped not only with the content of education but also the Marxist methodology of teaching as well as Marxist aims of education.

A Marxist teacher must entirely be different in attitude and temperament from a bourgeois teacher. His philosophy of teaching will be the Marxist philosophy. He must be an active member of the Marxist social order.

According to Lenin, a best Marxist worker can only be a best Marxist teacher. Both in thought and action he must be a true Marxist. He should not have only mastery on the content of education but also have consciousness about life, social environment and communist ideology. He should possess sound health, respect for cultural heritage, deep practical sense, socialistic bent of mind and true patriotism.

Merits and demerits of Marxist education :

Some countries of the world have accepted the Marxist educational system. But it has both merits and demerits.

Merits

- In Marxist system of education all people irrespective of caste, creed, sex, Social and economic status have been provide with equal educational privileges.
- Education at all levels (from elementary to higher) is free.
- Gates of Nursery and Adult education are open to all.
- The first ten years of educations is compulsory.
- Marxist education makes no distinction between men and women. All are equally treated.
- Marxist education is productive and vocationally biased.
- It is based on work experience and social justice.
- Marxist education intends to develop a strong sense of dignity of labour, respect for labour and elderly people and a spirit to protect public property.
- It is based on the principles of co-operation and activity.
- It intends to develop creativity and aesthetic sense in children.
- It is a system of education, which is absolutely controlled by the state.
- Marxist education is primarily socialistic but it helps to develop individually also.

In spite of all these advantages Marxist education is not entirely free from disadvantages and limitations.

Demerits

- Marxist education is absolutely state controlled education. It attaches too much importance to the role of the state in education. Consequently curriculum construction, determination of the methodology of teaching, examination system all is determined by the state. It does not allow any other agency in education. Regional or local need is totally neglected.
- Freedom in education is absolutely neglected or otherwise explained in Marxist system of education.
- The role of the teacher in Marxist education is insignificant. He enjoys academic freedom only from the Marxist's standpoint.
- Competition is conspicuously absent in Marxist education. As a result an individual does not take initiative.
- Marxist education from the very beginning gives too much importance to science, technology, mathematics, commercial and industrial arts. Marxist education attaches relatively less importance to the development of finer aspects of life.
- Marxist educational philosophy believes that economics lies at the root of every human activity. But this is not absolutely true from scientific of view. As economics occupies the pivotal position in the curriculum one of the principle aims of Marxist education is to acquire productive skill. As a result creative faculties of the child are neglected.
- In Marxist education democratic principles are not taken into consideration. In this respect the opinion of Bertrand Russell is remarkable. He says, 'If the Marxist dogma remains as virulent as it is at present, it must in time, become a great obstacle to intellectual progress'.
- In Marxist educational philosophy too much importance is attached to class struggle. But in the present world the acrimony between the bourgeoisie and the proletariat is not very acute. In this context Bertrand Russell opines: 'The whole Marxist philosophy is so much concerned with the class-struggle that it becomes vague and indefinite when it contemplates the class-less world that it aims at creating'.
- Bertrand Russell further remarks, 'the education in capitalist countries suffer from domination of the rich and the education in Russia suffers, conversely, from the domination of the Proletariat. Children of proletarians are taught to despise the children of the bourgeoisie'.

2.5.6 : SUMMING UP

Indeed, the continuing viability of Marxian perspectives today are bound up with the continuing expansion of capitalism in a global economy and growing importance of the economy in every domain of life. Marxism has historically presented critical perspectives on capitalism and the ways that economic imperatives shape institutions like schooling to correspond to the interests of the ruling class. Neo-Marxist theories have sought to overcome a too-narrow focus on class and economics by stressing the importance of developing theories of agency and resistance and incorporating dimensions of gender, race, sexuality, and other subject positions into an expanded notion of multicultural education, democratization, and social justice. They have also developed a wide range of proposals for the reconstructions of education and development of alternative pedagogies and educational practices. These neo-Marxian positions are fiercely contested by conservative positions, however, and the field of education remains today a contested terrain where neo-Marxian positions are part of the force of opposition.

Every knowledgeable Marxist recognizes this and is prepared to act in accordance with dialectical materialism. While many philosophies are chiefly theoretical, Marxism is concerned with theory and practice. Dialectical materialism is a worldview and a philosophy of evolution and revolution—the call to action is implicit in its makeup. Every good Marxist understands his philosophy and is prepared to act upon it, because Marx himself requires it: “The philosophers have only interpreted the world in various ways; the point, however, is to change it.”

Unfortunately from a Marxist point of view, all such change is merely transitory, because each new synthesis (including the long-anticipated communist classless society) inevitably becomes a new thesis in the never-ending process of dialectical materialism. Even the victorious dictatorship of the proletariat will be but a brief moment in evolutionary history. Communist dialectics decrees that communism itself is transitory. The synthesis of communism today will become the new thesis of tomorrow, and new struggles will evolve according to the laws of dialectical materialism.

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2.5.8 : ASSIGNMENTS

4. Explain the Values of the Marxism.
5. Relate Marxism and Curriculum.
6. Educational implication of Marxism

Block-3

National Values and Education

Unit-1

National Values enshrined in the Indian Constitution

CONTENT STRUCTURE

3.1.1 : Introduction

3.1.2 : Objectives

3.1.3 : Constitution of India

3.1.4 : National values enshrined in the Indian constitution

3.1.5 : Summing up

3.1.6 : Suggested Readings

3.1.7 : Assignments

3.1.1 : INTRODUCTION

The major objective of this Unit is to develop your familiarity with the basic values of Indian Constitution. You will be able to understand the Constitution of India and the directive principles. The meaning, nature and significance of these values which are considered as national goals or values. These will focus on the educational implications of these values.

3.1.2 : OBJECTIVES

After careful study of this Unit you will be able to :

- Define values.
- Identify the national values enshrined in the Indian Constitutions.

3.1.3 : CONSTITUTION OF INDIA

India, also known as Bharat, is a Union of States. It is a Sovereign Socialist Secular Democratic Republic with a parliamentary system of government. The Republic is governed in terms of the

Constitution of India which was adopted by the Constituent Assembly on 26th November, 1949 and came into force on 26th January, 1950. The Constitution provides for a Parliamentary form of government which is federal in structure with certain unitary features. The constitutional head of the Executive of the Union is the President. As per Article 79 of the Constitution of India, the council of the Parliament of the Union consists of the President and two Houses known as the Council of States (Rajya Sabha) and the House of the People (Lok Sabha). Article 74(1) of the Constitution provides that there shall be a Council of Ministers with the Prime Minister as its head to aid and advise the President, who shall exercise his/her functions in accordance to the advice. The real executive power is thus vested in the Council of Ministers with the Prime Minister as its head.

The Constitution of India is the supreme law of India. It frames fundamental political principles, procedures, practices, rights, powers, and duties of the government. It imparts constitutional supremacy and not parliamentary supremacy, as it is not created by the Parliament but, by a constituent assembly, and adopted by its people, with a declaration in its preamble. Parliament cannot override it.

The world's longest constitution is the Indian's constitution. At its commencement, it had 395 articles in 22 parts and 8 schedules. It consists of approximately 145,000 words, making it the second largest active constitution in the world. Currently, it has a preamble, 25 parts with 12 schedules, 5 appendices, 448 articles, and 101 amendments.

3.1.4 : NATIONAL VALUES ENSHRINED IN THE INDIAN CONSTITUTION

Value can be defined as any human activity, thought, or idea, feeling, sentiment, or emotion which could promote self-development of the individual in all its dimensions. The other complimentary function of value is that it should also contribute to the welfare of the larger social unit such as the family, the community, and the nation of which the individual is a member. Value is an enduring belief. It directs and control human behaviours. It judges human actions as per set criteria which are governed by some socio-cultural, psychological and/or philosophical contexts. It ultimately becomes individuals' ways of life, outlook or a part of personality and a matter of preference.

National values are those values which a nation adopts and practices in relation to the individual, community, society, nation, and the world. National values are based upon the cultural, social and philosophical traditions of a country. National values of a country are influenced by the changing philosophical ideologies, sociological perspectives, social conditions, and political doctrines of a nation and these aims at social, economic and political development of a nation. Without moral and

spiritual value a country will be a nation without soul. National values may change with the change of social circumstances.

In India the fundamental values are articulated in the Preamble to its Constitution which are justice, liberty, equality, and fraternity. These values are universal in nature and are the foundation of every civilized society.

The national values that the modern Indian society upholds and which guide all individual and social life are provided in the Indian Constitution which was adopted by the Constituent Assembly on November 26, 1949 and it came into force on January 26, 1950. The Constitution of every country in the world determines its culture, economic, educational, political and social ideals and values. Our philosophical tradition lies in the utmost importance given to the determination of the ideals and ways of life. In fact, the Vedic, Buddhist, Islamic, Christian and other traditional values have ultimately shaped the Indian Constitution. The growing and changing needs of our country were also kept in view. The important values enshrined in our Constitution are :

- Democratic principle, such as freedom, equality, tolerance, readiness to see other man's point of view, the ability to adjust in and work with groups.
- Socialist principles such as respect for and commitment to equality in opportunity and status, maximizing national productions and wealth, equitable distribution of wealth.
- Secular principles such as respect for all religious, freedom of worship, readiness to see and manage civic affairs without reference to religion.

The Constitution of India rests on the foundation of the above values. Every constitution has Preamble with which it begins and which embodies its objectives or basic purposes. The Preamble is the most precious part of the Constitution or it is the prelude to the Constitution. It is the soul of the Constitution which reads as follows :

“We, the people of India, having solemnly resolved to constitute India into a Sovereign Democratic Republic and to secure to all its citizens :

Justice-Social, economic, and political;

Liberty-of thought, expression, belief, faith, and worship;

Equality-of status and of opportunity; and to promote among them all;

Fraternity-assuring the dignity of the individual and the unity of the nation.

In our Constituent Assembly this twenty-sixth day of November 1949, do hereby adopt, enact and give to ourselves this Constitution.”

These values permeate the Constitution as a whole, but in part III dealing with Fundamental Rights, and part IV with Directive Principle of State Policy they figure predominantly. In 1977, part IV a was added-Fundamental Duties.

(**Note :** Three new terms Socialist, Secular, and Integrity of the nation were added to the original text of the Preamble with the 42nd Amendment to the Constitution in 1976.)

The Philosophy as outlined in the Preamble of the Constitution of India became the guiding Philosophy of Education. The Constitution of India is the chief source which provides direction to the development of national systems of education also. Constitution is the mirror of the Philosophical and Sociological perspective of all areas of life including education. It lays emphasis on (a) Democracy, (b) Socialism, (c) Secularism, (d) Justice, (e) Liberty, (f) Fraternity. The system of education, therefore, must be in accordance with these values as the compass of the Indian life and education.

Constitution lists the role of the Central Government, State Governments and Union Territories in running and administering the educational systems.

We would now try to understand the Democratic, Socialistic and Secularistic values and their educational implications.

3.1.5 : SUMMING UP

The world's longest constitution is the Indian's constitution. At its commencement, it had 395 articles in 22 parts and 8 schedules. It consists of approximately 145,000 words, making it the second largest active constitution in the world. Currently, it has a preamble, 25 parts with 12 schedules, 5 appendices, 448 articles, and 101 amendments.

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3.1.7 : ASSIGNMENTS

1. What are values?
2. Identify national values enshrined in our Constitution.
3. Can you think of education without any emphasis on development of some fundamental values? — Justify.

Unit-2

Democracy

CONTENT STRUCTURE

3.2.1 : Introduction

3.2.2 : Objectives

3.2.3 : Concept of democracy

3.2.4 : The educational implication of democracy

3.2.5 : Summing up

3.2.6 : Suggested Readings

3.2.7 : Assignments

3.2.1 : INTRODUCTION

First we would learn the concept of Democracy. The concept of democracy originated in the ancient Greek City States. The Greek word corresponding to Democracy suggested a system in which the people performed the ruling. In India brotherhood of man (Vasudhaiv Kutumbakam) was the foundation of Aryan Democracy during the period between 2000 to 1500 B.C.

Etymologically, the term democracy is derived from two Greek words namely 'Damos' and 'Kratia', the former meaning the 'people' and the latter 'power'. Democracy thus means the power of people.

3.2.2 : OBJECTIVES

After careful study of this Unit you will be able :

- To define the Democracy
- To state the democracy regards political and social liberties

3.2.3 : CONCEPT OF DEMOCRACY

In modern times Democracy is used not only to refer to a specific form of social and political control rather signifies a certain way of life. Democracy rests on the belief in the dignity of individuals

and voluntary sharing of life by every member of the society with all other members. The following principles emerge as the characteristics of Democracy in its modern sense :

- (1) Democracy affirms the worth and dignity of the individual.
- (2) Equality i.e., equal right is guaranteed to all.
- (3) Democracy regards political and social liberties.
- (4) Democracy rests on individual opportunity as well as individual responsibility.

Democracy has enshrined three deities of liberty, equality, and fraternity.

The modern concept of Democracy was propounded by Abraham Lincoln. It implies that ruling power rests with the people without distinction of caste, creed, colour, or sex. Most of the modern states including India which emerged out of colonial rule in the second half of the 20th Century adopted Democracy as the guiding principle of political ideology.

In modern times, however, Democracy has acquired a much wider connotation. It is used not only for a specific form of social and political control but also, to denote a certain way of life. Ideally, democratic way of life is characterized by the respect for the dignity of the individual, equality, i.e., equal right guaranteed to all, individual opportunity as well as individual responsibility.

According to its nature Democracy can be of

- (i) ethical dimension,
 - (ii) political dimension,
 - (iii) social dimension, and
 - (iv) economic dimension.
- (i) Ethical dimension implies that an individual is entitled to full respect for his dignity and worth of an individual.
 - (ii) Political dimension includes participation of the people in Government, deals with suffrage, election, voting power, and so on.
 - (iii) Social dimension implies equality of all irrespective of caste, class, colour, creed, sex and wealth.
 - (iv) Economic dimension implies economic equality as far as possible, satisfaction of the basic needs of the people, equality of opportunity in undertaking economic activities and freedom from want.

In a country like India democratic values are reflected in all walks of life and to all aspects of society.

The four fold ideas of justice, liberty, equality, and fraternity adopted by our Constitution aim at the elimination of social inequalities and economic disparities. All these ideas have great significance for our education.

Justice :

Justice in the field of education implies that every individual must have equal opportunity of upliftment, development, and progress through education as a result he can understand the principles of ideals incorporated in our Constitution. To provide justice in the field of education the doors of the educational institution should remain wide open to the children of any citizen in the country. No discrimination should be allowed to take place between students belonging to different status, society or different caste, creed, colour, etc.

Liberty / Freedom in Education :

Pestalozzi, one of the early educationists conceived the aim of education as freedom from dependence and achievement of self-reliance. Pestalozzi has also observed that man should be made free and provided with stimuli in education for developing his self-reliance. The student's needs be given an adequate academic freedom. They should be made free from external influence that prevents them from seeing and saying the truth. Education should also encourage them to utilize their freedom to perform their duties and fulfil their responsibilities with sincerity.

Equality in Education :

It is imperative to provide adequate facilities to children to develop their abilities to the optimum. Equality of educational opportunity is essential to achieve this purpose. In spite of individual differences, importance of environment is very important for educational growth. So emphasis is laid on quantitative quality of education irrespective of caste, creed, colour, social status, or financial condition of individuals. The Education Commission 1966, have rightly observed "One of the important social objectives of education is to equalize opportunity enabling the backward or underprivileged classes or individuals to use education as a lever for the improvement of their condition."

Fraternity in Education :

All individuals of a country share the same nationality. In that sense all are brothers and sisters. There should not be any distinction of caste, colour, creed, language and gender in the development of individuals. Fraternity upholds cohesiveness among people.

Universal brotherhood being an important tenet of democracy, its place in education is of fundamental significance. Students, teachers, parents, and even non-teaching staff should be bounded with love, sympathy, understanding, and fellow feeling. The “we” morale and the nationalistic spirit have to be developed in future citizens of the country through education.

3.2.4 : THE EDUCATIONAL IMPLICATION OF DEMOCRACY

Without education, democracy has limited relevance and effectiveness and without democracy education loses its meaning. Mathur (1966) has laid down the following two pre-conditions for success of education for democracy.

(1) There should be economic betterment of the people. Democracy cannot be established if the basic needs of the people remain unfulfilled.

(2) The second pre-condition is the formation of an educated electorate. Democracy can function properly when the people are educated and are conscious of their rights and duties. Education provides people with the capacity for better judgement regarding right and wrong, just and unjust.

Further, democracy can survive if there be flexibility and creativity.

Democracy and aim of education

The secondary Education Commission (1953) in India included the development of democratic citizenship as one of the aims of education. Other aims are : improvement of vocational efficiency, and development of personality and development of qualities for leadership.

Development of intellectual aim in a democracy implies the following aims :

- (i) Education should aim at developing the skill of clear thinking in the students.
- (ii) Education should aim at developing open-mindedness in the students.
- (iii) Education should aim at enabling the students to express themselves clearly both in speech and writing.
- (iv) Education should aim developing the ability to participate freely in discussion and exchange of ideas.

The moral aim of education for democracy implies tolerance, discipline and cooperation, etc. and above all development of character, in true sense.

The social aim of education in a democracy implies :

- (a) Art of living gracefully in a community.

- (b) Passion for social justice.
- (c) Development of true patriotism.
- (d) Development of internationalism.

Democracy and Curriculum

Curriculum in a democracy should be based on the following principles :

- (i) Principles of relating contents to the aspirations and needs of the people.
- (ii) Principle of diversification i.e. providing courses according to the aptitudes and interest of the students.
- (iii) Principle of vocational efficiency i.e. curriculum should prepare for a vocation so that children become socially useful productive individuals.
- (iv) Principle of child-centered education i.e. maximum opportunities should be provided to the child to remain active and participate effectively in the teaching-learning process.
- (v) Principle of inclusive education.

Democracy and Methods of Teaching-Learning

Methods of teaching-learning should be activity-centred, child-centred, and life-centred and participative.

Following are the important methods of teaching-learning visualized in a democracy.

- (i) Group work.
- (ii) Project method.
- (iii) Socialized recitation, role-playing, gaming, etc.
- (iv) Survey method.
- (v) Enquiry methods and techniques.
- (vi) Strategies appropriate to Constructivism.

Democracy and Discipline

Discipline in a democratic educational set up implies self-discipline and social discipline. Attempts are made to provide social situations which encourage and direct the impulses of the pupils in common purposes and co-operative activities.

Students are provided opportunities to conduct some of their own affairs. Student council, class committees are formed.

Provision for participation in a number of co-curricular activities - cultural, civic, social, etc. is made so that students learn to work in groups and appreciate the values of co-operation, tolerance, etc.

Democracy and The Teacher

A teacher can play an important role in developing democratic attitudes, ideals and values in the students. He, therefore, himself should possess a democratic outlook. He should give due regard to the individuality of the students. He should appreciate the individual differences of the students and accordingly arrange his teaching-learning.

Democracy and School Administration

There should be a proper division of powers and responsibilities at various levels.

‘Decentralisation’ and ‘human relationships’ should be the watchwords of educational administration.

Democracy and the School

Thomas H. Briggs has observed that “School is truly the guardian of Democracy.” William Kilpatrick assigns the following functions to school in Democracy.

- (1) To give its pupils an intelligent understanding of the issues of Democracy.
- (2) To make its pupils well disposed towards Democracy as a way of life.
- (3) To make its pupils skilful in the co-operative activities through which Democracy must function.

3.2.5 : SUMMING UP

The modern concept of Democracy was propounded by Abraham Lincoln. It implies that ruling power rests with the people without distinction of caste, creed, colour, or sex. Most of the modern states including India which emerged out of colonial rule in the second half of the 20th Century adopted Democracy as the guiding principle of political ideology. However, Democracy has acquired a much wider connotation. It is used not only for a specific form of social and political control but also, to denote a certain way of life. Ideally, democratic way of life is characterized by the respect for the dignity of the individual, equality, i.e., equal right guaranteed to all, individual opportunity as well as individual responsibility.

The four fold ideas of justice, liberty, equality, and fraternity adopted by our Constitution aim at the elimination of social inequalities and economic disparities. All these ideas have great significance for our education. Without education, democracy has limited relevance and effectiveness and without democracy education loses its meaning. Mathur (1966) has laid down the following two pre-conditions for success of education for democracy.

(1) There should be economic betterment of the people. Democracy cannot be established if the basic needs of the people remain unfulfilled.

(2) The second pre-condition is the formation of an educated electorate. Democracy can function properly when the people are educated and are conscious of their rights and duties. Education provides people with the capacity for better judgement regarding right and wrong, just and unjust.

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3.2.7 : ASSIGNMENTS

1. Explain the ethical dimension of democracy.
2. Mention three strategies for improving sense of fraternity among people.
3. What are the principles of Democracy in education to be fastened?
4. Select three important intellectual aims of education in India.

Unit-3

Socialism

CONTENT STRUCTURE

3.3.1 : Introduction

3.3.2 : Objectives

3.3.3 : Concept of Socialism

3.3.4 : The educational implication of Socialism

3.3.5 : Summing up

3.3.6 : Suggested Readings

3.3.7 : Assignments

3.3.1 : INTRODUCTION

Socialism, general term for the political and economic theory that advocates a system of collective or government ownership and management of the means of production and distribution of goods. Because of the collective nature of socialism, it is to be contrasted to the doctrine of the sanctity of private property that characterizes capitalism. Where capitalism stresses competition and profit, socialism calls for cooperation and social service.

In a broader sense, the term socialism is often used loosely to describe economic theories ranging from those that hold that only certain public utilities and natural resources should be owned by the state to those holding that the state should assume responsibility for all economic planning and direction. In the past 150 years there have been innumerable differing socialist programs. System of social organization in which property and the distribution of income are subject to social control rather than individual determination or market forces.

Socialism refers to both a set of doctrines and the political movements that aspire to put these doctrines into practice. Although doctrinal aspects loomed largest in the early history of socialism, in its later history the movements have predominated over doctrine, so much so that there is no precise canon on which the various adherents of contemporary socialist movements agree. The most that can be said is that socialism is, in the words of Anthony Crosland, a British socialist, “a set of values, or aspirations, which socialists wish to see embodied in the organization of society.”

3.3.2 : OBJECTIVES

After careful study of this Unit you will be able :

- To define the Socialism
- To state the educational implication of Socialism

3.3.3 : CONCEPT OF SOCIALISM

Socialism is a Socio-economic-political doctrine which arose as a revolt against capitalism. Started in Europe in the 19th century, it soon spread to almost all parts of the world. Karl Marx and Lenin in Russia and Mao in China were the chief architects of Socialism.

Socialism aims at establishing society which is based on the total supremacy of the state and total submission of the individual to the state.

Several types of socialism have emerged during the course of time. Each emphasises on different way of achieving socialist goals. Following are the prominent types of socialism.

- (1) Christian Socialism
- (2) Democratic Socialism
- (3) Fabian Socialism
- (4) Gandhian Socialism
- (5) Guild Socialism
- (6) Marxist-Leninist Socialism
- (7) Scientific Socialism

Socialism is usually associated with revolutionary methods. It generally believes that without 'Violence' socialist ideals could not spread.

Indian Concept of Socialism

Gandhiji, Jawarlal Nehru and Jai Prakash Narain are the great supporters of Socialism. However, there is a marked difference between their approach and that of Marx. Gandhiji saw Socialism as a way of life. He called it 'Sarvodaya Samaj' in which the 'greatest good of all' is the end. He explained his socialism in an article in 1947 under the caption 'who is a Socialist? Gandhiji wrote, "Under socialism all the members of society are equal — none low, none high. Under it the prince and the peasant, the wealthy and the poor, the employer and the employee are all on the same level."

The distinguishing features of Indian Socialism are :

- (1) It is based on equality between man and man.

- (2) Economic system must be based on human outlook.
- (3) Socialism does not sacrifice man for money.
- (4) It believes in building a classless and casteless social system.
- (5) It stresses equality, freedom and social justice.
- (6) It believes in mixed economy i.e. public ownership as well as private ownership.
- (7) It aims at providing special facilities to weaker sections of the society.
- (8) It believes in the growth of all types of industries – large scale, cottage and small scale.
- (9) It believes in free expression of views.
- (10) It is based on democratic ideals.
- (11) It believes in ‘non-violent’ means to achieve its goals.
- (12) It stresses decentralization in administration and planning.

Principles of Socialism :

- (i) Social Justice : Socialism aims at social justice.
- (ii) Equality : Socialism aims at equality.
- (iii) Classless Society : Socialism aims at establishing a classless society, free from exploitation, oppression, and disparity.
- (iv) Fellow feeling : Socialism aims at establishing a society based on mutual co-operation and fellow feeling.
- (v) Public Ownership : Socialism pre-supposes public ownership of the means of production.
- (vi) Abolition of Capitalism : Socialism aims at establishing the capitalist system.
- (vii) Active Participation : Socialism aims at the active participation of the individual in the productive process of society.
- (viii) Developing Necessary Attitude : Socialism aims at developing necessary attitude and skills towards work.
- (ix) State Control : Socialism stands for total state control in affairs of life.

3.3.4 : THE EDUCATIONAL IMPLICATION OF SOCIALISM

Various committees and Commissions in India have suggested educational measures conforming to socialist pattern of society. The Kothari Commission has observed “one of the important social objectives of education is to equalize opportunity, enabling the backward or under-privileged classes

and individual to use education as a lever for improvement of their condition. Every society that values social justice and is anxious to improve the lot of common man and cultivate all available talent must ensure progressive equality of opportunity to all sections of population. This is the only guarantee of building up of an egalitarian and humane society in which the exploitation of the weak will be minimized.” The impact of socialism on education is as follows.

Aims of Education and Socialism

The following aims of education are adopted for establishment of socialist, democratic Indian society :

- (1) Development of Democratic outlook.
- (2) Development of Socialist values.
- (3) Providing equality of educational opportunity to all.
- (4) Rapid expansion of educational facilities to all areas.
- (5) Developing values like dignity of labor, non-violence, unselfishness, and selfless service etc.
- (6) Giving practical shape to the Constitutional Directives to education.

Teaching of Socialism

It is the responsibility of educational institutions to bring about adequate awareness regarding Socialism among the teachers and students. A school can convey positive attitude and values regarding Socialism to students through the following :

- (1) Direct teaching of Socialism.
- (2) Living the values and attitudes to be learned through the organization of various activities.
- (3) Teachers becomes models embodying the desired values and attitudes.

Common School System

The so-called public schools provide good education only to microscopic minority of rich children. It goes against the principles of Socialism. The Kothari Commission advocated the abolition of this system and suggested a system of common schools throughout the country which will be opened to all children, irrespective of caste, creed, community, religion, economic conditions of social status. It observed, “on grounds of social justice as well as for the furtherance of Democracy it is essential to make special efforts to equalize educational opportunities between these groups.” However, due to various reasons this has not been possible in India. In fact it is being popular day by day.

Contents of Curriculum

The need for national identity for promoting national integration and social cohesion by cultivating values as enshrined in the Constitution of India through school curriculum is necessary. Subject matter should stress on equality. Study of socialistic movement should be encouraged. Topics like democratic duties of citizens, equality, freedom, rights, socialism, social reform movements, non-violence etc. to be included in various subjects.

Besides theoretical knowledge, practical skills and experiences should be provided. Group activities like debates, discussion, social service camps, social surveys, etc. to be organized. Inclusion of socially useful productive work as an essential component of school curriculum should be the key note of the curriculum. Introduction of Information Technology and its effective use would enable students to do well in the age of modernization.

Text books at the school have been nationalized as an impact of Socialism. The contents of text books are oriented and regulated according to the national policy and ethos. Efforts are being made to keep price range of text books within the easy reach of the parents.

Means of Providing Equality of Opportunity in Education

- (1) Tuition Free Education : School education should be completely free from tuition fee.
- (2) Free Textbooks at the Primary Stage : At the primary stage, a program of providing free textbooks should be given high priority and introduced immediately.
- (3) Book Bank : A program of book banks should be developed in secondary schools and in institutions of higher education.
- (4) Grants for Purchase of Books : The top 10% of the students in educational institutions should be given small grants annually for the purchase of books which need not necessarily be textbooks.

Adequate Scholarships

The Education Commission has suggested the following program of scholarships at different stages :

- (1) Scholarship at the primary stage : At the end of lower primary stage no promising child should be prevented from continuing his studies. The target should be to provide scholarships for 25% of the enrollment at the higher primary stage.
- (2) Scholarships at the secondary stage : The target should be to provide scholarships for 10% of the enrollment.

(3) Scholarship at the university stage : Scholarships should be available to at least 25% of enrollment at the undergraduate stage. Scholarships should cover at least 50% of the enrolment at the post graduate stage.

Education of the Backward Sections of Society

Special investigations may be carried out, regarding important aspects of spread of education amongst the tribals and their effects. The Education Commission recommends, “The education of the backward classes in general and of the tribal people in particular is major programme of equalization and of social and national integration. No expenditure is too great for the purpose.” The special facilities may be provided to the girls.

Meeting the Needs of Slow Learners

In the ordinary classes, where instruction is traditionally geared to the need of the average child, the dull children have to work under a great hardship. They need individual attention, special, remedial help and a modified curriculum to suit their rate of learning. In some educationally advanced countries, special schools have been established for this category of children. Special classes in ordinary schools can also be held very profitably. Now it is the policy of the national government to promote inclusive education at elementary stage.

Suitable Legislation

The state should take suitable steps to exercise control on private enterprise which thrives on high fees charged from the students. The public schools run by such organizations should not be allowed to perpetuate class differences. However, Socialism is a way of life and has to grow silently in the hearts of our people and the greatest binding force that can quicken, it is the force of education. Therefore, it can be said that the classless society will ultimately emerge from the class-room itself.

3.3.4 : SUMMING UP

Socialism refers to both a set of doctrines and the political movements that aspire to put these doctrines into practice. Although doctrinal aspects loomed largest in the early history of socialism, in its later history the movements have predominated over doctrine, so much so that there is no precise canon on which the various adherents of contemporary socialist movements agree.

In a broader sense, the term socialism is often used loosely to describe economic theories ranging from those that hold that only certain public utilities and natural resources should be owned by the state to those holding that the state should assume responsibility for all economic planning and

direction. In the past 150 years there have been innumerable differing socialist programs. System of social organization in which property and the distribution of income are subject to social control rather than individual determination or market forces.

Socialism is a Socio-economic-political doctrine which arose as a revolt against capitalism. Started in Europe in the 19th century, it soon spread to almost all parts of the world. Karl Marx and Lenin in Russia and Mao in China were the chief architects of Socialism.

Every society that values social justice and is anxious to improve the lot of common man and cultivate all available talent must ensure progressive equality of opportunity to all sections of population. This is the only guarantee of building up of an egalitarian and humane society in which the exploitation of the weak will be minimized.”

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3.3.7 : ASSIGNMENTS

1. Explain main characteristics of socialism from the Indian context.
2. Does our Constitution believes in socialism? — Justify.
3. How can you ensure equality of educational opportunities for all children?
4. Expand your idea about ‘Common School System’.

Unit-4

Secularism

CONTENT STRUCTURE

3.4.1 : Introduction

3.4.2 : Objectives

3.4.3 : Concept of Secularism

3.4.4 : The educational implication of Secularism

3.4.5 : The need of the hour

3.4.6 : Summing up

3.4.7 : Suggested Readings

3.4.8 : Assignments

3.4.1 : INTRODUCTION

Secularism focuses on religion to other ‘temporal’ things in consideration of nature, reason, science, and development. It is also termed as modernization of religious beliefs and traditional values and hence the term secularization.

It ensures freedom of both believers and non-believers of secularism. Hence, it gives the right of freedom to the people. It also protects the beliefs and traditional values of religion. Secularism provides religious freedom i.e freedom to choose the religious and individual wants. One can follow multiple religious as well.

Secularism is often misunderstood with atheism. This is completely false. Secularism is choosing our religion and believing and following the religious practices and traditional values. Atheism is not believing in God at all and the force beyond. Secularism is just a framework for the society for striving equality in every aspect. Aspects of politics, education and law etc.

Secularism is to create a society in which people of all religions or people who don’t belong to any religion can live together peacefully. It says that no one shall be subject to discrimination by any State, institution, group of persons, or person on grounds of religion or other beliefs.

With the 42nd Amendment of the Constitution of India enacted in 1976, the Preamble to the Constitution asserted that India is a secular nation. However, neither India’s constitution nor its laws define the relationship between religion and state. The laws implicitly require the state and its institutions

to recognise and accept all religions, enforce parliamentary laws instead of religious laws, and respect pluralism. India does not have an official state religion. In matters of law in modern India, however, the applicable code of law is unequal, and India's personal laws - on matters such as marriage, divorce, inheritance, alimony - varies with an individual's religion. Muslim Indians have Sharia-based Muslim Personal Law, while Hindu, Christian and Sikh Indians live under common law. It is further complicated by the fact that many Hindu temples of great religious significance are administered and managed by the Indian government. The attempt to respect unequal, religious law has created a number of issues in India such as acceptability of child marriage, polygamy, unequal inheritance rights, extra judicial unilateral divorce rights favorable to some males, and conflicting interpretations of religious books.

Secularism as practiced in India, with its marked differences with Western practice of secularism, is a controversial topic in India. See also pseudo-secularism Supporters of the Indian concept of secularism claim it respects. Supporters of this form of secularism claim that any attempt to introduce a uniform civil code, that is equal laws for every citizen irrespective of his or her religion, would impose majoritarian Hindu sensibilities and ideals. Opponents argue that India's acceptance of Sharia and religious laws violates the principle of Equality before the law

3.4.2 : OBJECTIVES

After careful study of this Unit you will be able :

- To define the Socialism
- To state the educational implication of Socialism

3.4.3 : CONCEPT OF SECULARISM

India has decided to build itself into a Socialist Secular and Democratic society in which different communities and groups belonging to all faiths can flourish side by side. All citizens irrespective of any difference of caste, colour, and religion have the opportunities to make the best of their abilities for personal fulfillment and social progress.

The word Secularism did not exist in the Indian Constitution as enacted on 26th November, 1949, however, subsequently it was incorporated in its Preamble with 42nd Constitutional Amendment in 1976.

The word Secularism is derived from the Latin word 'Saeculum', meaning 'this present age'. The word Secularism was first used in the 19th Century by George Jacob Holydake. Holydake based Secularism as a social and ethical system on the following principles.

1. Primary emphasis on material and cultural improvement of human beings.
2. Principle of respect and search for all truth, whatever be its source which can be tested in experience leading to human betterment.
3. Principle of concern for 'this present age' or world and its improvement, and
4. Principle of independent rational morality, which does not base itself on faith in divine order commandment.
5. The meaning attached to Secularism tends to minimize the importance of the spirit and the DIVINE power.

According to Oxford Dictionary 'Secularism' means "the doctrine that morality should be based solely in regard to well-being of mankind in the present life to the exclusion of all considerations drawn from belief in God". Chambers Dictionary defines 'Secularism' as "the belief that the state, moral, education, etc. should be independent of religion." In the deeper sense of the word 'Secularism' is not concerned with what is religious and spiritual and is surely opposed to every thing that is irrational.

The Indian concept of Secularism implies that there shall be no state religion and that the state shall treat all religions equally.

Although the word Secularism was introduced only in 1976 in our Constitution, our Secularism is historical. Ashoka's Secular outlook is one of the landmark not only of Indian civilization but also of the human civilization. He made a passionate appeal for developing a spirit of reverence and tolerance for all faiths.

Dr. B. R. Ambedkar, the principal architect of our Constitution explains the concept of a Secular state in these words, "Secular does not mean that it shall not take into consideration the religious sentiments of the people. All that Secular state means is, that this Parliament shall not be competent to impose any particular religion upon the rest of the people."

According to Brubacher, Secularism has "no religious point of view while it has a theory of moral education." "If the secularist has any religion at all it is likely that scientific doctrine constitutes the presuppositions of that religion and that scientists are its high priests."

Education Commission (1964-1966)

The adoption of a Secularist policy means that no religious community will be favoured or discriminated against. The instruction in religious dogmas will not be provided in state schools. But the secularist policy is not an irreligious or antireligious policy. It does not belittle the importance of religions. It gives to every citizen the fullest freedom of religious belief and worship. It promotes not

only religious toleration but also an active reverence for all religions. We have to make a distinction between 'religious education' and 'education about religions'. The former is largely concerned with the teaching of tenets and practices of a particular religion in a particular form, and it would not be practicable to provide this type of religious education in respect of any religion to pupils belonging to different faiths. But it is necessary for a multi-religious democratic State to promote a tolerant study of all religions so that its citizens can understand each other better and live amicably together.

The Education Commission (1964-66) has recommended : "We suggest that a syllabus giving well chosen information about each of the major religions should be included as a part of the course in citizenship or as a part of general education to be introduced in schools and colleges up to the first degree. It should highlight the fundamental similarities in the great religions of the world and the emphasis they place on the cultivation of certain broadly comparable moral and spiritual values".

Constitutional Provisions

After obtaining her independence India adopted Secularism as a way of life. Our Constitution guarantees the fullest freedom of religious belief and worship. It has laid down the following provisions in connection with religious and moral education in educational institutions.

Article 19 (1) : "Subject to public order, morality and health and to other provisions of this part, all persons are equally entitled to freedom of conscience and the right freely to profess, practise and propagate religion."

Article 21 : "No person may be compelled to pay any taxes, the proceeds of which are specifically appropriated in payment of expenses for the promotion or maintenance of any particular religion or religious denomination."

Article 22 (1) : "No religious instructions shall be provided in any educational institution wholly maintained out of State funds."

3.4.4 : The educational implication of Secularism

Education for Securing Secularism in India

India's present educational system promotes Secular attitudes and values through its broad-based aims, curricula, enlightened teachers and appropriate activities, all emphasizing open-mindedness, progressivism, rationality, freedom from bigotry and superstition, and equal respect for all religions. The following traits characterise education for Secularism in India.

Education and Aims. The aims and objectives of such a system are Secular. They seek to develop India as a rational, democratic, progressive and modern welfare State. The philosophy of humanism guides such educational objectives. The well-being of all the citizens of the country is the goal towards which India's educational energies are directed.

Organization of educational institutions. The organization of most of Indian educational institutions is based on Secular principles. It is necessary to observe Secular, Democratic, rational criteria in appointments, promotions, admissions, and all such matters.

Content of Curricula. The educational curricula at all levels in India lay special emphasis on the promotion of Secular values. Lessons in textbooks are free from religious bigotry and prejudice while the good ideas and values emphasized in different religions are presented in appropriate forms. The co-curricular activities aim at promoting harmony and co-operation among different groups and respect for each other's culture in the students. It is not permitted to condemn or unduly practice in all schools, colleges and universities to celebrate fairs, festivals, birth anniversaries, etc., relating to different religions. While imparting moral education equal importance is given to different faiths.

Value of Science teaching. Secularism stands for scientific rationalism. It stresses logical thinking and abhors superstitions and irrational things. Therefore, Indian education today puts much emphasis upon science teaching. Science is taught in a practical manner at all levels of schooling, so that it might influence the attitudes and values of the pupils. The spirit of science with emphasis on inquiry, experimentation, proof and critical outlook, permeates the teaching of other subjects also.

Role of Teachers. In the education for Secularism in India the teachers today are expected to treat their pupils in an impartial manner. They eschew all caste, community and class considerations in dealing with students and colleagues. Equal respect is given to all students and to all religious groups. Every conscientious teacher behaves in a truly Democratic and fair manner. They should work as living models or ideals whose objective, attitude and unbiased activities can influence their students.

Thus, the present Indian Secular educational system is trying to create a social climate in the country in which Secular values are sought to be promoted effectively and enthusiastically.

3.4.5 : THE NEED OF THE HOUR

India since 1950 has become a Socialistic, Democrat, and Secular state. In the new education policy 1986, the following four national goals are set.

- (1) A United, Secular India.
- (2) A Modern Nation.
- (3) A productive India
- (4) A Humane and Caring Society.

If judiciously planned and successfully implemented, Value education can prove to be very vital and effective in realizing these goals. Therefore, The Commission has rightly recommended that

value education should find an important place in the school Curriculum. In the policy statement, it has been suggested that “The basic and essential values underlying our Constitution (Preamble) as well as those contained in the four national goals referred to above should form the basic syllabus for value education, which should find an important place in the school / Curriculum and be given the necessary attention and time.”

The National Curriculum for Primary and Secondary education (A Frame Work) 1985 under the caption “Emerging Concerns and Imperatives” indicates :

“Constitutional imperatives : The school Curriculum of a Country, like its Constitution, reflects the ethos and the main Concerns of that Country. The value enshrine in our Constitution point towards the development of a pluralist, open society and a state which is democratic, socialist and secular in nature.”

In a paper entitled “Education in the Five-Year Plan, 1974-79 published by the Ministry of Education and Social Welfare, Government of India it is pointed out “Perhaps the most significant needs of the hour is to transform the educational system with a view to :

- Cultivating the basic values of humanism, democracy, socialism and secularism;
- Inculcating a love for motherland;
- Strengthening national integration;
- Accelerating the process of modernization and the development of a scientific temper and outlook; and
- Promoting productivity through the teaching of technology and technological skills.

Under socio-cultural consideration it is stated “to bridge the gap between the haves and have nots, the question of equity assumes a profound importance” and hence “the value of equality of opportunity has to be demonstrated first through the educational system and the design of the curriculum. Education has been accorded a place of great importance in the Constitution of India. According to the article 45 of the Constitution, “the State shall endeavour to provide universal, free, and compulsory education to all children up to the age of 14 years by the year 1960.” Unfortunately, inspite of various steps taken by the government at the state and national levels, the goal is not yet reached, even after the latest amendment of the Constitution.

The Universalization of Elementary Education (UEE) or Universalization of Primary Education (UPE) has been adopted as a national goal. Education for all (EFA) has now been regarded as the international target and a national challenge for India for true empowerment and democratization. Emphasis was laid on (i) universal enrolment, (ii) universal attendance, and (iii) universal retention. Education for all envisions, quality schools, and enable the student to achieve Minimum Levels of

Learning (MLL). Sarbasikha Abhijan and District Primary Education program has been adopted for fulfilling universalization of primary education.

The need for strengthening national unity, national identity is being felt now than ever before. As such there is a strong plea for promoting national integration, and social cohesion by cultivating values as enshrined in the Constitution of India through school curriculum. With this in view the ten core components identified in the National Policy of Education, 1986 need to be reaffirmed. They are as follows :

- (i) The history of India's freedom movement;
- (ii) The Constitutional obligations;
- (iii) The content essential to nurture national identity;
- (iv) India's common cultural heritage;
- (v) Egalitarianism, democracy, and secularism;
- (vi) Equality of sexes;
- (vii) Protection of the environment;
- (viii) Removal of social barriers;
- (ix) Observance of the small family norm;
- (x) Development of the scientific temper.

In the school where teachers work with sense of dedication, where there is mutual respect, affection and love among the students, parents, teachers and the community, values develop in the children in a natural way.

The Fundamental Duties as laid down in article 51A of part IVA of the Indian Constitution also have to be included in the core components.

Education liberates human beings from the shackles of ignorance, privation, and misery. It must also lead to a non-violent and non-exploitative social system. School curriculum therefore has to aim at enabling learners not only to enable the learners to acquire knowledge but also to develop understanding positive attitudes, values, and habits conducive to the all-round development of their personality.

School curriculum has therefore, help to generate and to promote among the learners :

- language abilities of listening, speaking, reading, writing, and thinking, and communication skills for social living.

- mathematical abilities to develop a logical mind.
- scientific temper characterized by the spirit of enquiry, problem solving, courage to question leading to elimination of obscurantism, superstition, and fatalism, at the same time sustaining and emphasizing Indian tradition.
- understanding of the environment in its totally both natural and social and their interactive processes, the environmental problems and the ways and means to preserve the environment.
- understanding the diversity in lands and people living in different parts of the country and the countries composite cultural heritage.
- appreciation of the sacrifices and contributions made by the freedom fighters and social workers from rural, tribal and weaker sections from all the regions of the Indian society in India's freedom struggle and social regeneration, and readiness to follow their ideals.
- appreciation for the need of a balanced synthesis between the change oriented technologies and the continuity of the countries traditions.
- knowledge of and respect for the national symbols and the desire and determination to uphold the ideals of national identity and unity.
- deep sense of patriotism and nationalism.
- understanding of the positive and the negative impact of the processes of globalization, liberalization, and localization in the context of the country.
- qualities clustered around the personal, social moral, national, and spiritual values that make a person human and socially effective.
- qualities and characteristic necessary for self-learning and lifelong learning leading to the creation of a learning society.
- willingness to work hard for increasing productivity.
- appreciation of the various consequences of large families and over population and need for checking population growth and
- cultivating proper understanding and respectful attitude toward members of the opposite sex.

Role of the Teachers

The teacher is the key person who can inculcate all the required values in children in spite of many odds. This task would become easier if the teacher through his personality, character and action sets an example before the students. The teachers should understand the values inherent in the subjects and try to highlight those values while teaching. Good teaching of a subject consequently

implies not only the application of psychological principles underlying the learning process but also developing and understanding of the philosophy of the subject. The teaching should embody and exemplify the attitudes, values, work habits, and mental dispositions associated with the particular subject. The values are inherent in the school subject, for example science subjects aims to :

- (a) develop values like neatness, cleanliness.
- (b) the systematic approach.
- (c) the rational approach.

Social studies aims at developing

- (a) socialism.
- (b) secularism.
- (c) nationalism.
- (d) equality.
- (e) social justice, etc.

Teacher education at the preservice level should prepare teachers with adequate skills to develop proper value systems among children which are inherent in all the school subjects. So during teacher training values should be integrated with the methodology of teaching and practice teaching.

The co-curricular activities have tremendous potential for the development of social values and character in students and most schools make provision for a variety of such activities like,

- student self government in schools.
- NCC, NSS, Programme
- excursions and field visits.
- social service and working with the community activities.
- sports and games.
- literary and cultural activities.

All these provide opportunities for boys and girls to come together in the pursuit of common goals and ideas.

The regular subjects of the school curriculum, the co-curricular programme of the school and the overall ethos of the school are very good sources of value education. In the school where high ideals guide the working of the school where teachers work with a sense of dedication, where there is mutual respect, affection, and love among all concerned – students, parents, teachers, and the community, values are in the children in a natural way. Proper planning and effective implementation

of the co-curricular activities provide opportunities for students to develop their social, cultural, and intellectual interests and for plasticizing values of democratic group life. Similarly in collegiate education we should try to inculcate the basic values of humanism, democracy and secularism in the students so that we can build up a humane and caring society.

“Education does not mean the teaching people what they do not know. It means teaching them to behave as they do not behave. It is not teaching the youth the shape of letters and the tricks of numbers and leaving them to turn their arithmetic to roguery and their literature to last. It means on the contrary, training them into the perfect exercise and kingly continence of their bodies and souls. It is a painful, continual and difficult work to be done by kindness, by watching, by warning, by precept and by praise, but above all by example”— John Ruskin

3.4.6 : SUMMING UP

Secularism is often misunderstood with atheism. This is completely false. Secularism is choosing our religion and believing and following the religious practices and traditional values. Atheism is not believing in God at all and the force beyond. Secularism is just a framework for the society for striving equality in every aspect. Aspects of politics, education and law etc.

With the 42nd Amendment of the Constitution of India enacted in 1976, the Preamble to the Constitution asserted that India is a secular nation. However, neither India’s constitution nor its laws define the relationship between religion and state. The laws implicitly require the state and its institutions to recognise and accept all religions, enforce parliamentary laws instead of religious laws, and respect pluralism. India does not have an official state religion. In matters of law in modern India, however, the applicable code of law is unequal, and India’s personal laws - on matters such as marriage, divorce, inheritance, alimony - varies with an individual’s religion. Muslim Indians have Sharia-based Muslim Personal Law, while Hindu, Christian and Sikh Indians live under common law.

India has decided to build itself into a Socialist Secular and Democratic society in which different communities and groups belonging to all faiths can flourish side by side. All citizens irrespective of any difference of caste, colour, and religion have the opportunities to make the best of their abilities for personal fulfillment and social progress.

Dr. B. R. Ambedkar, the principal architect of our Constitution explains the concept of a Secular state in these words, “Secular does not mean that it shall not take into consideration the religious sentiments of the people. All that Secular state means is, that this Parliament shall not be competent to impose any particular religion upon the rest of the people.”

The Education Commission (1964-66) has recommended : “We suggest that a syllabus giving well chosen information about each of the major religions should be included as a part of the course

in citizenship or as a part of general education to be introduced in schools and colleges up to the first degree. It should highlight the fundamental similarities in the great religions of the world and the emphasis they place on the cultivation of certain broadly comparable moral and spiritual values”.

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3.4.7 : SUGGESTED READINGS

- (1) Brubacher, John S. (1950) — Modern Philosophies of Education, McGraw-Hill Co., New York.
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- (7) Gupta, R. C. (1965) — Socialism, Democracy in India, Ram Prasad and Sons, Agra.
- (8) Mohanty, J (1987) — Democracy and Education in India, Deep and Deep Publications, New Delhi.
- (9) Mohanty, J. (1986) — Indian Education in the Emerging Indian Society. Sterling Publisher, New Delhi.
- (10) NCERT (1987) — The Teacher and Education in emerging Indian Society. Publication Department, New Delhi.
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- (12) C. Soti Shivendra and Sharma, Rajendra K. 2002 — Philosophy of Education, Atlantic, New Delhi.

3.4.8 : ASSIGNMENTS

1. Write in your words the meaning of 'Secularism'.
2. Expand your own ideas on Article 19(1) of our Constitution.
3. State Teachers' role in inculcating sense of secularism among school children.
4. What is secularism in education?

Block-4
Great Thinkers
Unit-1
Contribution of Great Thinkers (A)

CONTENT STRUCTURE

4.1.1 : Introduction

4.1.2 : Objectives

4.1.3 : Educational Contributions of Swami Vivekananda

4.1.4 : Educational Contributions of Sri Aurobindo

4.1.5 : Summing Up

4.1.6 : Suggested Readings

4.1.7 : Assignments

4.1.1 : INTRODUCTION

In this Unit-you have come across that a philosophy of education takes its shape through integration as well as synthesis of cultural inputs. With burning sensation of nationalism and their protests against the British education systems prevailed in India about 150 years ago, some national heroes gave vent of their inner voice and intellectual inputs in building independently our national philosophies of education. Their philosophical architectures maintain some commonality, as each is solidly grounded on the Indian philosophical systems, though these differ in many aspects what they have emphasized on. Some of these national philosophers of Indian education, for example, are- Swami Vivekananda, Shri Aurobindo,- who have offered their best in building Indian philosophy of education.

4.1.2 : OBJECTIVES

This Unit will make you enable to —

1. understand philosophy of education propounded by each of the two Indian national heroes — Swami Vivekananda, Shri Aurobindo,

2. estimate contributions to Indian education made by each of the above mentioned two Indian personalities, and
3. analyse to what extent all these educational ideas are relevant in our contemporary education systems.

4.1.3 : EDUCATIONAL CONTRIBUTIONS OF SWAMI VIVEKANANDA

PHILOSOPHY OF SWAMI VIVEKANANDA

Swami Vivekananda (1863-1902) is known to the world as the patriot-saint of India, as the symbol of vigor, as a social reformer, as a religious leader, as a philosopher and so on. But he was an educationist who propounded original ideas on education, for ensuring an educational renovation from the height of his unquestioned love for country and humanity. He developed his ideas on education after Vedantic philosophical stances and ardently visualized the full manifestation of perfection endowed in man.

According to Vedanta, man's real nature is pure consciousness, known as the Atman, which is beyond body and mind. To Swamiji, the Atman is the ultimate source of not only all knowledge and happiness, but also of all noble qualities and capacities inherent in man. Education is the process by which this innate perfection is manifested. Vivekananda's concept of 'potential divinity of the soul' gives a new, ennobling concept of man and that concept of potential divinity of the soul prevents this degradation, divinizes human relationships and makes life meaningful and worth living. Thus, Swamiji has laid the foundation for 'spiritual humanism', which is manifesting itself through several neo-humanistic movements and the current interest in meditation, Zen, etc. all over the world.

In order for awaking his countrymen Swamiji attempted to do the following :

- to rouse the religious consciousness of the people and create in them pride in their cultural heritage;
- to bring about unification of Hinduism by pointing out the common bases of its sects;
- to focus the attention of educated people on the plight of the downtrodden masses, and to expound his plan for their uplift by the application of the principles of Practical Vedanta.

But his formulation is not a revival of the ancient educational system, but its readjustment with the changed modern scenario. Netaji Subhash Chandra Bose wrote : "Swamiji harmonized the East and the West, religion and science, past and present. And that is why he is great. Our countrymen have gained unprecedented self-respect, self-reliance and self-assertion from his teachings." Long

before the ideas of Karl Marx were known in India, Swamiji spoke about the role of the labouring classes in the production of the country's wealth.

In brief his philosophical ideas may be summarized as :

Let us discuss the educational philosophy of Swami Vivekananda. First let us concentrate on the life philosophy of Swami Vivekananda in a summarized form :

(1) Swami Vivekananda was greatly influenced by the classical Indian philosophy being a student of philosophy as a subject and tried to apply those concepts for the good of the common people.

(2) The philosophical thoughts of Vivekananda were shaped by Vedanta and these are generally called Neo-Vedantic.

(3) Service and Renunciation were the two key words which he believed most and tried to apply for the development of our society.

(4) The foundations of Vivekananda's Neo-Vedanta are the Upanishadas and their interpretations from his personal illumination.

(5) Vivekananda tried to socialize the essence of his philosophy for the common people of India.

(6) Thus, he was an idealist, nationalist as well as a humanist.

EDUCATIONAL PHILOSOPHY OF VIVEKANANDA

From Swami Vivekananda's writings, speeches and practices of his own life the following ideas on education can be deduced.

(1) Education is based on development of inner potentiality.

(2) Education is man making.

(3) Education is "by which character is formed, mind of strength is increased and by which one can stand one's leg."

(4) Education is a tool for social development.

(5) Upliftment of masses is also an emergent dimension of education.

(6) Education is the training of the intellect and spiritual training for the learners.

(7) Democracy is the best form of Government implying freedom which is inseparable from responsibility, the sources of which are morality, philosophy, law and other social factors.

(8) The social progress is possible through mass education and woman's education.

(9) He believes in the Universal brotherhood of man, and upliftment of man kind.

Meaning of Education :

Education according to Swami Vivekananda is self-realization which takes place from within. It brings perfection through the manifestation of one's potentialities. In his inimitable words — 'Education is the manifestation of the perfection already in man'. He states it more clearly — 'knowledge is inherent in man, no knowledge comes from outside; it is all inside'. What is learning? Vivekananda answers — "what a man 'learns' is really what he 'discovers' by taking the cover off his own soul, which is a mine of infinite knowledge. Man manifests knowledge, discovers it within himself, which is pre-existing, through eternity. 'Education is nothing but the manifestation of the infinite power lying within the soul which involves the only question of being conscious of it. Every man is born with a light divine.'" Thus education is self-revelation.

Freedom in Education :

Swami Vivekananda was a staunch supporter of freedom in education because he believed it the first requisite of development. Education must be based on the needs of the child. The task of education is to nurse the process with every care and assistance, but never through any force, artificial manipulation and interference. Education should provide the child ample scope for his free growth according to his nature. When freedom in education is given to a child, it is sure to say that the child will develop positive ideas, deep self-confidence and the spirit of independence. Self-activity is the pre-condition to realise one's freedom i.e., self-discovery.

Teachers' Responsibility :

Teacher plays an important role in the task of educating the child. According to Vivekananda a true teacher is one who can come down, immediately; to the level of the student and can "transfer his soul to the student's soul", and see through the student's eyes, hear through his ears, and understand through his understanding. A teacher, in its truest senses is a friend, philosopher and guide capable of providing proper direction and guidance to his pupils. He has to understand the needs of the pupil and to guide his learning and activities accordingly. The teacher, according to him, should be a 'role model' to his pupil.

Guru Grahayasa is recommended by Swami Vivekananda, and is one of the best ways a teacher can help the pupil. So we can say that teacher's responsibility is to show the pupil light in order to lead a brighter future.

Aims of Education :

Swami Vivekananda says — "The end of all education, all training, should be man-making. The end and aim of all training is to make the man grow." Education he maintains, should help people to

build up self-confidence and self reliance, based on balanced human relationships. The ultimate goal of all educational effort is to strive towards character development characterized by the development of will-power, leading to courage, stamina and fearlessness. Through education the individual should develop adaptability and be able to meet the challenge of a changing society, and this can be able through education and training that he or she receives from his parents and teachers. Education should lead to a feeling of brotherhood and the unity of mankind.

Education should teach us to serve humanity the hungry, the ignorant and the suffering masses. According to Swami Vivekananda, work is worship, so to serve the masses is to serve God, so education should lead us to recognize this and to fulfill this end. Education should lead us to acquire the spirit of renunciation.

In India, he maintains, the important aim of education is self-sufficiency, each individual should be given practical and vocabulary training along with traditional, religious and cultural subjects. There should be workshops regarding pupil in order to train them in crafts and trades. Students must be given education in Western Science and technology, in order to advance our country in the field of science, technology and productivity for improving quality of life.

Curriculum :

Swami Vivekananda did not prescribe any specific curriculum, but some general instructions were given by him on the type of the subjects which the students would learn. According to him children should include cultural heritage in terms of history, geography, poetry, grammar and language. He also prescribed for every pupil to study various branches of modern science and equally gave importance in Western technology and engineering and said that it should be included in the curricula of schools and colleges, and it would aim at the economic development of the country. Education must be life-skills building process.

Vocational subjects should be included in the curriculum for every child. He also gave stressed on skills, crafts, etc. along with others studies which would enable pupils to learn a living at the end of their studies and to make them self supporting. He included cookery, needle-craft, child-rearing, economics and psychology should be included in the curriculum for girls.

He laid special emphasis on physical education in the sense that a good physique beholds good mind. He not only asserted for Brahmacharya but also prescribed practice of yoga for the students. Moral and religious education were other dimensions of curriculum according to Swami Vivekananda. However, he advised that this part of curriculum should be free from any particular dogma or secretarion philosophy or theology. On the contrary, the subject matter of moral and religious education must be a synthesis of religion and science. It would help inculcation of universal values in all human beings.

Thus, he pleaded for the education of unity of world's religion what his great master Sri Ramakrishna testified in his life.

The Method of Instruction :

The method of instruction what Swami Vivekananda proposed, is based an ancient Indian tradition but still it has a great value. Swami Vivekananda gave more importance on Guru-pupil relationship, so that the pupil learns by example and precept rather than through books and lectures alone. According to him "The practice of meditation leads to mental concentration." He holds that there is only one method which helps to attain knowledge that is concentration. He asserted that the more the power of concentration, the grater amount of knowledge an individual can acquire. Lack of concentration leads to wastage of power.

Discussion among teacher and pupils is an effective method of instruction. The teacher should invite questions and stimulate the spirit of enquiry in the pupil. For Vivekananda, travel was an ideal method of learning because he wished the teachers and pupils to go out and learn from outside, not only within India but to other countries too, so that they can communicate with each other and be able to share our knowledge and philosophy with people of other countries.

Medium of Instruction :

As regards to medium of instruction, Vivekananda strongly advocated for mother-tongue. He a true nationalist, and a champion of national education argued instruction through mother-tongue. He visualized to Indianise Indian education. He also wanted to spread mass education through mother-tongue so that it will reach to everyone.

Students :

Swamiji pleaded : One who solve own problems efficiently is the best students. So the development of our nation lies on the hands of the students. The characteristics of best students according to him are :

- (1) In his own word — "Faith in our self and faith in God - this is the secret of greatness" so each student must have faith in themselves and in God in order to reach their destiny.
- (2) Students must always have a will power and they should have self confidence within them in order to move forward in life.
- (3) Students must have a disciplined conduct and a good character and should be polite, humble, truthful, and follow what is good ; have a motivation for learning and cultivation of knowledge, cooperation and fellow feeling.

- (4) Each student must develop love for their country.
- (5) Students should always practice religion and should not perform any kind of evil deeds.

Women's Education :

Swami Vivekananda's worries as well as eagerness for women's education had been deep and genuine. As he was highly impressed to see the women of the progressive countries (America, England, Japan) working with men and, thereby immensely contributing to national advancement Vivekananda was greatly pained at the miserable condition of women in India. According to Swamiji — "The real strength or 'Shakti' of a country are its women." He quotes Manu — "Daughters should be supported and educated with as much care and attention as the sons." He wanted women to be free from all fetters as self-respecting persons, with their own individuality, and was in favour of women being given such training as would infuse them with strength so that they can tackle the problem that face them. So far, he opined : women had been down-trodden, and considered inferior to men, they could not enjoy equal rights and privileges with men, because of their denial to opportunities to education.

His idea of women's education included fostering ideal daughters, ideal wives, and ideal mothers and of course building ideal nation and humanity.

He strongly advocated that schools should be established for girls and educational centres for women. He prescribed teaching of History and purans, house keeping and the arts, the duties of home life and the principles that make for the development of character, so that women may grow up as ideal mothers of heroes and as women of courage and chastity. Thus, he visualized women as true partner of all-inclusive social development.

Advancing his thoughts on women education much work has been done in the field of women's education after independence in India. The education policy adopted by the Government of India for equality of opportunities for the women education and empowerment has been saturated by Vivekananda's urge for women education. In this way he was so modern even in one hundred years ago.

Mass Education :

Swami Vivekananda's views on education will not be complete without touching upon his thoughts on mass education. At time when social leaders were busy with widow remarriage, abolition of idol worship and other social reforms mainly confined to the upper strata of the society, he felt that the neglect of the masses was the main cause of India's downfall. 'Our great national sin is the neglect of the masses and that is the cause of our downfall' said Swamiji. He fully realized that, "A nation is

advanced in proportion as education and intelligence is spread among the masses.” This reflects his urge for ensuring equity in educational opportunities to all for true national development.

He respected human individuality and chanted the mantra, “each soul is potentially divine” and is endowed with capacity and creativity. According to Swamiji : Education is the birth right of every human being; it is a biological, social economic and spiritual necessity.

He always wanted a process of ‘leveling-up’ and no ‘leveling-down’, so the only way to rise again was by spreading education. Education, to him was a comprehensive. To him true education was the powerful tool for arresting people’s sufferings, discriminations, prejudices, human injustice and indignity. He also advocated for non-formal education for them.

Conclusion :

In conclusion, Swami Vivekananda was the most eminent great educator who contributed his life for the welfare of the masses. So R.C. Majumder has rightly said : ‘Swami Vivekananda combined in himself the role of a great saint and fervid nationalist. He placed Indian nationalism on the high pedestal of past glory, and it embraced the teeming millions of India both high and low, rich and poor. He devoted his life to the awakening of national consciousness and many of his eloquent appeals would stir the national sentiments of India even today to their very depths’. Vivekananda advocated for a positive system of education in which he synthesized spiritual and material values.

Question :

Let Us Check Our Progress

1. What is Neo - Vedanta ?
2. Mention different points regarding educational philosophy of Vivekananda.

4.1.4 : EDUCATIONAL CONTRIBUTIONS OF SRI AUROBINDO

PHILOSOPHY OF SRI AUROBINDO :

(1) According to Sri Aurobindo, “The world knows three kinds of revolution. The material has strong results, the moral and intellectual are infinitely larger in their scope and richer in their fruits, but the spiritual are the great sowings.” It is therefore the spiritual force through which universe can be explained.

Knowledge according to Aurobindo is nothing but to develop spiritual consciousness. Knowledge here communicates significantly between material world and spiritual consciousness.

(2) The evolution of human mind and life according to Sri Aurobindo, must necessarily lead towards an increasing Universality.

In his theory of evolution, he observed that the history of the world is the history of development, both material & nonmaterial world. Therefore, development is sourced from evolution. In the same fashion homo-sapiens have been evolved from the one-cell animal — both evolution and progress are proportionally related and they obviously follow the continuous process. If the evolution is continuous, then it's a natural question: What next after human being? The answer, according to Aurobindo, is the more developed human being or the concept of Super-man will be resulted. The Superman does not mean the imaginary person but he will be the Supramental strength of mind.

(4) Sri Aurobindo believed in the all round development of human being. Mostly he gave importance on vital education. According to him, “The soul is something of the divine that descends into the evolution as a divine principle within it to support the evolution of the individual out of the ignorance into the light”. He further added :-

“It is the whole consciousness, mental, vital, physical also, that has to rise and join the higher consciousness and, once the joining is made, the higher has to descend into them. The psychic is behind all that and support it”.

EDUCATIONAL PHILOSOPHY OF SRI AUROBINDO :

The Training of the Senses :

Sri Aurobindo gave most importance on the training of sense organs. We everybody see or hear in our surroundings. But is there any difference between see and look or hear and listen. Where lies the difference? The answer is given by Aurobindo himself :-

“Perhaps in a little more ‘presence’, a little extra consciousness that transmutes everything, adds a new dimension to our ordinary perceptions and gives them a freshness, a penetrating force, a comprehensiveness, an intuitive ‘something’.”

Sensations are an excellent instrument for attaining knowledge by seeing, observing and hearing. ‘Studies develop our sensation, the mind receives things through sensation.’ By the education of the sense organs one’s education and knowledge may be enhanced. If any person can distinguish different odours, yes! it’s a means of education is possible.

Actually without sensation nothing is possible to perceive through which knowledge is possible. Informations do nothing. So education should be developed on the basis of training of senses. It is explained nicely by Aurobindo - “In fact, they should be used for this, as instruments of observation, control and knowledge. If one is sufficiently developed, one can know the nature of things through

sight; through the sense of smell one may also know the value, the different nature of things; by touch one can recognize things, It is a question of education; that is, one must work for it”.

Development of Artistic Faculties :

He has felt urgency of general education to add and function of some cultural and aesthetic education, to add artistic taste and refinement to power and precision that is the aesthetic culture which will protect learners from degrading influences.

In our society performing art and education is not highly related. We some what neglecting performing and creating art in our education system, so according to Aurobindo, “This supreme intellectual value of Art has never been sufficiently recognized. Men have made language, poetry, history, philosophy agents for the training of this side of intellectuality, necessary parts of liberal education, but the immense educative force of music, painting and sculpture has not been duly recognized.”

Enlightenment of the Inner Movements :

It means to be consciousness about oneself conscious of the different part of one being and their respective functions — we have to enlighten ourselves through education. The Mother said :-”To perfect oneself, one must first become conscious of oneself”.

Therefore, by education, Sri Aurobindo upholds to improve the inner potentiality of human being through the right operation of the educational system.

Aims of Education :

If we synthesize the above fundamentals of Sri Aurobindo’s philosophical formations, we can arrive at aims of education. The aim of education according to Sri Aurobindo is the integral development of learners. Education to be fulfilled if it embraces five principal activities of the human being-(i) The physical, (ii) The vital, (iii) The mental, (iv) The psychic and (v) The spiritual.

(i) Development of physical culture is another aim of education according to him. Besides cognitive and mental development, physical development is also well placed in his education system. “If our seeking is for a total perfection of the being, the physical part of it cannot be left aside, for the body is the material basis, the body is the instrument which we have to use.”

(ii) Sri Aurobindo used to offer vital education for the learners at Pondichery. He maintains in the vital education — “The vital is the life-nature made up of desires, sensations, feelings, passions, energies of action, will of desire, reactions of the desire. Soul in man and of all that play of possessive and other related instincts, anger, fear, greed, lust, etc. that belong to this field of nature.”

But the basic target of vital education in his views, is to organize and training “of this complex of forces, is of the utmost importance for the building up of character.”

(iii) He criticizes the present quantitative aspect of our educational system and thinks that the improvement of the quality of oneself should be the ultimate target of our education system. About the present situation he rightly points out —

“The greatest mistake is to make an accumulation of factual knowledge, i.e., erudition, the crowning end of the education. Instead of learning how to acquire knowledge, the student is asked to store in his memory the knowledge gained by others, so as to keep it ready at hand - at last for the time of the examination”.

In this way, he rationalizes the essentiality of the mental education for the child.

(iv) “Psychic” means “belonging to the soul or psychic. The psychic being is a conscious form of the divine growing in the evolution.” Mother adds: With psychic education we come to problem of the true motive of life, the reason of our existence upon earth, the discovery to which life must lead and the result of that discovery: the consecration of the individual to his eternal principle.” That is ‘I am the master of my destiny’.

(v) Spiritual aim of education is mixed up with the psychic education and both are given the generic name “yogic discipline” although each has different goal to attain. Simply, psychic education implies a higher realization upon earth, while the spiritual education implies an escape from all earthy manifestation, even far away from the whole universe, a return to unmanifest. Psychic life is the life immortal, ever progressive change, on the other hand, spiritual consciousness means to live the infinite and eternal, to throw oneself outside the creation, beyond time and space.

This five fold aims of education proposed by Sri Aurobindo speaks for a new education which is known as ‘supramental education’. According to him, it will progress from above downward, a continuous transformation from one state of being to another, till the final state, the physical is reached.

This education advocates for a new ascent of species above and beyond man toward superman.

Teaching and Learning :

Sri Aurobindo in his A Preface on National Education (1920-21) prescribed three principles of teaching and learning as pointed out below :-

(I) “The first principle of true teaching is that nothing can be taught. The teacher is not an instructor or task master, he is a helper and a guide. His business is to suggest and not to impose. He does not actually train the pupil’s mind, he only shows him how to perfect his instruments of knowledge and helps and encourages him in the process. He does not impart knowledge to him, he shows him how to acquire knowledge for himself.”

(II) “The second principle is that the mind has to be consulted in its own growth. The idea of hammering the child into the shape desired by the parent or teacher is a barbarous and ignorant superstition.” A child must be induced to expand according to his own natural dharma. The teacher’s task is to find child’s dharma, develop it and use it, “to help growing soul to draw out in itself” to make it perfect.

(III) “The third principle of education is to work from the near to the far, from that which is to that which shall be.” That is, the teacher and his teaching must foster a free and natural growth for facilitating the child to have the condition of genuine development. Learning is, then, growing, discovery of self.

The Teacher :

(1) The first duty of the teacher is to help the student to know himself and to discover what he is capable of doing.

(2) According to Aurobindo the relation between teacher and student should be a relation of soul to soul. Familiarity is not required, not even advisable, but consideration and respect, as well as patience, understanding and love to be considered.

(3) The teacher should be punctual, calm, methodical, orderly, sympathetic, courteous and will have a good personality. Nothing should be imposed from outside but suggestions will come from the inner part.

(4) The attitude of the teacher must be one of a constant will to progress, not only in order to know always better what he wants to teach the students but above all in order to be a living example to show them what they can.

Thus, a successful teacher is expected to have :-

(a) “Complete self-control not only to the extent of not showing any anger but remaining absolutely quiet & undisturbed under all circumstances.” (Mother)

(b) “Must know that all are equal spiritually and instead of mere tolerance must have a global comprehension or understanding.” (Mother)

“The business of both parent and teacher is to enable and to help the child to educate himself, to develop his own intellectual, moral, aesthetic and practical capacities and to grow freely as an organic being, not to be kneaded and pressured into form like an inert plastic material (Aurobindo).

Physical and Moral Education :

To Sri Aurobindo physical education, the base of the total curriculum, means not only the proper functioning of the various organs of the body but also the development of strength, balance and a

sense of beauty, something akin to conceptualization of Plato. “If our seeking is for a total perfection of the being”, says Aurobindo, “the physical part of it cannot be left aside; for the body is the material basis, the body is the instrument which we have to use.” Therefore, a development of the physical consciousness must always be a considerable part of the complete aim of education.

The education of the intellect divorced from the perfection of the moral and emotional nature, is injurious to human progress, says Sri Aurobindo and he admits the difficulties involved in providing a suitable moral training for the school and college. He finds reasons to distinguish the heart from the mind and opines, that to instruct the mind is not to instruct the heart. Further, he points out pertinently that “the attempt to make boys moral and religious by the teaching of moral and religious text-books is a vanity and a delusion, precisely because the heart is not the mind and to instruct the mind does not necessarily improve the heart.” The best kind of moral training for a man, that Sri Aurobindo conceives of is, “to habituate himself to the right emotions, the noblest associations, the best mental, emotional and physical habits and the following out in right action of the fundamental impulses of his essential in moral training, Sri Aurobindo stresses the value of suggestion and deprecates imposition.

Integral Education :

Sri Aurobindo conceived of education as an instrument for the real working of the spirit in the mind and body of the individual and the nation. He thought of education that for the individual will make its one central object the growth of the soul and its powers and possibilities, for the nation will keep first in view the preservation, strengthening and enrichment of the nation — soul and its *Dharma* (virtue) and raise both into powers of the life and ascending mind and soul of humanity. And at no time will it lose sight of man’s highest object, the awakening and development of his spiritual being. This underlies the true and living integral education of him... Integrality of education is conceived as a process of organic growth and the way in which various faculties could be developed and integrated, is dependent upon each child’s inclination, rhythm of progression and law of development, **Swabhava** (inherent disposition) and **Swadharma** (inner nature). Integral education is not conceived as a juxtaposition of a number of subjects and even juxtaposition of varieties of faculties. The idea is to provide facilities for varieties of faculties, varieties of subjects and various combinations of pursuits of Knowledge, Power, Harmony and Skill in works.

“The system of Integral Education as being experimented at the Ashram accepts the truth and values underlying all the systems of education, but it is identical with none of them. It does stress harmonious development of the physical, the vital and the mental, but the harmony is sought to be achieved not by any mental or moral or religious ideas or system, but by an uncompromising stress on an inner seeking and discovery of the psychic and spiritual principles in the personality” [Exploration in Education, p.3.]. Again, “An Integral education which could with some variations, be adapted to

all nations of the World, must bring back the legitimate authority of the spirit over a matter fully developed and utilized”, Mother.

Mother maintains, “To pursue an integral education that leads to supramental realization a fourfold austerity is necessary and also a fourfold liberation”, and their practice will constitute the fourfold discipline or Tapasya which can be defined as: Tapasya of Love; Tapasya of Knowledge; Tapasya of Power and Tapasya of Beauty.

Conclusion :

Sri Aurobindo visualized the true National System of Education and formulated in its model that appeared in the Karma Yogin for the first time long before the proposition of basic education given by Gandhiji himself. His formulation of national education perfectly reflects his deep sense of patriotism and burning passion for education of the Indian children and youths where “They (students) should be the children of the past, possessors of the present, creators of the future. The past is our foundation, the present our materials and the future our aim and summit” (Sri Aurobindo). Latter, this formulation culminated fully into his Integral Education which is being practiced till the date at Sri Aurobindo Ashram, Pondicherry.

Question :

Let Us Check Our Progress

1. Explain integral education.
2. Indicate at least three important educational thoughts of Sri Aurobindo.

4.1.5 : SUMMING UP

Two Indian educators namely Swami Vivekananda and Sri Aurobindo have been discussed briefly in this Unit.

Swami Vivekananda emphasizes on mass education. He believed in the potentiality of human being and the education is the means of extracting and developing those potentialities.

Integral education is rooted in Sri Aurobindo who envisages to integrate our body, mind and spirit for the upgrading of self. Education is the way to realize the self and the world.

If you like to reflect upon all of the two systems of education, you are sure to identify their strengths and limitations. Surely, you will be ultimately able to evaluate our present day’s education very critically and to offer valuable suggestions for making our contemporary national education system more effective and life-centric.

4.1.6 : SUGGESTED READINGS

1. Chakrabarti, J.C. — Modern Education, 1995, Usha Publishing House.
2. Saint-Hilaries — Education and The Aim of Human Life, 1996, Sri Aurobindo Ashram Trust.
3. Aurobindo — A New Education for a New Consciousness, Sri Aurobindo Ashram Trust, 1995.
4. Purakait. B. R. — Great Educators, New Central Book Agency (P) Ltd., 1995.
5. Third Survey of Research in Education — NCERT, 1987.
6. Swami Vivekananda — A Hundred Years since Chicago, R.K.M. and Mission, 1994.

4.1.7 : ASSIGNMENTS

1. Discuss critically educational contribution of Swami Vivekananda.
2. Elucidate educational concept of Sri Auobindo specially in reference to educational philosophy, aims and role of the teacher.

Unit-2

Contribution of Great Thinkers (B)

CONTENT STRUCTURE

4.2.1 : Introduction

4.2.2 : Objectives

4.2.3 : Educational Contributions of Rabindranath Tagore

4.2.4 : Educational Contributions of M. K. Gandhi

4.2.5 : Summing Up

4.2.6 : Suggested Readings

4.2.7 : Assignments

4.1.1 : INTRODUCTION

In this Unit-you have come across that a philosophy of education takes its shape through integration as well as synthesis of cultural inputs. With burning sensation of nationalism and their protests against the British education systems prevailed in India about 150 years ago, some national heroes gave vent of their inner voice and intellectual inputs in building independently our national philosophies of education. Their philosophical architectures maintain some commonality, as each is solidly grounded on the Indian philosophical systems, though these differ in many aspects what they have emphasized on. Some of these national philosophers of Indian education, for example, are- Rabindranath Tagore and Mahatma Gandhi- who have offered their best in building Indian philosophy of education.

4.1.2 : OBJECTIVES

This Unit will make you enable to —

1. understand philosophy of education propounded by each of the two Indian national heroes — Rabindranath Tagore and M.K.Gandhi,
2. estimate contributions to Indian education made by each of the above mentioned two Indian personalities, and
3. analyse to what extent all these educational ideas are relevant in our contemporary education systems.

4.2.3 : EDUCATIONAL CONTRIBUTIONS OF RABINDRANATH TAGORE

PHILOSOPHY OF RABINDRANATH TAGORE :

Rabindranath Tagore's (1861-1941) manifold reflective as well as creative expressions are embodied in his life-long literary works he composed, experiments in both Shanti Niketan (abode of peace) and Shri Niketan (abode of beauty and aesthetics) he did, addresses he delivered in home and abroad, his art works he did, the letters he composed, etc. If all these are critically analyzed, we become charmed to discover his inner voice and the very realization — a continuous endeavour in searching for a concept of a Universal Man who is endowed with potential — ability re-construct one world permeated through a sense of fraternity; and a divine power for reducing human sufferings and acquiring spirit of joy, love and enjoyment in life. "This discovery of truth is pure joy to man — it is a liberation of his mind." Thereby, man must clearly realize some central truth — the principle of unity that there is in every man.

Man's highest joy is in losing his egoistic self and in the uniting with others. This power gives him a new power and insight and beauty of mind. To live in perfect goodness is to realize one's life in infinite. Then, education of man is the cultivation of his spirit, production of sensitivity towards life. Love for humanity implies the dignity of man. Man can be nourished by love and educating justice. Joy of work is the joy of action. Action pertaining to education is to be joyful — exploration of self. This travail is man's glory. Love for humanity implies the dignity. Tagore's concept of Universal Man is a hybrid conception of man of all ages, genders, strata, not restricted by any geo-political boundaries. His philosophical standing is grounded by the Upanisadic teachings, Vaishanava cult, Buddhism, colored with universal laws of nature of man expounded in human and material sciences of his days and what he grasped from numerous information sources, he observed in the countries he visited and experiences and he gained in his experiments on education.

The problems to which Tagore addressed himself were education, caste, rural reconstruction, self-reliance and self-respect, the role of tradition, the fruitful blending of the cultures and the thoughts of East and West, the status of women, civic consciousness and self-government. Tagore not only professed revolutionary ideas but drew up programmes to give them practical and concrete shape. Therefore, in the philosophical parlance he deserves a unique position.

Some of his philosophical thoughts are being summarized below :

(1) Rabindranath's philosophy is rooted from the Upanishadas. He tries to take fragrance from the world of infinite to realize Satchidananda to his life and writings too. But mostly he applied the concept of 'Ananda' in his life philosophy, defined as Anandabad.

(2) Tagore is greatly influenced by naturalistic philosophy. For him the inclusive and ultimate target of human life is to natural development of the individual. He promotes that nature should have freedom to educate the child through direct and personal experience from the nature itself. Tagore was naturalist but like a pragmatist he works on a vast canvas beyond the frontiers of a single individual to the universal human society.

(3) Tagore's philosophy is keenly related to the concept of God and nature. Man is the highest creation of God in the universe. Man is, therefore, originated from his internationalism and humanism. Human being can be expressed through the creative activities like poetry, literature, different arts like painting, music, dramatics etc., Aesthetics and the science of beauty are the link between human and divine. To him the art of music which almost directly bridged the gulf between the man and divine.

(4) Consciousness is the greatest gift of God according to Tagore. From his Consciousness ethics on morality which awakened the values of truth, beauty, goodness, love, etc.

EDUCATIONAL PHILOSOPHY OF RABINDRANATH TAGORE :

Now we are going to discuss educational philosophy of Tagore —

(1) Tagore's idea about education is to cultivate human being through 'Communion with nature mingled with freedom and Joy and Cultural Collaboration with other people'.

(2) Creative selfexpression is one of the prominent educational philosophy of Tagore. He considered cultural practices as part and parcel of Curricula. To him dance, drama, recitation, singing and other performing arts are integral part of the education system.

(3) Tagore's concept of national integration, international understanding leading to globalised world have been used in education as a tool for developing oneself.

(4) Tagore's emphasis on the development of socialization, social awareness, skillfulness, productive ability and social usefulness through education is relevant in present day's context.

(5) The basic principle of Tagore's educational philosophy are freedom and harmony with natural and human sunng.

(6) The objective of education according to Tagore is to the all-round development of learners reflected through his words —

"The ideal education must combine in himself the gifts of a philosopher, a poet, a mystic, a social reformer, a scientist and a veritable man action, because he has to take into account all types of men

and their aspiration, all facts of human personality, all levels of man's experience, all fields of endeavour and achievement".

Aims of Education :

Aims of education, according to Tagore, can be deduced from his philosophical standing and thought on education. He has presented aims of education in multitude dimensions, all embracing life which vibrates with the hymn of Satyam, Sivam and Sundaram... The supreme aim of education is harmony of all existence.

- Education aims at the creation of Universal Man (Vishvamanav).
- Education aims at initiating and sustaining harmony and love between man and nature...
- Education objects to offer man the unity of truth.
- Education aims at developing full man.
- Education is living, not alien from realities and cultural contexts." "True education consists in knowing the use of any useful materials that has been collected, to know its real nature and build along with life a real shelter for life."
- Education must appreciate both the liberal and utilitarian aspects of human life.
- Education must aim at developing men and women who may be able to fulfill the needs of the country.
- Education aims at fostering physical, intellectual and emotional development of the child.
- Education, what he calls 'total or natural education', consists of cultivation of knowledge together with the performance of manual labour in the natural surroundings.

Education aims at developing the spirit of nationalism as well internationalism education.

Curriculum :

The Santiniketan and Visvabharati introduced music, art, craft, dance, drama and mainly aesthetic approach in the mist of nature. He emphasized the vocational education also. At Sreeniketon he established the Vocational unit on the basis of work oriented education system. Other than Vocational and creative subjects, academic subjects are also given importance for imparting education. Tagore wished to equip his strength with the help of curricular and co-curricular activities for ensuring balanced education of the child.

The curriculum consists of not only traditional subjects which can develop intelligence but also subjects like music and dance which helped to realize the all sided development of a learner. Tagore felt the need for introduction of modern sciences and technologies in curriculum of the students

though he emphasized on the cultivation of the past treasure of India in child. In this way, he was an Indian Pragmatist.

Methods of Instruction :

There was a lot of novelty in his methods. According to Tagore Nature is a great book as well as a great teacher. Children should learn from direct experience of nature. The teacher and the pupils used to sit in the shade of a tree and the act of learning was executed in the open contact with nature. The students can enjoy full freedom. Children are also evaluated through examination but in a free and pressureless atmosphere.

Mostly activity based education system have been followed. The activities are—

- (1) Academic enhancement related to individuals enrichment of life.
- (2) Activities related to Community development programmes.
- (3) Activities related to Vocational programmes.

The medium of instruction is the mother tongue. Tagore's views that reward and punishment do not provide any effect but for teachers' initiation, inspiration and encouragement no material reward was needed to motivate the students, whereas punishment only deteriorated motivation. Here, the teachers role is as initiator and maintainer.

Role of the Teacher :

A teacher can not teach well unless he himself continues to learn just as "a lamp can never light another lamp unless it continues burn its own flame." A teacher does not merely inform but inspire his pupils. A real teacher is benevolent mentor-co-learner, co-discoverer as well as task master. He envisioned a true constructivist teacher devoted to flowering of the plant in pupil.

Conclusion :

According to Tagore, education was not only imparting information but to develop himself by improving the personality and through formation of character. With all the advancement of science and technology quality and quantity can not move simultaneously resulting lacking of human progress. Tagore is the rare personality who tries to revive the ideals of ancient Indian culture and heritage. His approach is basically cultural upgradation. The ideas of Tapovan or the Gurukul system that he advocates is the natural reaction against the mechanical system of education. Rather Tagore introduced different creative subjects together with our cultural heritage is the unique implementation of his

philosophy into practices. He experimented in education and learning for the balanced cultivation of the treasure within the child and his experiments were never unsuccessful in his days.

Question :

Let Us Check Our Progress

1. Discuss the life Philosophy of Tagore.
2. What is Anandabad?

4.2.4 : EDUCATIONAL CONTRIBUTIONS OF M. K. GANDHI

PHILOSOPHY OF GANDHIJI :

Mohandas Karamchand Gandhiji's (1869-1948) philosophical standing was a product of Indian culture and his experiments with truth what he derived at home and abroad. His philosophical ideas and thoughts were underpinned by the various kinds of school of philosophy or 'isms' — ancient Indian thoughts and religions, Swami Vivekananda, some Western social reformers like Tolstoy, Ruskin, Thoreau and his experiences with life both in South Africa and India. As such his manifold experiments with truth what he realized and practiced in his life can not be enveloped in any particular philosophical 'ism'. However, he is best called the father of 'Gandhism' a hybrid philosophy which proclaims:- "God is that indefinable something which we all feel but which we do not know... To me God is Truth and Love, God is Ethics and Morality... God is the source of light and life and yet he is above and beyond all these. God is conscience....He transcends speech and reason ... He is the purest essence....He is the greatest democrat the world knows for he leaves us 'unfettered' to make our own choice between evil and good....". Again he adds: "I then found that the nearest approach to truth was through love ... I found too, that love in the sense of ahimsa had only a limited votaries in the world." This does not mean his advocacy for blind religious notions about God rather he very resolutely says: "I don't care for God if he is anything but Truth, anything but the un-denial Reality revealed in man and outside." He also speaks for a pragmatic test and continues, "God to be God must rule the heart and transform it." Gandhi placed full faith on Man who, according to him, is a complex being endowed with consciousness, reason, conscience, will, emotion and similar qualities and powers which are the expressions of the spirit or soul present in him. Morality is, for Gandhi, the very basis of life of man...

The path to realization of True, Self or God by man, therefore, lies through the love of others and the performance of duties towards others. He looks, morality is the essence of dharma and

Love (ahimsa) is the essence of morality; it is the nearest approach to God; the Truth manifested in our knowledge of Reality. Love in man is the Divine Law or God inherent in him.

Gandhi realized this truth what was observed in his insatiable love for mankind. Thus, he was imbibed by the idea that Love without Truth would be blind and narrow; Truth without love would be a mere unrealized Ideal. Some moral maxims which Gandhi accepted and found useful in life are, for example:- The greatest good of all; Satisfaction lies in the effort, not in the attainment; If we utilize the present well, then alone we can ensure future progress. (Therefore, he was fond of saying, “I am a practical idealist”.); Good habits are the most important capital of our life; No success is worthy of human effort if it does not ennoble man; The true source of rights is duty; etc.

In dealing with all such things Gandhi prescribed two steps — self-analysis and self-purification and for discovering one’s self, he advocated for practice of five cardinal virtues: ahimsa (harmlessness), satya (truthfulness), asteya (non-stealing), bhrahmacharya (chastity) and aparigraha (non-possession of unnecessary things).

Like all ancient Indian thinkers he held, “Ignorance is at the root of failures” and reason is the voice of God and truth alone prevails (satya eva jayate). Gandhi accepted the original conception of natural classes (varnas) but he severely criticized and tried to reform the latter conception of castes which regarded as an undesirable excrescence of the original ideal. He strongly believed in dignity of labour and upheld the notion that all kinds of labour, intellectual, mental commercial, agricultural, etc. are necessary for maintenance and improvement of society in all aspects... He believes in democracy as the ideal form of governance of society but that democracy can not be evolved by forcible methods rather it will emerge through its right practices in our civil society. Gandhi vividly depicted his dream of the gradual spiritual expansion of the individual towards its identity with humanity through service and self-sacrifice for the betterment of the world. Like Plato, Gandhi advocated for a complete system of education what he called Nai Talim — a new practice of education for sorvadoya (full realization for all), for all round development for all. In fine, Gandhi called himself a practical Idealist and attempted to present India with national systems of education, alien from the ruling British educational model at his life time.

Some of his philosophical ideas may be summarized as :

(1) Truth is the ultimate reality of life and non-violence is the way to achieve the goal. Gnadhiji believes that truth is one and therefore, it is the ultimate target of human life. Non-violence is the process for attaining truth which is the basic target for upliftment of humanity.

(2) He realizes no difference between Truth and God. God is the highest manifestation of Truth. The whole Universe is the expression of Truth itself. The supreme goal of life is searching truth.

(3) As a significant political personality in India he wanted to establish a society based on truth, non-violence, equality, justice and other human qualities.

(4) Gandhiji believed in democracy and socialism for developing and organizing a country guided by the moral and social values.

(5) Gandhiji is one of the greatest humanists and he presented himself for the service of mankind. His concept of humanism and socio-political philosophy are rooted in the Indian cultural heritage and values.

(6) Secularism is a very much dominating factor of Gandhiji's philosophy. Throughout his political career Gandhiji exhibited himself as a symbol of secularism what lead to the shaping our constitution, when India attained independence.

(7) Gandhiji believed that without the upliftment of masses no nation can be advanced. He pointed out "I would have mass education, not as we ordinarily understand it, but education of parents, so that they can undertake adequately the moulding, of their children and that is he philosophy of mass education for Gandhi".

EDUCATIONAL PHILOSOPHY OF GANDHI :

The true picture of his philosophy of education can be understood if you synthesize the following points which have been deduced from his philosophy of life.

(1) Education should be self-supporting mechanism. Gandhiji believed that handcraft would make education more realistic, productive and self supporting.

(2) Free and compulsory education should be provided between the age group 7 and 14 which was supported by the First Conference of National Education at Wardha in 1937.

(3) Craft-centered education was his innovative ideas on education as a means for social transformation. Gandhiji believed that the highest development of mind and body is possible only through handcraft. Self supporting and productive based education system is possible by craft centered education for improving quality of life of the masses.

(4) The medium of instruction should be mother tongue. Gandhiji believed that only positive transfer of teaching-learning is possible through mother tongue. This concept is universally accepted.

(5) Non Violence is the creed of life. Ahimsa is the best tool. About non-violence in education Gandhiji uttered, "We cannot, will not think of exploitation, and we have no alternative but this plan of education which is based on non-violence." Gandhiji's basic educational philosophy is to apply the concept of non-violence in the teaching and learning to develop basic human qualities and also to promote democratic citizenship among learners.

(6) Dignity of labour is an important value in life. Gandhiji believed that education should be work oriented which can enable learner to appreciate the dignity of labour. Thus, education will be productive and it will help the society and nation to go ahead.

(7) Realistic or activity based education system is more convincing form of education. Activity is natural dharma.

Gandhiji will be better to view as pragmatist. Gandhiji advocated for productive education rather than bookish knowledge. His educational concept gives emphasis on productive efficiency and practical skills through craft. The selected activity - to be taught and applied to make the learners good craftsman and enable them to provide self supported education.

Aims of Education :

Aims of Education according to Gandhi may be stated as :

(1) To develop self realization, self confidence, morality and oneness with God is the ultimate aim of education.

(2) According to Gandhiji “True education should result not in the material power but in spiritual force”. Therefore, according to Gandhiji education should be based on spirituality which is the ultimate aim of his concept.

(3) Gandhiji advocated the self-supporting education as its utilitarian aim as it can remove unemployment and it is need-based too.

(4) By education Gandhiji meant all round development of mind, body and spirit. It is possible through a productive craft. It involves all round progress by hand, heart and head.

(5) The end of all education according to Gandhiji ‘should be the building up of character’. Moral development is held as the highest priority by Mahatma Gandhi.

Ideas on Basic Education :

Gandhiji is more famous for his educational innovation, popularly called ‘Basic Education’. It is held as a means as well as a culture for causing social revolution through his cult of ‘Sarvodaya — leading to all round development of all without any trace of the governing principles of exclusiveness. Basic education was held by him as the education for all for building bases of life. Its philosophy and practices have socio-cultural, economic, pragmatic, etc. perspectives.

(1) The education must be free and compulsory and universally it should be provided among learners between age group 7 and 14 irrespective of caste, gender or habitation-levels.

(2) Medium of Instruction should be imparted in mother tongue.

(3) Education should be provided on some basic craft chosen considering the need and capacity of the learners. The Wardha Committee advised weaving, spinning, card-board, wood-work, leather work, kitchen, gardening, agriculture, fishery and obviously selected crafts to include as different activities on basic education.

(4) He developed the scheme and concept of basic education which would itself be productive, self-sufficient, economically viable and relevant to life.

(5) The craft is not to be taught mechanically but its sequential logic and its application to be understood carefully.

(6) Basic education gives importance on three fundamental values. These are as follows:

- (i) Dignity of labour,
- (ii) Social awareness,
- (iii) Secular outlook.

(7) Basic education is essentially an education system for life and through life.

(8) It aims at all round development of learners. Development must touch upon — Head, Hand and Heart of the child.

(9) Basic education has four distinct phases :

- (a) Pre-Basic stage (up to 7th year)
- (b) Junior-Basic stage (7th to 10th year)
- (c) Senior Basic stage (11th to 14th year)
- (d) Post Basic stage (14th year to onwards)

(10) The basic education has a close relationship between school and community. It makes children more social and co-operative. It involves the following activities —

- (i) to organize school as a functional unit linking between school and community.
- (ii) to participate in the life around the school.
- (iii) to organize various social activities of the child.

Curriculum :

Gandhiji introduced activity-based curriculum to extract all round development among learners by learning through doing. His curriculum includes:

- (1) Basic craft (agriculture, spinning, weaving, cardboard, wood and metal work).

- (2) Mother tongue.
- (3) Mathematics (to develop computational ability arising out of craft work).
- (4) Social studies (Cultural contribution of the country).
- (5) General Science (Nature study, Zoology, Physiology, Hygiene, Physical Culture, Chemistry and Physics).
- (6) Moral studies.

The Teacher :

Gandhiji visualized that:

- (1) The teacher is to be more active.
- (2) He must be a good planner, doer and thinker.
- (3) He will be able to correlate various subjects with craft.
- (4) The teacher should be conscious about the allround development of the learners.
- (5) He should have a flexible personality.
- (6) He should have mastery over craft and correlational principles of instruction.
- (7) He is the instructor and also a guide.

Conclusion :

The concept of Gandhiji's philosophy of education is unique, balanced and unquestionable. But its implementation is rather weak. Therefore, Education Commission (1964-66) has rightly pointed out :-

“What is now needed is a reorientation of the basic education programme to the needs of a society that has to be transformed with the help of science and technology”.

In spite of these criticisms, Gandhiji's contribution to our national systems of education is still remarkable minimally in the aspect of value education. Further, many of his ideas have been recognized by UNESCO.

Question :

Let Us Check Our Progress

1. What is basic education?
2. Briefly discuss the scheme of basic education of Gandhiji?

4.2.5 : SUMMING UP

Two Indian educators namely Rabindranath Tagore and M. K. Gandhi have been discussed briefly in this Unit.

Tagore applied his creative self expression on education. To him world is the expression of Joy and beauty. What is real that is beauty according to Tagore, which was admitted as Ananadabad. Basic education is the creation of Gandhiji on the foundation of truth and nonviolence very much significant in today's perspective.

If you like to reflect upon all of the four systems of education, you are sure to identify their strengths and limitations. Surely, you will be ultimately able to evaluate our present day's education very critically and to offer valuable suggestions for making our contemporary national education system more effective and life-centric.

4.2.6 : SUGGESTED READINGS

1. Tagore Rabindranath — *Siksha and Culture*.
2. Tagore Rabindranath — *Atma Parichaya*.
3. Chakrabarti, J.C. — *Modern Education*, 1995, Usha Publishing House.
4. Purakait. B. R. — *Great Educators*, New Central Book Agency (P) Ltd., 1995.
5. Third Survey of Research in Education — NCERT, 1987.

4.2.7 : ASSIGNMENTS

1. Briefly discuss Tagore's philosophy of education and in this light discuss Tagore as an educationist.
2. What is basic education? Briefly discuss merits and demerits of basic education system.
3. Discuss the concept of mass education of Vivekananda and Gandhi and mention how they are relevant presently.
4. Write brief notes on : Integral Education, Basic Education, Education for the Universal Man, Man-making Education.

Block-5
Building a Philosophy
Unit -1
Building a Philosophy of Indian Education

CONTENT STRUCTURE

- 5.1.0 : Introduction**
- 5.1.1 : Objectives**
- 5.1.2 : Philosophy of Education Revisited**
- 5.1.3 : Concerns for Perspectives for Building a Philosophy of Education**
- 5.1.4 : Perspectives for Building a Philosophy of Education**
- 5.1.5 : Basic Elements in the Design of a Philosophy of Education**
- 5.1.6 : Building a Philosophy of Indian Education**
- 5.1.7 : Heuristics for Building Philosophy of Indian Education**
- 5.1.8 : Let Us Sum Up**
- 5.1.9 : Suggested Readings**
- 5.1.10 : Assignments**

5.1.0 : INTRODUCTION

You have in the earlier Modules of this Paper gained understanding about various schools of philosophy, Western & Indian, relations of philosophy and education, various schools of educational thoughts and ideas and their directives, prescriptive, normative and reflective formulations in developing theoretical foundations of education as a discipline, as a systems, a field of inquiry, a tool for solving individual as well as social problems contextualized either in classroom or outside of the classroom though related to life of people. You have also got an understanding that those philosophical outlooks

vary from “ism” to “ism” because the “ism”-protagonists differ in their respective world view, in the basic foundations of philosophy, metaphysics, ontology, epistemology, axiology, aesthesis, etc. and ultimately attempt to solve problems concerning all these dimensions. Moreover, you have observed that those philosophical “isms” go on changes across time and space all over the world. Even today philosophy examines critically the intellectual disputes of the time and to suggest alternative arguments of ways of viewing things. Another role of philosophy has been to develop sensitivity to the logic and language used in constructing solutions to problems pertaining to man’s life in all aspects. It is possible to trace the history of ideas by tracing the development of philosophical thought and the history of philosophy reflects some of humanity’s best thinking - our collective wisdom.

5.1.1 : OBJECTIVES

After going through this Unit you will be able to : —

- reflect upon your understanding about philosophy of education
- be acquainted with the essential perspectives of philosophy of education to be built
- be acquainted with the essential perspectives for building a philosophy of Indian education
- build a philosophy of Indian education

5.1.2 : PHILOSOPHY OF EDUCATION REVITIED

Max Muller argued that philosophy in India was recommended ‘not for the sake of knowledge, but for the highest purpose that man can strive after this life’. This means Indian philosophy aims beyond logic. This uniqueness in Indian philosophy rests on the fact that it did not take its rise in wonder or curiosity, as it did in the West,; rather it originated under the pressure of a practical need arising from the presence of moral and physical evil in life. Thus, philosophic endeavor was directed primarily to find a remedy for life, finally came to un-bean metaphysical questions and man’s aim was attainment of perfection and in some cases a continual progress towards perfection within the limits of present life. The ancient Indian did not stop at the discovery of truth, but strove to realize it in his own experience. Philosophy thereby becomes a way of life, not merely a way of thought.

Especially, in India you have observed that the temporal variations in philosophical stances are discernible in ancient Vedic systems, Buddhism Jainism, etc but the paradigm shifts are to some extent overlapping in many occasions. Those changing nature has undergone even in the mediaeval

India and then in British India too. Not only have that changes been noticed even after. All these changing orders are reflections of the great thinkers in their attempt to solve in-coming problems as time passes on and cultural transformation undergoes.

Therefore, philosophy is not a theory but an activity striving towards the systematic clarification of thoughts, problems, and emerging issues concerning life but it is never divorced from life. Hence, we may consider philosophy is a valid tool aiming at solving problems concerning knowledge, reality, and values on the main and takes into consideration of induction, deduction, dialectic, analysis and synthesis as methods. Bergson rightly observes that philosophy “does not only facilitate speculation, it gives us also more power to act and live” which is never isolated from humanity and the Nature and both reason and intuition are equally necessary. Further, Sri Aurobindo puts : “Reason is not the supreme light and yet it is always a necessary light bringer and unless it has been given its rights and allowed to judge and purify our first infrarational instincts, impulses, rash favours, crude beliefs and blind prejudices, we are not altogether ready for the full unveiling of a greater inner illumination.” Thus, philosophy loves a continuous journey for exploring riddles of changing life.

In the social context of education we consider political theory, in the aims of education, metaphysics and value theory, in curriculum and method, knowledge theory ... For philosophical solutions of educational problems, philosophical method tries to perform three functions. One is speculative, another is normative and the last is critical.

In Routledge International Companion to Education, Bob Moon, Miriam Ben-Peretz, and Sally Brown, eds. (New York: Routledge, 2000, 3-18.) have re-assessed ‘philosophy of education’ very meticulously . The term “philosophy of education” is that throughout most of Western thought what might be regarded broadly as philosophical reflections on education were never regarded as constituting a distinct discipline or branch of philosophy. On the one hand, for most of the great writers in the philosophy of education pantheon (such as Plato, Aristotle, or Rousseau) such reflections were continuous with their accounts of epistemology, ethics, politics, or human nature. It would never have occurred to them that a philosophy of education could be developed that was not, at heart, an elaboration of such “purely” philosophical themes. At the same time, and from what might be termed the opposite direction of the theory-practice dialectic, what today is called “philosophy of education” has also long been regarded as continuous with the serious reflections of practicing educators, curriculum theorists, and educational policymakers. Having a “philosophy of education,” in this sense of the term, is simply a phrase for the process in which educational practitioners or reformers develop thoughtful, and to varying degrees systematic or coherent, justifications for their educational practices and commitments (something with which, not surprisingly, few academic philosophers have had very much experience or direct concern).

Question :

Let Us Check Our Progress

What do you mean by 'philosophy of education' from a teacher's end?

5.1.3 : CONCERN FOR PERSPECTIVES FOR BUILDING A PHILOSOPHY OF EDUCATION

An era of transition from an old to a new one seems very discernible in the matter of quest in philosophy of education everywhere. But the cry for that search tells us that it is an inclusive search requiring many voices / stances. Experts argue that the current mood in philosophy of education is generally towards understanding and dealing with problems and issues in context rather than a return to the idea that the individual, society and education can be understood in an overriding system of thought. The assumption that a set of universal principles or a system of thought can explain the multitude of variables that pervade personal and social relations in education is a non-entity. The new trend is not on system development but rather in human predicaments in specific contexts. But there are others who find ground in developing philosophy of education. Broudy, for example, emphasized certain things that educators have a right to expect from philosophy of education, including attention to the problems of education in general and schooling in particular, clarification of educational concepts and issues, and rational discourse and freedom of inquiry.

Even today philosophical task is constant probing and inquiry and this inquisitive restlessness makes philosophy an enduring human enterprise, one that is never quite completed but is always in the making. This search involves education no less than other human concerns. But philosophy of education cannot be viewed in a vacuum but must be seen in the interplay with other forces. May be today a single philosophy of education suitable at any particular moment as philosophies have their ebb and flow and their values depend on particular needs of the times. This means striking out in a new philosophical direction, critical examination of the older philosophies, or even going to philosophy outside our own cultural traditions. Whatever may be the case, some vantage points from which to view education call for inclusion.

Question :

Let Us Check Our Progress

Give reasons for requirement of perspective for a philosophy of education.

5.1.4 : PERSPECTIVES FOR BUILDING A PHILOSOPHY OF EDUCATION

Some experts see that developing a philosophical perspective on education is not too easy. A philosophical perspective makes education very practical as it helps us see the interaction among students, curriculum, administration, and goals. Moreover, educators need a philosophical perspective in order to give depth, and breadth of meaning and direction to their personal and professional endeavors. However, there is no one way to develop a philosophical perspective. The approach suggested by Charles Marler, (1975) may be cited below.

1. **Becoming aware of Education as more than School or Classroom Activities.** Any philosophy of education as a branch of social philosophy must not mean education as only classroom activities, it embraces whole of life of a person from womb to tomb. Education is interrelated with holistic development and direction a society takes and both the teacher and the learner must become aware of. In the broadest sense education involves minimally two things; (i) passing on the cultural heritage from one generation to the next so that essential social and cultural continuity exist and (ii) providing the skills, abilities and understanding to develop new ways of doing things in light of changing conditions. Becoming aware of education in these terms is a necessary ingredient for developing a philosophical perspective.
2. **Becoming aware that Philosophy provides a Comprehensive view of Education.** Philosophy as a disciplined study is concerned with developing a coherent, logical, and comprehensive outlook. It also embraces within it a wide range of issues and problems, and education has been important to most philosophers. When education becomes aware that philosophy embodies comprehensive perspectives and tools for developing organized and structured views, the basic groundwork for a philosophical perspective on education has been laid.
3. **Studying the Historical development of Philosophical Ideas and their relation to Education.** Philosophy of education must provide a chronological and systematic body of knowledge one can find helpful in understanding what has happened in educational thought up to the present. It must depict and explain how aims, objectives, and practices of education have evolved and what departures in aspects of education came in and how those were reconciled. It may also help one to develop an appreciation of educational traditions and offer more a more intelligent and critical evaluation of such traditions. Further, it does give us continuity; it provides a basis for developing new ideas and a vantage point from which to evaluate new aims and practices.

4. **Studying the Philosophical Treatment and Analysis of specific issues in Education.** Concerned problems and issues may focus on particular problems like equality of educational opportunity, moral education, inclusive education, professionalism, from various standpoints of psychology, economics, management, etc. But it may look at such problems in a critical, holistic, and ethical fashion. It extends to the wholeness of life in a civic society. Philosophy helps us identify and express problems in clear and logical language. Derivatively, a philosophy of education must attempt to explain and solve various broad and narrow problems and issues in education both logically and without ambiguity.
5. **Engaging in continuing Personal Research, reading and study in Philosophy of Education.** This means that one must appreciate in using philosophical thinking and must be committed in continuing study. Such doing may involve creating new outlook through combining, interrelating.. and drawing conclusions from philosophical ideas. Likewise, an educator must have scope and ding — motto to enhance educational perspective. Philosophy of education should not be a self-contained body of knowledge; rather it shall be open to criticism, experimentation and renovation.

Question :

Let Us Check Our Progress

Mention the various perspectives for a philosophy of education.

5.1.5 : BASIC ELEMENTS IN THE DESIGN OF A PHILOSOPHY OF EDUCATION

Harry S. Broudy in his famous book, *Building a Philosophy of Education* looks the methodological strength of philosophy and posits, philosophy of education as an applied philosophy which gives the philosophical treatment of educational problems at various levels such as emotional, factual or information, explanatory or theoretical and philosophical. Naturally, building philosophy of education must touch upon the major fields of classical philosophy - metaphysics, epistemology, logic, ethics and aesthetic. Therefore, Broudy has expounded an approach of classical realism in the sense that it accepts regulative principles, the idea of truth pertaining to it is independent of the knower, the idea of structure in the universe and society that are normative for man's striving toward the good life and for these education will help him to achieve it. This normative approach may not be understood as single one and eternal. The norm should be directed by and grounded in various "isms" of philosophy.

The architecture proposed by Broudy offers us a guide to the philosophical treatment of educational problems. The method applied throughout is to begin with an educational problem and

to see what makes it controversial or difficult to solve. Nevertheless “sooner or later this search reveals certain presuppositions about the ultimate nature of truth, goodness and the nature of man”. In his language building a philosophy of education means, “dealing with educational problems philosophically rather than acquiring a philosophy as the primary goal”. Broudy has raised his philosophy of education building taking three vital stands: Man, Society, and the School, Values in the Educational Enterprise and The good Life and the School which hold as the three broad frameworks in which the educational problems lie and the solutions can be envisioned. You will be able to grasp more deeper understanding of each of the above three framework if you concentrate your attention to the following presentations.

Man, Society and the School

1. A philosophy of education must embody definition and the nature of philosophy of education. It should consider education as control of learning and offer definition of philosophy of education minimally at emotional level, informational level theoretical or explanatory level and also philosophical level.
2. It should deal with aims of education, attempts to explain ultimately the good life as the aims of education and must give meaning of it good life -subjectively and objectively.
3. It must go on exploring education with proper elaboration of the structure and dynamics of personality. This means the strength, limitation of the learner, his appetite for learning, his abilities, etc ... In this way the evolving philosophy of education would deal with natural and reflective freedom, self-realization and self-integration of the educand.
4. It must take into consideration and also attempts to highlight education and its social perspectives including autonomy for freedom in education Hence, it is imperative that philosophy of education and sociology of life of man should come together for sharpening education as a tool for comprehensive human development.
5. Any philosophy of education can not overlook the theme- Reality and Knowledge. The emerging philosophy of education must attempt to hints on solutions to the adopted meanings of ‘being’ and ‘becoming. How far knowledge is stable? What is relationship between science and metaphysic? What is valid knowledge? Relative importance of sensation and perception, and intuition.

Values in the Educational Enterprise

As because philosophy of education is a branch of social philosophy at its operation level, the problem pertaining to human values has been the central concern in education through out the ages.

1. The philosophy of education must deal with human values and take cues from General value theory : experimentalist theory of values, emotive theories of values, values as objective, the value areas, intrinsic and instrumental aspects of values, positive and negative values, higher and lower values .It must tackle the problems and difficulties of values in education.
- 2 The envisioned philosophy of education must embrace problems and their solutions related to the economic, health, associational values, recreational values and aesthetic values very critically.
3. Further, the philosophy of education should be concerned in the moral and religious (if admissible). It must set the criteria of Moral values, and Moral Education and Moral Development

The Good Life and the School

1. In this aspect the philosophy of education must look critically the curricular issues, contexts, and concerns; curriculum approach, curriculum modalities, and subject matters in great details so that their successful operationalization modes lead to ultimately the envisioned good life.
2. Another problem in education is what method of instruction is to be used for curriculum transaction. This issue is strongly related to the theory of knowledge- epistemological arm of philosophy. Hence, a good philosophy of education must be straightforward to solve the problems of knowing and it should relate method and the theory of knowing.
3. The organization of an educational system is another area. It embraces several issues and also faces many headed problems concerning grouping in formal schooling, progressive development of the structure of education and institutions for learning, adult continuing education, professional education of teachers, in-formal education, role of mass-media in education, etc Socio-political ideology related organizational problems, etc. A good philosophy of education must understand those issue and problems and strives to give solutions.

Some Discussion

With this framework in mind Broudy in his long critical intellectual journey toward building a philosophy of education has selected some definite inns which gives specific meanings of philosophy of education to be built as education is not a haphazard enterprise, rather it has purpose, goal or aims and objective. For an intelligent talk about aims of education, we have to specify on what level of generality the discussion will take place. As education is a value-laden enterprise or a kind of positive science, educative enterprise promotes good life for its beneficiaries, though we have to define a good life in variant terms. In fact the good life has two correlative subdivisions- the good individual and the good society. Weights to anyone of these two or to the both depending upon other determining factors, issues, beliefs of the society.

The task for philosophy of education to outline and also to transcribe the good life, the good individual, the good society into learning that presumably contribute to their productions. The subjective estimates of good life are based for the most part on how pleasant or satisfactory our own lives seem to us. Objectives estimates also insist on pleasantness, but they are subordinate it to duty to the common welfare, quality of character, and a rough notion as to what we have a right to expect from life in an average set of circumstances. These two when combined we can suggest that perfect functioning of any human capacity is accompanied by pleasure. For education the good life as an aim translates itself into a programme of helping each individual lay the groundwork for such cultivation. However, the good life is too general a notion to be directing education and it cannot be defended on rational grounds.

A good life means a good life of Man who is describable by his personality, the most general feature of human life. Four major principles seem to describe the essential working of the human personality—these are appetitive principle, self-determination, self-realization and self-integration. For education, each of these principles implies acquisition and use of knowledge. Knowledge of Self, knowledge of society, and knowledge of nature are gymnasias where we practice the skills and perfect the habits needed for self-determination, self-realization and self-integration.

A philosophy of education must look forward for solutions of issues, problems and concerns relating to education and values in great details. The aspect is of utmost importance as the very nature of education is charged with affectivity, sensitivity, whole some personality grounded with certain norms—may be either relative or stable over time - and also held important by some “isms” accepted by the social orders. Naturally, different theories of values, various kinds of values. concern about negative and positive values must come forward in determining aims and objectives of education. Specifically, economic, health, recreational, affectional values, moral values, democratic humanistic values, secularism, aesthetics and education, etc must be dealt in the emerging philosophy of education for a particular nation.

For the inculcation of value-laden good life in the formal school and solving problems pertaining to it must be effected with curriculum development, curriculum re-design and curriculum transaction. Curriculum may take many approaches. It may find rationale in subject matter centric curriculum, problem centered curriculum, or any type of curriculum grounded on the contemporary paradigm shifts in learning, instruction or pedagogy. Curricular issues and contents are always problematic as much of these are both philosophy and social philosophy grounded. And the nature of knowledge to be integrated in a curriculum differs from philosophical ‘ism’ to ‘ism’. For example, to Dewey curriculum is a process as much as a distinct body of subject matter; while the Reconstructionists favour ‘world’ curriculum with emphasis on truth, brotherhood and justice effecting multicultural

education. Naturally, a philosophy of education in its emerging state must take hold of general skills, competences, efficiencies, etc to be developed and inculcated in the individuals taking cues from the metaphysical, epistemological, axiological views which are held important. for a nation or a society. From an appropriate deduction of the foundations of the curriculum specific cognitive, psychomotor, meta-cognitive, affective tasks to be included as the subject matters or activities which have high probability for the attainment of attributes; characteristics, qualities, role-playing, etc.—all contributing to the journey towards good life. Not only, these, other aspects of education should be integrated in the curriculum structure, such as methods of teaching, learning styles, mode of assessment, principles of placement and classroom organization administration management, etc.

Consequently, the philosophy of education must give clues, directions, through curriculum grounded on metaphysics, epistemology, and axiology to the advancement to good life—personal, vocational, social, and even spiritual. Not only these, this philosophy should be powerful and functional enough to solve ever-emerging changes in the waves of human life and to adjust curriculum accordingly. It must be ever vigil to help the ship to reach its destination even though the young learners become usually perturbed in the sea of existential anxiety and identity crises in the rapid changing world orders. The matter of discipline in classroom or in the campus is some giant issues. This philosophy of education must look deeply the facts and would be potentially enable to suggest solutions or prescribing remedial measures.

Further, there are problems relating to teachers, their education, professional advancement, professional code of conducts, or ethics, academic and professional freedom, etc.

Question :

Let Us Check Our Progress

Express your opinion to support the argument - education must be value-oriented enterprise.

5.1.6 : BUILDING A PHILOSOPHY OF EDUCATION

The Perspectives

Indian education means our national system of education. The central idea of a system of education to be really Indian in nature must hold the attire of Indian-ness. It should highly regard “education and life are inseparable and coterminous. To live is to undergo education. Education is in a way, like music in which two discernible notes keep sounding and, as they alternate in varying rhythm, reflect how the powers potential in a person grow—powers of the body and mind, of intellect and imagination, of creativity and intuition. In our education, freedom of imagination and self-control;

dissent and discipline take turn and appear in myriad form in the play of education. It is also a fact what you have already been acquainted with after your long journey to the other Units of this course of study that the very aim of Indian philosophy. is not the disinterested pursuit of truth and resolution of doubt (samasya) but to serve as practical aid (prayojana) to show the right way of living. Or, it aims at not just to unravel the mystery of life but to discover a way-out of its misery. Spiritual liberation (moksha) became the highest goal of life both in orthodox and heterodox schools of Indian philosophy. For attaining both the practical and liberal goals of life education has been regarded as the only tool.

Education is basically considered as a natural process wherein three basic native urges underlie growth of the student. The first is urge to be free. Freedom means a continuous initiative from within to fullness and harmony; to aspiration and creativeness, i.e., self-realization—the human spirit endeavours to transcend all its limitations to experience a moment of boundlessness. The second urge is urge to grow more and more ... This urge goes on and on to discover oneself. Management of this urge according to our ancient masters as brahmacharya. Herbert Marcuse observed that methodological sacrifice of the libido, its rightly enforced deflection to socially useful activities and expressions is culture; one can not be a human being without cultural experience. The third urge inherent in a growing person is the urge to fashion for himself a philosophy of life, namely his understanding of himself as well as of his environment in which he is both actor and spectator. He must learn to appreciate how parts are related to the whole and how to value each part as it is in itself and in its relationship to the whole.

Purushartha and Pachakosha are two concepts in Indian philosophy that throw light on the nature and status of values. Literally purushartha means, "what men live for". It is based on the realization that desires constitute the source of human action. The ancient Indian teachers recognized four supreme ends- artha (wealth, the economic value material in nature), kama (physical well-being, pleasure both physical and psychological), dharma (righteousness, orientation to discriminate between bad and good) and moksha (spiritual liberation leading to spiritual bliss). That is the central point of the purushartha teaching is that man ought to distinguish between the lower and higher ends of life and pursue the higher values. This does not mean that the lower values of life are to be abandoned altogether but that should be pursued only as means to the realization of a higher aim in life. Pachakosha commonly means five sheaths or koshas. The Upanishadic meaning of the term constitutes five sheaths of 'self' which are being annamaya, prannamaya, manomaya, vijñanamaya and anandamaya referring to the physical, physiological, psychological, intellectual and spiritual aspects. These five sheaths constitute a hierarchy. Cultivation of the five koshas is the cultivation for self-realization. The first two are referred to as '*sat*'; the third and the fourth as '*cit*' and the fifth one *ananda*. The proper and full development of all the aspects of *sat*, *cit* and *ananda* is the highest end of human life

for which education is to be designed. This all round development of personality through the process of education for all irrespective of castes, creeds, and gender. This concept regards - educational development in man is progressive and ceaseless.

The function of education from Indian lenses is to help the pupil to carve out for himself a philosophy of life by which he must live. He needs to have a vision of his destiny and a clear view of the role he must play in life. Even in the circumstance of modern life there is no reason for despair, if education in the proper sense is allowed to play its role—awaking the pupil to an appreciation of freedom and responsibility in making choices in accordance with his own philosophy of life (pearled with value systems) which blossoms in many petals indicating what he thinks, speaks, moves works Education from the Indian perspectives fails if it does not help the individual to cultivate the hardest of all hard arts—the art of life, namely, the art of self-determination inspired and guided by elevated thoughts, humane values and refined tastes.

Two main characteristics of an educated mind in our ancient teacher like Krishna is detachment and humility. The ancients in India used to say: Knowledge be gets humility [vidyadadativinaya]. Arrogance, on the contrary, is associated with dogmatic beliefs. Freedom to speak and act in accordance with one's conception of truth is associated with the state of mind which is free from fear. Fear is associated with ignorance and there is no happiness where there is fear. True liberty is attained by self-discipline propelled to conquest by the mind particularly of six enemies—desire (kam), anger (krodh), greed (lobh), attachment (moha), intemperance (mada) and covetousness and jealousy (matsar).

Another equally essential and enduring gain of education was regarded as vivek- skill in discriminating and forming sophisticated and dispassionate judgments. Vivek embraces the entire realm of thought and action and all fields of knowledge. It helps to keep the spirit of inquiry alive. Yet another characteristic of an educated mind is what our ancient gurus called equality (samya bhava)—a commitment to equality of all. Equality was considered native to the dignity of man. It is essentially an ethical quality far more real and profound than the popular political principle of equality. Man's freedom and even his control over himself presuppose his regard for the equality of all human beings. Ishopanishad advocated: He who has learnt to regard other beings in the someway as he regards himself cannot hate anyone. He who has true knowledge and has experienced sameness with other beings can have no attachment, no sorrow. Then good education enables a person to understand other men, their thinking and actions.

Last but not least important gain expected of good education, in accordance with the Indian tradition, is cultivation of a clear view of one's dharma (not popularly called religion or creed). The term connoted many concepts at a time, including eternal laws, justice, duty, practical morality and

sometimes even customs. Literally, dharma means what holds in the midst of change. Each person must work out for himself his concept of dharma and his commitment to his inner self as well as to the world outside ... This is the necessary part of his education as it determines what he is expected to do in life in view of his personal attainments and his position.

Moreover, you have already gleaned that Philosophy of Education, a branch of philosophy, or some calls of social philosophy, is concerned with the problems of education in its entirety. It is an activity, especially in giving meaning and new meaning to the educative process saddled with problems or incompleteness of individual as well as collective life. You have also already learnt that these problems are general as well as specific. In this sense philosophy of education is an important branch of applied philosophy, of course normative in nature as by education we mean that it is value-laden. The criteria may be either rigid or flexible, visibly defined in the social matrix of values and aesthetics. Further, it as a process takes hold of methods of enquiry which is held functional and hence functionally viable, reliable and valid in theorizing education as a system.

The educational system which we attempt to set up “must depend on the kind of society we mean to live in, on the qualities in men and women on which we set the highest value, and on the estimates which we make of the educability of both of those who are endowed with the higher intellectual or aesthetic capacities and of ordinary people.” - Cole. Whatever is the role of society in education system; every nation feels to set up its own education system and looks forward attainment of its aspirations and hopes, different from those of other nations in details through its operational mechanisms. We have left behind our ancient, mediaeval and colonial past and India achieved her independence about sixty years ago. We most solemnly resolve to build a democratic society and most ardently pledge to be the effective members of a civil society and aspire for an education system that will be strong enough to make democracy as a way of life. As a democratic way of life implies flexibility, rationality, justice, creativity, freedom of various kinds, and many more qualities of life, we can not close our windows and hinder emerging changes what humanity witness in other cultures to come in.

That is to say in the changing order of the contemporary world we need to have our unique philosophy of education which will be truly Indian so that our education can serve developing and safeguarding Indian identity in both individual as well as collective life. Certain axiological directions of the Indian philosophy may be cited as: Reverence for Life, Unity of all life and being, and tolerance. Other directions to life from our Constitution are: Justice-social, economic and political; Liberty—of thought, expression, beliefs, faith and worship; Equality—of status, and opportunity; Fraternity—assuring dignity of the individual and the unity of the Nation. Further, the concern for the well-being and happiness of all mankind (*Sarvajana Sukhino bhavantu*) is also mention-worthy and our philosophy of education must utmost care of these directions to life.

Building the Indian philosophy of education, thus, does not mean the resultant philosophy to emerge will be alienated from our culture, heritage, values systems, etc of Indian origin. We know that development of a civilization is a cumulative development. Similarly building a philosophy of education must take note of the old day's goods to sustain in this system. For examples, we have got creative formulations of Swami Vivekananda, Gandhi, Rabindranath, Sri Aurobindo, etc, each addresses to educational problems and provide their solutions mainly from the classical Indian philosophical stances, though each of them advocates for inclusion of new knowledge and wisdom in educational systems.

Each of the above philosophy of educational ideas differ in some respects and each has been thought of in pre-independent India as marks of protests against the colonial systems of education set in India by the British rulers. Each of the above educational thinkers has given us directions towards which our National philosophy of education should go and help the national systems of education. Indeed, after independence emphasis has been laid on formulating the national philosophy of Indian education. Practically, we notice a shift- from religio-philosophic ethos to democratic-humanistic-eclectic model in the Indian philosophy of education to operate now, though it is not so explicitly cartographer. Some traces of that philosophy may be visualized in the National Education of Sri Aurobindo, Basic Education of Gandhiji, Kothari Commission Report, Indian. Constitution, reports of five-year plans, National Policy on Education, 1986, 1992 (revised), etc. But for a student of education a task remains how to build a philosophy of our national education.

The National Curriculum Framework for School Education asserts that education has been the torch bearer of humanity's most noble ideals, as such it must aims at encouraging pupil for the cultivation of tolerance, humanism, unity in diversity under India's vast goldmine of her traditions, philosophy, and beliefs in good life. and its meaningful curriculum shall be responsive to the socio-cultural context of the country. The concept of good life and hence for attaining it through education as an instrument for achieving goals of action and establishing social cohesion underpinned by secularism, democracy, equality, liberty, fraternity, justice, national integration and love for the country.. It must ensure total development of the child reflecting all round development of body, mind and spirit According to The International Symposium and round table UNESCO, 1990, we now envisage for a desirable national education system which will better fit all people, not just a few people, to be active participants in creating a more equitable, fairer and more livable world in the twenty first century. For which we need to pay attention to many aspects of caring for—

- ☐ oneself including one's health
- ☐ one's family, friends and peers
- ☐ other people

- ☐ the social, economic, and ecological welfare of one's society and nation
- ☐ human rights
- ☐ the other species
- ☐ livability of the earth
- ☐ truth, knowledge and learning.

The perspectives of Indian philosophy of education to be built so far discussed, are leaned to axiology and to some extent to its metaphysics. The perspective does contain epistemological bearings. You might be able to understand that attainment of purushatha is possible to man and it is attained by knowledge gathering or experiencing. Indian schools of philosophy give us direction to six knowing paradigms. These are, perhaps, known to you. A synopsis depicting relationship between objectives and related activities may be drawn as :

Objectives	Activities
Perception -action of senses on the sensible objects	Development of sense organs or training of senses
Inference -anumana / induction	Cause-effect relationship
Comparison -analogy	Comparing subject matters
Non-perception -immediate cognition of non-sensible objects	Conception of non-perceptible objects
Postulation - necessary supposition of an unperceived fact to explain conflicting phenomena	Problem solving
Testimony -hold as valid as stated by some trustworthy person or script	Verbal knowledge

Therefore, an Indian philosophy of education should take into consideration of the above taxonomy of cognitive objectives in the matters of curriculum development and its transaction thoroughly. However, a careful temper of eclecticism should be kept always in mind so that the evolving system of philosophy of Indian education does not incorporate incompatible or inconsistent theorization.

Question :

Let Us Check Our Progress

What are the elements those signify uniqueness of philosophy of Indian education?

5.1.7 : HEURISTICS FOR BUILDING A PHILOSOPHY OF INDIAN EDUCATION

Finally, Broudy in a bit reflective mood admits that building a philosophy of education is a never-ending endeavour since problems in education take new forms and colour in the fast changing world. Philosophy of education as an applied philosophy strives to solve these problems although philosophy and its applied sisters including philosophy of education are in transformative mood. However, Broudy looks building philosophy of education from personal perspective too. Therefore, finally he poses ten pertinent questions, some of which are given below:

1. Could I list the major problems that have to be taken up in philosophy of education?
2. Could I advance some argument to demonstrate why these problems are genuine difficulties?
3. Could I show in some detail how each of these problems is logically related to the others?
4. Given a concrete problem in curriculum, methodology or organization, could I restate it so that it becomes a problem in the philosophy of education?

However, he says, “As you continue to philosophize, you will discover why the philosophic quest never ends in one big illumination. Each new era presents the same problems in a new setting; the old solution never quite fit, ... The philosophic mind is the growing mind, and it therefore outgrows its own solution.” Dewey pointed out that a “philosophy of education” is not the application of ready-made ideas to everyday problems but rather the formation of right mental and moral attitudes to use in attacking contemporary problems. Hence, philosophy itself is the theory of education in its most general phases”. When fundamental changes occur in social life, we must reconstruct our educational programme to meet those challenges. In this way, education has a moral influence and has a vital part in helping us become the kind of moral persons who are interested in promoting not only our own growth but also in promoting the growth of others. Philosophy of Indian education at the present age can not be ornamented by merely an imitation of the past philosophic goods; rather it should be a synthesis of the noblest gems of all humanistic approaches to good life. Still it will ever-shining for its unique Indian-ness.

In the next Unit of this Module you will have some experiences about how some of our great educators have attempted to build Indian philosophy of education according to their own intellectual map and philosophy of life.

Question :

Let Us Check Our Progress

Philosophy of Indian education should be ever-evolving in nature. why?

5.1.8 : LET US SUM UP

This Unit has given a special emphasis on philosophy as a method of enquiry for searching truth or knowledge that enables one to solve life's problems. Its major tripartite aspects—metaphysics, epistemology and axiology are pursuit to get answer to the questions—What is real? What is true? and What is good? Any philosophical 'ism' is not God-given. It is created by man through his continuous experiments with truth with some specific purposes. Any philosophical theorization is essentially and entirely new, or built in vacuum. A particular philosophy is grounded on some perspectives and it may either support or repudiate some existing philosophical stances.

Secondly, philosophy of education is a branch of social philosophy and it is normative in nature and accordingly, attempts to solve some fundamental problems of education as a process as well as a product... It always looks forward for attainment of good life of man and set certain criteria for goodness in life. In this point it is axiology oriented. In other time it solves problems in knowledge creation too. Ultimately it determines aims of education.

Thirdly, a philosophy of education is not perspective - free or context-free. So we generally and popularly call the Greek Philosophy, Western Philosophy or Indian Philosophy.

Fourthly, we have attempted here to present the essences of Indian Philosophy as the perspective for the proposed philosophy of Indian education.

Finally, the present discourse presents you with some heuristics what might be useful to you if you genuinely like to build a philosophy of Indian education.

5.1.9 : SUGGESTED READINGS

1. Brubacher, John S. (1962) Modern Philosophies of Education. New Delhi : Tata McGraw-Hill
2. Harry S. Broudy Building a Philosophy of Education New Delhi: Prentice - Hall of India, 1965, 2nd edn
3. Seshadri, C., Khader, M.A. & G.L. Adya (Eds) (1992). Education in Values. New Delhi : NCERT
4. Jha, V.S (1988) Education : What it is and What it needs. In School Education in India—Present status and future needs (Eds Malhotra et al) NCERT.
5. Hariyana, M. Outlines of Indian Philosophy.

5.1.10 : ASSIGNMENTS

1. Briefly discuss the main features of Indian philosophy.
2. Discuss about perspectives of philosophy.
3. Trace the sources of problems in education and point out how those problems can be tackled philosophically.
4. What should be governing points in building a philosophy of Indian education?
5. Write an essay on Building a Philosophy of Indian Education.

Block-6

Unit -1

Modern Concept of Philosophy : Analysis

CONTENT STRUCTURE

- 6.1.1 : Introduction**
- 6.1.2 : Objectives**
- 6.1.3 : Modern Concept of Philosophy : Analysis**
- 6.1.4 : Logical Analysis**
- 6.1.5 : Logical Positivism**
- 6.1.6 : Philosophical Analysis and Philosophy of Education**
- 6.1.7 : Relativism**
- 6.1.8 : Let Us Sum Up**
- 6.1.9 : Suggested Readings**
- 6.1.10 : Assignments**

6.1.1 : INTRODUCTION

We are now going to the last Unit of this paper. This Unit deals with some modern developments of philosophy and their implications in the advancement of educational ideas. But these are not actually post-modern tendencies in philosophy. These are modern at least in two ways - they have been developed by many exponents in both Europe and USA since the early part of the twentieth century and they have not addressed to metaphysical questions. Rather, they have advanced philosophical inquiries to clarification, logical description, analyzing languages of terms, concepts in various manners.

This new trend portrays the passion of philosophers' rigor and clarity of thinking. Moreover, they have led to a new conception of the nature and purpose of philosophy. Here the task of philosophy is no longer the creation of theories to explain the universe or the provision of rules for the good life but rather the clarification of thought itself. This is re-routing of philosophy from the highroad of speculative metaphysics to the path of analysis which bears special implication in educational discourse for arresting age-old controversies and debates. Indeed, this new route of philosophy has been aptly described by Ludwig Wittgenstein in his *Tractatus Logico Philosophicus* as :

The object of philosophy is the logical clarification of thoughts.

Philosophy is not a theory but an activity.

A philosophical work consists essentially of elucidations.

The result of philosophy is not a number of ‘philosophical propositions’ but to make propositions clear.

Philosophy should make clear and delimit sharply the thoughts which otherwise are, as it were, opaque and blurred.

Some philosophers also think that philosophy does not add to our knowledge of the world or of the nature of things, rather it articulates and appraises the logical structure of this knowledge and the principles that are used to establish it, and so indicates how the different parts of knowledge can not be most logically related. They strongly advocate that the problems of philosophy have never been solved because the logical structure of the theses proposed to solve them never been formulated exactly. Some times they have attempted to build a theory of meaning. From this; we have got philosophical analysis, logical analysis, logical positivism and logical empiricism though each is not invariant. These are some modern trends. These do not give us any “ism” in educational philosophy. They emphasize on critical analysis and clarification of educational terms. They like to build our capacity to give clarification of concepts what we generally come across in our educational discourse.

Further, a family of views has been formulated whose common theme is that some central aspect of experience, thought, evaluation, or even reality is somehow relative to something else. And, as such, standards of justification, moral principles or truth are sometimes said to be relative to language, culture, or biological makeup. It is really *relativism* that commits you to ignoring the opinions of others, since relativism says that whatever you believe is true for you irrespective of anyone else. In effect, relativism marginalizes everybody’s standpoint except your own. But just this may constitute the appeal of relativism.

From educational point of view, the main concern is with the logical components of the educational process and with the role of logical analysis in educational discourse And there have been some changes in paradigm of educational inquiry and research activities. In this Unit we are going to have some understanding about the above shifts presented as Philosophical Analysis—Logical/Linguistic Analysis, Logical Positivism and Relativism.

6.1.2 : OBJECTIVES

After careful study of this unit, the learners will be able to :

- Understand the concept of logical analysis and logical positivism.
- Know the meaning of relativism.
- Discuss the present relevancies of modern concepts of philosophy.

6.1.3 : MODERN CONCEPT OF PHILOSOPHY : ANALYSIS

In the history of Western philosophy, modern concept of philosophy indicates analysis to be the main function of philosophy. In general, it is known as analytic philosophy. Analytic philosophy' is an umbrella term currently used to cover a diverse assortment of philosophical techniques and tendencies. Analytic philosophy is sometimes called Oxford philosophy or linguistic philosophy, though such labels are misleading. Whatever else it is, analytic philosophy is manifestly not a school, doctrine, or body of accepted propositions. Analytic philosophers tend largely, though not exclusively, to be English-speaking academics whose writings are directed, on the whole, to other English-speaking philosophers. They are the intellectual heirs of Russell, Moore, and Wittgenstein, philosophers who self-consciously pursued 'philosophical analysis' in the early part of the twentieth century.

Analysis, as practiced by Russell and Moore, concerned not language per se, but concepts and propositions. In their eyes, while it did not exhaust the domain of philosophy, analysis provided a vital tool for laying bare the logical form of reality. Both Russell and Moore began doing philosophy as a comprehensive description of the whole of reality. But one of the chief characteristics of the development of analytic philosophy was that it came to concern itself less and less with giving such a description and more and more with analysis of particular concepts and notions. Among these are the concepts and notions of philosophy itself, of language, both natural and artificial, and of science. Though analytic philosophers continued to try to understand the world as before, they turned more often toward attempts to understand our talk about the world, whether that talk was philosophic or scientific. Of course it is evitable that this should turn into a preoccupation with language.

Wittgenstein, in the *Tractatus Logico-philosophicus* (1921), contended that the structure of language reveals the structure of the world; every meaningful sentence is analysable into atomic constituents that designate the fine-grained constituents of reality. This 'Tractarian' view was one Wittgenstein was to renounce in his later work, but it had considerable influence within the Vienna Circle in the 1920s, and in the subsequent development of logical positivism in the 1930s and 1940s. Carnap and Ayer, both exponents of logical positivism, held that the task of philosophy was not to uncover elusive metaphysical truths, but to provide analyses of propositions or scientific sentences (Other sentences, those in metaphysics and ethics, lack cognitive sentences). Their model was Russell's theory of descriptions, which provided a technique for analysing away apparent commitments to suspicious entities. Meanwhile, a number of former proponents of analysis, influenced by Wittgenstein, had taken up what came to be called ordinary language philosophy. Philosophers of this persuasion focused on the role of words in the lives of ordinary speakers, hoping thereby to escape long-standing philosophical muddles. These muddles, they thought, resulted from a natural

tendency, when pursuing philosophical theses, to be misled by the grammatical form of sentences in which those questions were posed.

Analytic philosophy, to many, seems to be continuous with large portions of our philosophic traditions. But why then it is considered to be very revolutionary? The answer might be given in three parts. First, it is developed in reaction to a very different philosophy which was dominant in Great Britain during the later half of the nineteenth century. Second, it came to be misunderstood as the complete rejection of the possibility of metaphysics. Third, it has identified itself with certain techniques, methods, and outlooks of natural science, even though it has given up philosophy's old claim to comprehensiveness.

Question :

Let Us Check Our Progress

1. Sum up in brief the major features of philosophical analysis?

6.1.4 : LOGICAL ANALYSIS

In the history of Western Philosophy Logical Analysis, also known as Language Analysis, is relatively a new movement. The name 'Language Analysis' suggests that it is concerned with the analysis of language. It is an analytic approach to philosophy. Language analysis is essentially a method and technique to solve philosophical problems, and not a school of thought representing a metaphysical position about the universe, mind, self or such other phenomenon. Language analysis is concerned with the correct use of language to describe verifiable facts and ideas. It is also referred to as Philosophical Analysis or Logical analysis. According to Logical analysts the use of language has to be so precise and logical that A. J. Ayer, views philosophy as 'a department of logic'.

To a certain extent philosophical analysis is continuous in style and method with the ways philosophy has been done since antiquity. Russell and Wittgenstein pointed out that one phase of their joint efforts may be compared to Plato's work in the *Theatetus*, and other phases of Russell's work may be compared to Plato's analyses in the *sophist*. Kenneth M. Sayne argues that Plato drew out philosophy from its crude form towards a 'pacticable method of philosophical analysis'. Urmson attributes the analytical quality to Aristotle as it is borne out in the latter's treatise *Nichomachean Ethics*. However, the origins of the movement in its present form can be traced back to Ludwig Wittgenstein.

Wittgenstein produced his monumental treatise, his magnum opus, *Tractatus Logico Philosophicus* in 1921. Being a revolt against the Western philosophical literature it gained immediate and wide-spread popularity. Wittgenstein emphatically contended that the whole of Western philosophy

and specially its metaphysical literature is nothing short of a veritable confusion of tongues. As he wrote : “ ... most questions and propositions of the philosophers result from the fact that we do not understand the logic of our language”.

Wittgenstein was a student of Philosophy at Cambridge and studied under G. E. Moore and Bertrand Russell. Initially Wittgenstein was very much influenced by Russell's philosophy of logical atomism. Logical atomism holds that the complex problems and ideas can be conceived of or broken up into its minute or atomic form and can be solved with clarity. Later on Wittgenstein deviated from Russell. He published his later work *Philosophical Investigations* in 1953.

Wittgenstein holds that the language of common usage or ordinary language is defective and as such ineffective in solving philosophical problems. So he considers that his task is to build up an ideal language or 'perfect' language. Some philosophers in Cambridge became enthusiastic in supporting Wittgenstein's idea of the reconstruction of language or the creation of an ideal language to explain philosophical propositions. But there sprang up a group of philosophers at Oxford, prominent among them being Peter Strawson, J. L. Austin and A. J. Ayer who deviated from Wittgenstein's position that language analysis should coin new technical terms to solve philosophical problems. Rather they satisfied themselves in analysing ordinary language. They were called 'Oxford group of language analysts'. They were interested in analysing the innumerable terms used in philosophy such as Mind, Self, Belief, Knowledge, Value, Freewill, good, Ought, etc. Gilbert Ryle was a professor of Philosophy at Oxford. He introduced several novel notions in his attempt to show that the traditional mind-body problem arose through a series of logical errors in thinking about mental and physical phenomena.

In another development, there has appeared a corrective to the ordinary language approach. It is felt that ordinary language is an outcome of attempts of groups of people to describe the objects, experiences, interactions, feelings, thoughts, etc. Ordinary language is fashioned or practical necessities. But this language may not be free from defects as the perceptions of individual members of the group as well as sub-groups within a longer group change and vary. So, it is only a guide for analysis and not the full substance. Concepts underlying usages in ordinary language should be analysed. This is a new thinking that may be called the 'Conceptual analysis approach', and is represented by P. H. Hirst and R. S. Peters.

Peter Strawson is also an ordinary language philosopher at Oxford. His attack on one of Russell's key theories, the theory of descriptions, tries to show that Russell forced his logical framework upon language, and that instead of cleaning up puzzles, it leaves them intact. For him, in order to understand descriptive or denoting phrases it is necessary to understand that language is lived and spoken, not rigid and written down in logic texts. Once this is understood in some detail, solutions can be provided for Russell's problems which take into account the real nature of language and which, therefore, can do the job they were designed to do.

As language analysis is only a method of philosophy, logical analysts have not built up any system of ideas or beliefs about the universe. In fact, they are against any sort of systematisation or system-building. However, a few contentions of language analysis can be listed:

1. The world is the reality. The world is within the purview of sense-experience or which is logically verifiable.
2. The world is not determined by our perceptions. It is a real world which can be described only through a better use of language. Linguistic confusion gives rise to metaphysical statements.
3. Large number of, if not all, philosophic problems, can be understood, solved or dissolved only through a close analysis or reform of the way language works.
4. Analytic method is the only method through which reality can be described. Philosophy is the act of analysis, criticism and clarification of the language used to describe reality. Speculation has no place in philosophy.
5. Logical/Language analysts believe in cause and effect relationships, but only at the physical level. They summarily dismiss the possibility of an ultimate cause, as it is not verifiable.
6. Value judgements pronounced through the use of ordinary language are usually defective. As such conditional statements which use 'if', 'in such a situation', 'under the defined, circumstances', etc. need to be made while making value judgements.

After our grand tour to logical analysis let us set our mind to the following two systems of logical analyses which may be instructive to any student of education.

Wittgenstein's views on Linguistic Analysis

Logical analysis has one foot on language/linguistic analysis. This trend does not attempt to construct an ideal language as precise as the scientific model of mathematics or trying to construct too rigid a set of rules for ordinary language but it intends to analyse ordinary language. The later work of Wittgenstein set new direction in philosophy which has a grand impact on linguistic analysis. The basic ideas of these works appeared in his *Philosophical Investigations*.

He observed that most philosophical problems were not really problems at all but puzzlement brought about by linguistic confusions. The rule of philosophy should, then not be to construct explanations about reality and so forth but to solve the puzzles of linguistic confusions. He saw language consisting of indefinite possibilities of usages. Thus, he emphasized on the explanation of meaning, or meaning of meaning (i.e., what is the explanation of meaning?). According to Wittgenstein, we get into problems when, upon hearing a word, we immediately begin to look for its meaning in some corresponding object. What we ought to do is look at the word itself, the sign, the statement, and examines the context of its usage. Usage depends on the meaning of the signs (that is names of

the word) in relation to other signs within a system of signs; in short within a language. Understanding a sentence involves understanding a language.

For example—what is meaning of thinking? According to him meaning of thinking varies. When confronted with the word, most of us may associate it with mind and mental activity. However, what happens when we begin to explain what we mean by *sign thinking*? Is it hidden away inside the eardrum? If we could open people's heads while they were thinking, could we see it? We would see physiological things. What do we do when thinking is going on? Some suggestions may come to mind : writing, reading, speaking. Is thinking done by mouth and larynx? What do we say mind is doing the thinking? Really we can not explain thinking only by signifying such agents as the brain, hand and larynx.

Wittgenstein maintained that when we try to describe thinking in words and statements, we signify agents of thinking and draw analogies from them. We try to sum al these up into a general term such as mind and then relate this to a things or objects. For centuries, philosophers have argued about mind, mental and thinking and have tried to locate and delineate them. Wittgenstein suggested that the puzzle is only linguistic.

He maintained that we have a tendency to look for commonality in all things that can be brought under a general term. Putting in other words-words have come to possess the meaning of a general image of things associated with, or corresponding to, the words. The result is a confusion of the things named with the names themselves-the words. He argued that this preoccupation is the source of metaphysics in philosophy. It is not the proper business of philosophy to reduce anything, to produce generalizations, or to offer grand explanations. Philosophy's business is to be purely descriptive. Further, Wittgenstein held that the explanation of the meaning of a word depends on the actual context of usage and the language structure being used. Words have no true meaning given to them by some independent power. They have meanings people give them by some independent power. They have the meaning people give them. Thus, we can not scientifically investigate what a word really means, and we cannot tabulate strict rules of usages. It is fruitless to construct an ideal langauge to replace ordinary language; rather an ideal langauge should remove the trouble of thinking that one had gotton the exact usage of an ordinary word. Thus, he rejected any necessary form of language. But he asserted that we could invent our own language games (systems of 'communication) to help us understand actual usage by showing the similarities and differences of a language. These constructed games would be used to examine actual and possible uses of language in our contexts.

In fine we see that Wittgenstein had no -systematic doctriine, no rules of procedure, and no lock-step "grand manner" approach to philosophizing. We may say his view recommends uncorking the bottle and letting the fly out to see where it will go.

Gilbert Ryle's Views

Gilbert Ryle admitted as the most influential British philosopher views analysis as a matter of finding the sources of linguistic confusion by examining some of the continually perplexing problems in philosophy, such as mind-body dualism. His works on use of words mind, mental, thinking, knowing and related words are popular. His best known work is *Concept of Mind*. He does not consider mental mechanisms or mental processes but the uses of various concepts that describe them, such as learning, practising, trying, pretending, wanting, pondering, arguing, seeing, believing, knowing, etc. He attacked the Cartesian doctrine of splitting of body and mind. He holds that body is in the realm of matter, susceptible to and subject to the laws of matter-objective. In contrast, mind is hidden from view—a private, secret realm, subjective.

According to Ryle, a “category mistake” occurs when one allocates concepts to logical types to which they do not belong. To make a category mistake is to use a term as though it belonged to some logical category which it is not in fact a member. A logical category is a class of terms with certain logical powers, that is, of terms that can be used for making inferences about a certain subject matter but not about others. He cited the example of the visitor who came to Oxford and was shown the various colleges, laboratories, libraries, offices, and so on. The visitor then asked, “But where is the university?” This a category mistake for the visit was allocating the concept of university to the same logical type as its constituent colleges. In the case of Oxford, university is a collective logical type and college is a “constituent element” logical type.

Another relevant problem is associated with the term “knowing” and “knowledge”. Ryle maintained that we have confused “knowing that” and “knowing how”. “Knowing how” is having capacity to perform, being able to do, and so forth. But he pointed out that ‘knowing that’ something is the case does not mean that we necessarily know how to do it. In the same way, to be able to perform or do does not mean that we necessarily understand the purposes and reasons for doing. All too often we have assumed that knowing and knowledge are too much on the side of “knowing that”. This has resulted in the ignorant approach to formal education whereby we assume that we “cram the heads” of the students with facts and “knowledge” they will be able to go out into the world and perform successfully. A healthier concept of knowing and knowledge would be that to know in the best sense is to “know that” and “know how” Kneller has put Gilbert Ryle under informal analysis which views that the natural language has the power to remedy its own deficiencies. In this way many analytic philosophy has an important role to play in education as education deals with logic and language.

Question :

Let Us Check Our Progress

1. What do mean by ‘conceptual analysis approach ‘?’
2. Explain ‘category mistake’?

6.1.5 : LOGICAL POSITIVISM

Logical Positivism, is a philosophical movement inspired by empiricism and verificationism. It began in the 1920s and flourished for about twenty or thirty years. However, there are still philosophers who would identify themselves with some of the logical positivists’ theses. In some ways logical positivism can be seen as a natural outgrowth of radical or British empiricism and logical atomism. The driving force of logical positivism may well have been adherence to the verifiability criterion for the meaningfulness of cognitive statements. Acceptance of this principle led positivists to reject as problematic many assertions of religion, morality, and the kind of philosophy they described as metaphysics. The members of ‘Vienna Circle’, a group of philosophers, scientists, logicians and mathematicians, who propagate this philosophy are M. Schlick, O. Neurath, R. Carnap, E. Mach, F. Waismann, P. Frank, V. Kraft, H. Halim, K. Menger, H. Feigl, E. Zilsel, K. Godel, f. Kaufmann and A. J. Ayer.

In 1929, the manifesto of Vienna Circle was published with the following aims in view :

1. To establish science on a solid foundation.
2. To eliminate metaphysics from philosophy.

For realising these aims, they recommended the method of logical analysis. The heart of logical positivism is a theory of meaning. And the Central tenet of logical positivism is the verifiability criterion of meaning or the theory of verification. Logical positivism advocates for two kinds of meaning: Cognitive and Non-Cognitive. Cognitive meaning belongs to statements which convey information ; non-cognitive meaning belongs to sentences which express or arouse emotion, or move others to action. The logical positivists agreed with Wittgenstein that there are two main classes of cognitively meaningful statements : (i) analytic statements, such as those of logic and mathematics, which can be evaluated by reference to their logical form or to the meanings of their terms ; (2) factual statements (i.e., statements about actual. or possible state of affairs) which require some appeal observation, if they are reasonably accepted or rejected.

According to this theory, a proposition is cognitively meaningful or significant if and only if it is verifiable in sense-experience. Logical empiricists took genuine ideas to be composed of simple ideas traceable to elements in experience. If this is true and if thoughts about the empirical world are

‘made up’ out of ideas, it would seem to follow that all genuine thoughts about the world must have as constituents thoughts that denote items of experience. While not all positivists tried meaning so clearly to the sort of experiences the empiricists ‘had in mind, they were convinced that a genuine contingent assertion about the world must be verifiable through experience or observation.

Questions immediately arise concerning the relevant sense of ‘verify’. Extreme versions of the theory interpret verification in terms of experiences or observations that entail the truth of the proposition in question. Thus, for my assertion that there is a table before me to be meaningful, it must be in principle possible for me to accumulate evidence or justification that would guarantee the existence of the table, which would make it impossible for the table not to exist. But universal statements, such as ‘All metal expands when heated’, are meaningful, but it is doubtful that any observation could ever conclusively verify them. Faced with these difficulties, at least some positivists retreated to a more modest form of verification which insisted only that if a proposition is to be meaningful it must be possible to find evidence or justification that bears on the likelihood of the proposition’s being true. This is called the principle of verification.

While explaining the verification theory, A. J. Ayer made a distinction between ‘strong’ verification and ‘weak’ verification. A proposition is said to be verifiable in the strong sense of the term, if and only if its truth could be conclusively established in experience. But it is verifiable in the weak sense, if it is possible for experience to render it probable. He maintains : A statement is factually significant to a given person if and only if he knows how to verify the proposition which it purports to express : that is if he knows what observations would lead her under certain conditions to accept the propositions as being true, or reject it being false. Further, in Moritz Schlick’s words, “Stating the meaning of a sentence amounts to stating the rules according to which the sentence is to be used, and this is the same as stating the way in which it can be verified (or falsified). The meaning of a proposition is the method of its verification.”

Factual statements may be verified either directly or indirectly. A statement that asserts something about a present perception, like the statement “now I see a red square on a green ground” is verified by the act of perception itself. But a generalizing statement is indirectly verified by directly verifying statements deduced from it together with other statements that have already been verified. Thus, it follows that all factually meaningful (i.e., empirical) statements in principle must be capable of connection, direct or indirect, with sentences which describe immediate experiences and are instantly recorded. These the positivists called, “*protocol sentences*”. On the contrary, a statement is factually meaningless (or unverifiable in principle) if it is impossible to specify any observation that could be made under any conditions to discover whether it was true or false. Therefore, the statement is factually meaningless because it is in principle empirically unverifiable.

For example, the statements like “the world has a purpose” or “Only spirit is real” are cognitively meaningless; because there are no possible observations we can make which would show them to be true or false. The logical positivist did not claim that such statements serve no useful purpose. All that was denied was that they tell us anything about what is the case. The proper function of metaphysical statements, he said, is not to convey propositions but, like poems, to express feeling and to evoke it.

Logical positivists argue that there is no cognitively meaningful proposition or statement which implies such reality, which is beyond all possible sense-experience. The proposition (which expresses knowledge) must be either analytic or synthetic. Propositions of mathematics and logic are examples of analytic proposition. Synthetic propositions are such propositions whose criterion of determination of meaning is sense-experience. If any proposition does not express formally truth or falsity of anything, or it expresses anything which cannot be verified by experience, then that proposition is meaningless or cognitively not significant. It can have, however, emotive meaning.

The positivists conception of meaning leads to the elimination of metaphysics. Metaphysical propositions are neither analytic nor synthetic, and hence lack cognitive meaning. ‘Absolute is kind’, ‘soul is immortal’, ‘God lives in heaven’ - such metaphysical propositions are not cognitively significant; these are pseudo-propositions. Metaphysicians who claim to have knowledge of a reality which transcends the phenomenal world is not justified.

Another central tenet of logical positivism is that all meaningful statements fall into two categories necessary truths that are analytic and knowable a priori; and contingent truths that are synthetic and knowable only a posteriori. If a meaningful statement is not a contingent, empirical statement verifiable through experience, then it is either a formal tautology or is analytic, i.e., reducible to a formal tautology through substitution of synonymous expressions. According to logical positivists tautologies and analytic truths that do not describe the world are made true (if true) or false (if false) by some fact about the rules of language. “P or not P” is made true by rules we have for the use of the connectives ‘or’ and ‘not’ and for the assignments of the predicates ‘true’ and ‘false’.

The positive characterization of cognitive meaningfulness varies from author to author. It has been described as the property of having a truth value, corresponding to a possible state of affairs, naming a proposition, or being intelligible or understandable in the sense in which scientific statements are intelligible or understandable. Putting in other words George Kneller in his *Logic and Language of Education* maintains that to give meaning of a statement is to cite the rules by which it is to be used. In the positivist view, this is equivalent to stating how it can be verified or falsified.

Lastly, we may refer to logical positivists’ views about ethics and ethical terms. Ordinary ethical statements, i.e., statements of value can be divided into four main classes : (i) propositions which

express definitions of ethical terms; (ii) propositions describing the phenomena of moral experience and their causes, (iii) propositions exhorting moral virtues; and (iv) actual ethical judgements. Ethical philosophers have generally ignored the distinctions between these four classes. According to logical positivists, a strictly philosophical treatise should make no ethical pronouncements. This is so because ethical statements are not verifiable and hence they are not genuine synthetic propositions. The fundamental ethical concepts are unanalysable in as much as there is no criterion by which we can test the validity of the judgements in which they occur. Ethical judgements have no objective validity whatsoever. Linguistic statements which express moral judgements do not assert anything factual. These are expressions of feelings and as such do not come under the category of truth and falsehood. Ethical concepts refer to our feelings of approval or disapproval and ethical judgements are expressions of these feelings and emotions and a desire to arouse similar feelings and emotions in other.

For example, the sentences of normative ethics such as “The greatest good is the greatest number” or “To do good is to obey the laws of nature”, are expressions of speaker’s attitude or feelings.

A question then comes : What is the proper task of philosophy? In the positivist view it is to provide knowledge that is cognitively meaningful but not necessarily empirical—knowledge that is purely formal. Philosophy thus becomes the analysis of the formal properties of statements, logical, mathematical and scientific. Logical positivist considers by naming philosophy the “logic of science”. Rudolf Carnap sees that philosophy is the analysis of the expressions and statements of science or the analysis of the logical syntax (logical structure) of the language of science.

In brief, to analyze the logical structure or logical syntax of a system of statements is to identify and define their constituent concepts, to note that logical types of these statements (i.e., the kinds of statements that they logically imply), and to ascertain the logical relations in which they stand to one another. In this way philosophy clarifies and makes explicit the structure—more or less logical—of statements, theories, groups, of theories and whole branches of science.

Another characteristic feature of logical positivism is the commitment to “Unified Science”; that is, the development of a common language. Carnap called it the “physical” or “physicalistic language”. This language refers to physical objects rather than sense data. The physicalistic language is intersubjective in the sense that statements occurring in it, unlike statements about sense data, can always be verified in principle by two or more observers. It is universal language according to the positivists. Thus, the division of science into different branches, they claimed, is only a practical one, resting on certain differences in research procedures and in areas of investigation.

Critique of Logical Positivism

The Verification Principle has been a centre of criticism. First objection to this principle is that it violates its own requirements, for a synthetic statement that can’t itself be verified empirically. Since

the number of synthetic statements is infinite, they cannot be verified, and hence no proposition concerning them all, such as Verification Principle, can be asserted categorically. The second objection is that the principle is at odds with the very methodology of science it seeks to vindicate. For example, it excludes the most important of all scientific statements, the universal laws of nature. Third objection charged against logical positivism is that all statements about psychological and social states and processes can be transacted without residue into statements in a physicalistic language. A physicalistic language is inadequate for conveying such aspects of experience as a person's inner life. Finally, logical positivism was attacked for treating the problems of philosophy as solely syntactical.

The logical positivists were not slow to acknowledge the validity of most of the criticism. Eventually, the movement evolved into a borderless exclusive school of thought, whose members have taken the name of logical empiricism which claims that philosophy does not add to our knowledge of the world or of the nature of things; rather it articulates and appraises the logical structure of this knowledge and the principles that are used to establish it, and so indicates how the different parts of knowledge can be most logically related.

Influences of Logical Positivism

Logical positivism was essential to the development of early *analytic philosophy*. It was disseminated throughout the European continent and, later, in American universities by the members of the Vienna Circle. A. J. Ayer is considered responsible for the spread of logical positivism to Britain. The term subsequently came to be almost interchangeable with “analytic philosophy” in the first half of the twentieth century. Logical positivism was immensely influential in the philosophy of language and represented the dominant philosophy of science between World War I and the Cold War. Many subsequent commentators on “logical positivism” have attributed to its proponents a greater unity of purpose and creed than they actually shared, overlooking the complex disagreements among the logical positivists themselves.

Logical Empiricism

Question :

Let Us Check Our Progress

1. Indicate three characteristics of Logical Positivism.
2. Justify, in brief, importance of Logical Positivism in Education.

Logical empiricism is a sister concept in analytic philosophy. It has both similarities with as well as differences from logical positivism. We are going to have some ideas about logical empiricism now.

Logical empiricism has been fostered by logicians like Willard Van Orman Quine and Nelson Goodman or philosophers of science. For the logical empiricists as for logical positivists, philosophy is the logical critique of what passes for knowledge, whether formal or empirical; it articulates and appraises the logical structure of knowledge and the principles that are used to establish it. It indicates how different parts of knowledge can be most logically related. Earnest Nagel describes the subject matters of this philosophy as :

1. **Problems relating to the evaluation of evidence :** Under this belong analysis of the requirements for significant observation and experiments, of the various canons for estimating the probative force of evidential statements, of the nature and rationale of probable inference, and principle of judging the competence of decisions between alternative policies.
2. **Problems relating to the explication of concepts :** This rubric covers such matters as the examination of varieties of definitional procedures, of the criteria for empirical significance of the statements, of the logic of classification and measurement, and of the logical requirements for generalizing the applicability of ideas.
3. **Problems relating to the construction of systematic bodies of knowledge :** Under this headings are included discussions of the types and functions of general statements, of patterns of explanation of knowledge, and of the logical conditions for assimilating different branches of inquiry into a common intellectual framework.

Logical empiricism, like logical positivism, is basically a philosophy of science. It is also scientific in its preference for isolating specific problems and analyzing data. Analysis of language of science gives the logical empiricist an interest in the construction of languages as such. A language of science consists of a special vocabulary and a special grammar, that is, of (a) terms used in the statements, (b) rules for combining terms into statements, and (c) rules for relating statements to one (as equivalent, implied, etc.). Each science arranges its terms into statements into a hierarchy. The grammar of scientific language consists of rules for using the terms of the language.

The evolution of logical positivism into logical empiricism is most marked in the liberalization of the Verification Principles. This principle has two components : (1) the meaning of the statement is the method of its verification; (2) all factually meaningful statements are empirically verifiable. The logical empiricists have rejected component 1 altogether. They maintain that the meaning of a statement is quite distinct from the methods by which one might verify (or confirm it), since in order to verify a statement at all, one must necessarily have some idea of what it means. The meaning and verification are separate.

Component 2 has been liberalized in two ways ... First, it is now treated as proposal only and not a proposition. Instead of saying, "All factually meaningful statements are empirically verifiable" the logical empiricist declares, "Let us assume for philosophic purposes that all factually meaningful

statements are empirically verifiable (or rather confirmable).” Second, the notion of variability (i.e., complete verifiability) has been replaced by the much broader concept of conformability. A statement is said to be factually meaningful if it is confirmable to some degree that is say, if observation sentences can be formulated which lead us either to accept or to reject it. Conformability is distinguished from *testability*. A statement is confirmable if we can state the conditions under which it would be confirmed and testable if we can specify a method for producing these conditions. A sentence maybe confirmable without being testable.

Logical positivists had maintained that any meaningful scientific concept must, in principle, be fully definable in terms of the observable conditions under which statements containing the concept are true or false. This is called *operational definitions*. They take the form of conditional ‘if-then’ sentences. The antecedent, or ‘if’ clause, states the test conditions, or what the researcher must do in order to make certain observations. The consequent, or ‘then’ clause, states the response conditions, or what must be observed, after the test conditions have been produced, if the sentence is to be true. The operational definition has been criticized on number of grounds. In the first place, an operational definition only specifies can be applied. Therefore, the meaning of the term is never fully captured. The logical empiricists rejected the positivist view that all scientific concepts must be fully definable in observatinal terms. However, they maintained that at least part of the meaning of a theoretical concept can be stated in conditional sentences specifying observable conditions under which the concept is applicable. Such sentences are called reduction sentences.

But some logical empiricists are not satisfied with this explanation. Some like Carl Hempel deny that there is any acceptable criterion for the meaningfulness of theoretical terms and sentences. Other logical empiricists are less restrictive. They maintain that a theoretical concept is empirically meaningful if it belongs to a theory (a nomological network), some of whose concepts are reducible to observables. In Herbet Feigl’s words, “The hypothetical constructs of modern physics, despite their remoteness from the observational data, are well connected with these data in the elaborate network of lawful relationships.” Then a theoretical concept is meaningful if it forms part of a system of concepts from which an observational sentence can be derived that could not be derived without it.

To the logical empiricists, all genuine explanations are deductions. The things to be explained, they say, can be a particular event or a generalization. An event is explained as follows : Certain statements are made ‘up of antecedent conditions present either prior to or at the same time as the event to be explained. Certain other statements are made of general laws or generalizations. From these two classes of statements - one, $C_1, C_2, C_3... C_4$, stating specific antecedent conditions, the other, $L_1, L_2, L_3... L_4$, stating general laws—a statement describing the event is logically deduced. This statement must in principle be empirically confirmable or it cannot be factually significant.

A generalization is ‘explained’ by deducing it from two or more statements of general laws, that is, by subsuming it within a law yet more general. The logical empiricist also distinguishes between “low-grade” and “higher-grade” explanations. A low-grade explanation deduces from empirical laws a proposition about the event to be explained, putting the explicatum into a class of things characterized by the same empirical law. A higher-grade explanation deduces a proposition about the event or events to be explained from a theory. It is higher because theories tell us more than empirical laws. From a theory we can deduce a proposition about a range of phenomena, whereas empirical law enables us to deduce a proposition about phenomena of one kind only.

A theory is a set of sentences expressed in a particular vocabulary. The theory is interpreted, or given empirical reference, by means of “correspondence” or “coordination rules” which are sentences connecting certain terms of the theory with observational terms. These interpretative sentences state what observable properties, such as instrument readings, the theoretical terms are (partially) to designate.

For example, the law of reflection of light in optics permits us to deduce propositions concerning only the reflection of light. But from the Maxwell electromagnetic wave theory we may deduce many kinds of optical phenomena: reflection, refraction, diffraction, interference, dispersion, polarization, etc.

However, many logical empiricists have criticized the deductive model of explanation ... A few has rejected it as inconsistent with scientific practice. Many follow Hempel, who now distinguishes between deductive and statistical explanations. Statistical laws state the relative frequency with which something happens. They take the form : “The probability for an f to be a G is r”. Any-inference from them is more or less probable. Some logical empiricists, however, defend the deductive character of both statistical explanations and explanations in the behavioural sciences. Israel Scheffler maintains that such explanations are weaker than fully deductive ones but not different in principle.

The logical empiricism has made the greater contribution to educational thinking and, in particular, to the methodology of educational research. Logical empiricism has contributed to formulation of structure of knowledge embraced in education and psychology.

Question :

Let Us Check Our Progress

1. Distinguish between “theory” and “empirical law”.
2. Compare ‘testability’ and ‘conformability’.
3. What is ‘low-grade’ explanation?

6.1.6 : PHILOSOPHICAL ANALYSIS AND PHILOSOPHY OF EDUCATION

The use of philosophical analysis has some direct bearing on students, but perhaps it is most useful for educators in helping them clarify what they propose to do with students. One simple example is educator's confusion with word 'knowing'. Ryle has attempted to clarify confusion between "knowing that" from "knowing how". Many analysts maintain that analytic philosophy has an important role to play in education because so much education deals with logic and language. Teachers and students constantly deal in generalizations and value judgements about educational materials that need to be examined critically. The analysts emphasize that role of language is learning. And that there is a need to apply criteria for evaluating and clarifying the statements we make. This is a need that goes beyond the traditional studies of grammar. Therefore, some educators feel that language analysis should be the primary role with which philosophy of education is concerned. Books like Vance Packard's *The Hidden Persuaders* clearly show how easily now-a-day people can be manipulated and influenced by advertisers and politicians. Therefore, for both practical and philosophical reasons, philosophical analysis argues that we should be sensitive to language problems and attempt to make our language more precise and clear. Such philosopher believes that students should study the language the students themselves use to describe and justify the meanings they apply in life. Finally, we may be concerned with the logical components of the educational process and with the role of logical analysis in educational discourse as logic is the study of the principles and methods of valid inference.

Aims of Education

Philosophical analysts are interested in improving both the educator's concepts about education and the way in which these concepts are used.

Some analysts. Such as R.S. Peters, insist that one can not legitimately speak about the "aims" of education since if education is initiation into worthwhile activities, it already has all the aims it needs. Peters has questioned the use of the concept of "education" in general and has attempted to show how confusing the usage of the word has been. In short, the analysts do not attempt to prescribe any particular kind of education as much as they seek to clarify the conceptual devices employed by the educators, the process of using them, their underlying presupposition, and the purposes involved.

Thus, rather than prescribing aims to be achieved in the educational process, the analysts prefer to look at what we mean by education in the first place and what advantages may accrue from a clarified concept of education. R. S. Peters, for example, spoke about the "justification" of education

rather than mere aims. He pointed to at least four considerations that help us situate the meaning of education in order to arrive at better educational aims :

1. Education is more than mere specialized skills because it includes developing one's capacity as well as the 'what' of things, and organizing experience in terms of systematic conceptions.
2. Education is more than mere specialized knowledge and includes developing one's cognitive perspective, expanding moral understandings, and developing aesthetic appreciations.
3. Education includes doing and knowing things for their own sake, for the joy of doing and knowing.
4. Education is the process by which people are initiated into their particular life styles.

Thus, we must not forget in speaking about education that means figure in the meaning as well as aims. Aims belong to particular teaching strategies and not to some esoteric word of confused meanings, such as education.

Methods of Education

Analysts are concerned that both the methods and materials deserve serious analytical study. Most analysts avoid prescribing what should or should not go on in the educational process, they like to see that the educators and the students critically examine the curriculum from the standpoint of materials, methods, policies and procedures. Some analysts advocate devising paradigms in order to clarify concepts. Gordon Eastwood has described an appropriate analytic paradigm that includes "a syntactically and semantically appropriate analytic language system" He emphasized that education must be concerned with theory building in education from the standpoint of emphasizing the logical foundations of theory. This resembles Wittgenstein's idea of "language game". Eventually we underwent a shift from pragmatic paradigm to analytic paradigm. One of the areas which the analysts have spent much time is the activities of teaching. In this context, Paul Hirst sees teaching as a 'polymorphous' activity. He maintains that teachers need to be clear about the nature of the central activity in which they are professionally involved.

Thus, teaching methodologies are established based on teaching modes and other contextualized factors. Analysis is an on-going activity. Conclusions are not arrived at full blown and axiomatic.

Curriculum

Herein also the analysts put their effects in clarifying aspects of curriculum. For example, analysts, including Richard Pring, point out that such curriculum terms as integrated studies, integrated curriculum, unified knowledge, broad fields of experience, and problem solving are confusing and misleading and they lack clarity of meaning. Curriculum used to be viewed as something established

in order to achieve certain ends, but it seems that today the ends flow from the curriculum itself. Hugh Sokett (an analyst) maintains that throughout the literature on curriculum there is a great deal of talk about taking ends of ends and conceiving of the relation between means and ends as contingent. He argues that what must be maintained as central to any account of curriculum, aims and objectives is human intentionality—our conception of what we are doing. So, our conceptions must be clear. We must put efforts to examine present curriculum, we also need to promote an on-going critical attitude toward curriculum restructuring in which meanings and purposes are made clear.

Discussion

One of the functions of philosophy is to develop a critical attitude toward language and meaning, especially in education discourse. This is certainly something that analysts have fostered. Rather than accept ready-made answers and slogans as solutions for educational and social problems, they have supported an approach that insists that all ideas and issues be examined every step along the way. Analysts are wary of “grand manner of philosophizing” in which there is a cry for synthesis and simple solutions to complicated problems. They are skeptical of a utopian attitude toward problems in which emotive or predetermined ends may lead our thinking away. They are also fearful of the emotional factors that may overshadow clear and dispassionate thinking. They are well aware of the dangers of passionate and fuzzy thinking. They strive to make a grand tour what Socrates made the search for wisdom.

Critiques of analytic philosophy of education have pointed out that while analysis has helped educators clarify and define some educational problems better. This may be too limited a view to meet the demands of our changing complex culture. Shifting away from prescription has helped to make philosophers of education more wary of grandiose statements; but at the same time, some critiques note that while philosophers have ceased to prescribe, many other people e.g., psychologists, sociologists, continue to make grand prescriptions. Contemporary education now likes to tilt more to the latter experts.

Analysts have uncovered ambiguities and misconceptions in education. But where do we go from there? Wittgenstein wanted to “let the fly out of the bottle,” but where does the fly go once it gets out?

Suppose we had a nicely clarified and precise language with regard to education. The purely descriptive and analytic approach may be able to give us positive clarity about what we are doing in education ; but if we are doing the wrong things to begin with, the wrongness is not necessarily corrected simply by language clarification.

Clarification does not rule out prescriptions and recommendations about the problems of life.

However, analytic philosophy is an approach. It has given birth to cultural shift. Analysis may be looked as stimulus to advancement. The Analytic Movement has helped philosophers develop and implement more refined linguistic and logical tools. In education it is a powerful tool atleast to the educators. This modern trends have enriched our methodology of research too.

Question :

Let Us Check Our Progress

1. Explain the value of aims of education.
2. Indicate the nature of curriculum often philosophical analytic trend.
3. Mention a few limitation of analytic philosophy of education.

6.1.7 : RELATIVISM

Relativism is sometimes identified as the thesis that all points of view are equally valid. Relativism is the denial that there are certain kinds of universal truths. We come across two forms of relativism : Anthropological relativism and philosophical relativism. *Anthropological relativism* refers to a methodological stance, in which the researcher suspends or brackets his or her own cultural biases while attempting to understand beliefs and behaviours in their local contexts. This has become known as *methodological relativism*, and concerns itself specifically with avoiding ethnocentrism or the application of one's own cultural standards to the assessment of other cultures. This is also the basis of the so-called 'emic' (insider) and 'etic' (outsider) distinction, in which an emic or insider account of behaviour is a description of a society in terms that are meaningful to the participant or actor's own culture. An emic or insider account is therefore culture-specific. An etic or outsider account is a description of a society by an observer, in terms that can be applied to other cultures; that is, an etic account is culturally neutral, and typically refers to the conceptual framework of the social scientist.

Philosophical relativism, in contrast, is simply an anti-dogmatic position that asserts that the truth of a proposition depends on who interprets it because no moral or cultural consensus can or will be reached. Methodological relativism and philosophical relativism can exist independently from one another, or one can be based on the other.

The concept of relativism also has importance both for philosophers and for anthropologists. In general, anthropologists engage in *descriptive relativism*, whereas philosophers engage in *normative relativism*, although there is some overlap; for example, descriptive relativism can pertain to concepts, normative relativism to truth.

Descriptive relativism assumes that certain cultural groups have different modes of thought, standards of reasoning, and so forth, and it is the anthropologist's task to describe, but not to

evaluate the validity of these principles and practices of a cultural group. It is possible for an anthropologist in his or her fieldwork to be a descriptive relativist about somethings that typically concern the philosopher (e.g. ethical principles).

Normative relativism concerns normative or evaluative claims that modes of thought, standards of reasoning, or the like are only right or wrong relative to a framework. 'Normative' is meant in a general sense, applying to a wide range of views; in the case of beliefs, for example, normative correctness equals truth. This does not mean, of course, that framework-relative correctness or truth is always clear, the first challenge being to explain what it amounts to in any given case, e.g., with respect to concepts, truth, epistemic norms. Normative relativism, therefore, implies that things (say, ethical claims) are not simply true in themselves, but only have truth values relative to broader frameworks (say, moral codes).

If relativism is identified as the thesis that all points of view are equally valid, in ethics this amounts to saying that all moralities are equally good; in epistemology it implies that all beliefs, or belief systems, are equally true. Perhaps because relativism is associated with such views, few philosophers are willing to describe themselves as relativists. However, most of the leading thinkers who have been called relativists - for example, Ludwig Wittgenstein, Peter Winch, Thomas Kuhn, Richard Rorty, Michel Foucault, Jacques Derrida - do share a certain common ground which, while recognizably relativeistic, provides a basis for more sophisticated, and perhaps more defensible positions.

Although there are many different kinds of relativism, they all have two features in common :

1. They all assert that one thing (e.g., moral values, knowledge, meaning, beauty, taste) is relative to some particular framework or standpoint (e.g., the individual subject, a culture, a language, or a conceptual scheme).
2. They all deny that any standpoint is uniquely privileged over all others :

In contemporary philosophy, the most widely discussed forms of relativism are *Cognitive Relativism* and *Ethical (moral) Relativism*. Cognitive relativism holds that there are no universal truths about the world : the world has no intrinsic characteristics, there are just different ways of interpreting it. The Greek Sophist Protagoras, the first person on record to hold such a view, said, "Man is the measure of all things; of thing that are that they are, and of things that are not that they are not". Goodman, Putnam and Rorty are contemporary philosophers who have held versions of relativism. Rorty says, e.g., that "'objective truth' is no more and no less than the best idea we currently have about how to explain what is going on".

Ethical relativism is the theory that there are no universally valid moral principles : all moral principles are valid relative to culture or individual choice. There are two sub-types : conventionalism,

which holds that moral principles are valid relative to the conventions of a given culture or society; and subjectivism, which maintains that individual choices are what determine the validity of a moral principle. Its motto is ‘Morality lies in the eyes of the beholder’.

Conventionalist ethical relativism consists of two theses : a diversity thesis, which specifies that what is considered morally right and wrong varies from society to society, so that there are no moral principles accepted by all societies; and a dependency thesis, which specifies that all moral principles derive their validity from cultural acceptance. From these two ideas relativists conclude that there are no universally valid moral principles applying everywhere and at all times.

Let us now try to understand relativism from two other angles.

Methodological relativism

Methodological relativism refers to a practice, by Anthropologists who are concerned with describing actual human behaviour, in which the researcher suspends or brackets his or her own cultural biases while attempting to understand beliefs and behaviours in their local contexts. Relativism of this kind is intended as a methodological antidote to ethnocentric distortions in science, and should not be confused either with cognitive relativism or moral relativism. The need for methodological relativism is implied by the principle of cultural relativism, which states that an individual human’s beliefs and activities are best interpreted in terms of his or her own culture.

Postmodern relativism

The term “relativism” often comes up in debates over postmodernism, poststructuralism and phenomenology. Critics of these perspectives often identify and advocates with the label “relativism.” For example, the *Sapir-Whorf Hypothesis* is often considered a relativist view because it posits that linguistic categories and structures shape the way people view the world. Whorf refined this idea and engendered precision by examining the particular grammatical mechanisms by which language influences thought. He framed his discursive thrust as set below :

We dissect nature along lines laid down by our native language. The categories and types that we isolate from the world of phenomena we do not find there because they state every observer in the face; on the contrary, the world is presented in a kaleidoscope flux of impressions which has to be organized by our minds—and this means largely by the linguistic systems of our minds. We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way - an agreement that holds throughout our speech community and is codified in the patterns of our language ... all observers are not led

Despite criticism of his hypothesis, Whorf insisted that thought and action were linguistically and socially mediated, and not monolithically determined. In doing so he opposed what he called a “natural logic” position which held. According to him, that “talking, or the use of language, is supposed only to ‘express’ what is essentially already formulated non linguistically”.

Similarly, deconstruction is often termed a relativist perspective because of the ways it locates the meaning of a text in its appropriation and reading, implying that there is no “true” reading of a text and no text apart from its reading. Claims by literary critic Stanley Fish are also often discussed as “relativist”.

These perspectives do not strictly count as relativist in the philosophical sense. Nevertheless, the term is useful to differentiate them from realists who believe that the purpose of philosophy, science, or literary critique is to locate externally true meanings. Important philosophers and theorists such as Michael Foucault, Max Stirner and Friedrich Nietzsche, political movements such as post-anarchism or post-left anarchy can also be considered as relativist in this sense - though a better term might be social constructivist. The spread and popularity of this kind of “soft” relativism varies between academic disciplines. It has wide support in anthropology and has a majority following in cultural studies. It also has advocates in political theory and political science, sociology and continental philosophy (as distinct from Anglo-American analytical philosophy). It has inspired empirical studies of the social construction of meaning such as those associated with labelling theory, which defenders can point to as evidence of the validity of their theories (albeit risking accusations of performative contradiction in the process). Advocates of this kind of relativism often also claim that recent developments in the natural sciences, such as Heisenberg’s uncertainty principle, quantum mechanics, chaos theory and complexity theory show that science is now becoming relativistic. However, many scientists who use these methods continue to identify as realist or post-positivist, and some sharply criticize the association.

In fine, relativism is. the idea that some element or aspect of experience or culture is relative to i.e., dependent on, some other element or aspect. Some relativists claim that humans can understand and evaluate beliefs and behaviors only in terms of their historical or cultural context. The term often refers to *truth relativism*, which is the doctrine that there are no absolute truths, i.e., that truth is always relative to some particular frame of reference, such as a language or a culture.

One argument for relativism suggests that our own cognitive bias prevents us from observing something objectively with our own senses, and notational bias will apply to whatever we can allegedly measure without using our senses. In addition, we have a culture bias - shared with other trusted observers—which we cannot eliminate. A counterargument to this states that subjective certainty and concrete objects and causes form part of our everyday life, and that there is no great value in discarding such useful ideas as isomorphism, objectivity and a final truth.

Relativism does not say that all points of view are equally valid, in contrast to an absolutism which argues there is but one true and correct view. In fact, relativism asserts that a particular instance Y exists only in relation to and as a manifestation of a particular framework or viewpoint X, and that no framework or standpoint is uniquely privileged over all others. That is, a non-universal trait Y (e.g., a particular practice, behaviour, custom, convention, concept, belief: perception, ethics, truth, or conceptual framework) is a dependent variable influenced by the independent variable X (e.g., a particular language, culture, a priori cognitive architecture, scientific frameworks, gender, ethnicity, status, individuality). Notably, this is not an argument that all instances of a certain kind of framework (say, all languages) do not share certain basic universal commonalities (say, grammatical structure and vocabulary) that essentially define that kind of framework and distinguish it from the mere communication of other animals). Moreover, relativism also presupposes philosophical realism in that there are actual objective things in the world that are relative to other real things. Moreover, relativism also assumes causality, as well as a problematic web of relationships between various independent variables and the particular dependent variables that they “influence.

To make you more acquainted with the concept of relativism we are citing some views of some notable philosophers like Thomas Kuhn and Richard Rorty...

Thomas Kuhn

Thomas Kuhn’s philosophy of science, as expressed in *The Structure of Scientific Revolutions* is often seen as relativistic (and enthusiastically proclaimed as such within the humanities). He claimed that science undergoes periodic revolutions or “paradigm shifts”, leaving scientists working in different paradigms with difficulty in even communicating.

The third and most fundamental aspect of the incommensurability of competing paradigms : this is a sense that I am unable to explicate further, [in which] the proponents of competing paradigms practice their trades in different worlds. One contains constrained bodies that flail slowly, the other pendulums that repeat their motions again and again. In one, solutions are compounds, in the other mixtures. One is embedded in a flat, the other in a curved, matrix of space. Practicing in two different worlds, the two groups of scientists see different things when they look from the same point in the same direction. Again, that is not to say that they can see anything they please. Both are looking at the world, and what they look at has not changed. However, in some areas they see different things and they see them in different relations one to the other. That is why a law that cannot even be demonstrated to one group of scientists may occasionally seem intuitively obvious to another. Equally, it is why, before they can hope to communicate fully, one group or the other must experience the conversion that we have been calling a paradigm shift.

Thus, the truth of a claim, or the existence of a posited entity is relative to the paradigm employed. However, he was reluctant to fully embrace relativism.

Richard Rorty

Richard Rorty has a somewhat paradoxical role in the debate over relativism : he is criticized for his relativistic views, but prefers to describe himself not as a relativist, but as a pragmatist.

“In short, my strategy for escaping the self-referential difficulties into which “the Relativist” keeps getting himself is to move everything over from epistemology and metaphysics into cultural politics, from claims to knowledge and appeals to self-evidence to suggestions about what we should try.”

Thus, his position, in the view of many commentators, adds up to relativism. In *Contingency, Irony and Solidarity* he argues that the debate between so-called relativists and so-called objectivists is beside the point because they don't have enough premises in common for either side to prove anything to the other.

Question :

Let Us Check Our Progress

1. Indicate the value of relativism in the educational research?

6.2.8 : LET US SUM UP

We have in this Unit understood the basics of modern concept of philosophy within the big bracket of philosophical analysis of various genre. One by one several formulations like philosophical analysis, logical analysis, logical positivism, logical empiricims, philosophical analysis driven educational philosophy and relatioivism of various kinds. We have also learnt that all these philosophical discourses do not speak anything of “ism” of any form. All these formulations give us some new orientations to view the world, not metaphysical questions of the older philosophers. Their interests of inquiry remain in logic, language, description, verification, confirmation or validity of knowledge within a given perspective.

Philosopers of education have got stimulations and have increasingly concerned themselves in recent years with ordinary language and the conceptual structure of education. Analytic philosophers have sought to expose ambiguities and illogical uses of educational terms which lead to conceptual confusions, both in theory and in practice. The approach repudiates the dominance of philosophies that endeavoured (in the past) to encompass all aspects of education within an overreaching systematic

framework, instead, those engaged in philosophical analysis now deal with more limited domain of key conceptual problems.

In this context George L. Newsome, Jr. has raised some questions : What are some of the distinguishing features of analytical philosophy? Can analytic philosophy meet the demands of a practical discipline such as education? Regarding the first question some points may be taken in mind.

1. Analytic philosophers strongly contend that truths about human experience and the universe cannot be discovered by philosophical means. Matters of empirical facts and truths about the world are discovered or established by science - not philosophers.
2. Analytic philosophers strongly maintain that language does not give us a true picture or copy of reality. Verbal expressions have only such meanings as we give them.
3. Analytic philosophers prefer to deal with the problems of man one by one and strongly resist the urge to construct broad, general and speculative theories.
4. Since analytic philosophy is concerned with clarification of language, most often the language of science or some other discipline, one can philosophize about almost anything because to philosophize is to analyze language.
5. Analytic philosophy can help develop a defensible theory of education in the sense that it can help analyse and clarify language, provide models of theory, state criteria for meaning and verification, and in general, help search the logical and linguistic tangles in pedagogical knowledge.

In conclusion, some of the methodologies and techniques of analysis, particularly of the logical empiricist kind, though apparently well suited to analysis of the scientific language might not be equally appropriate for analysis of the language of pedagogy or social sciences. On the other hand, the languages of education are not common languages, and the logic of educational discourse and argument are a practical logic rather than an informal logic.

6.1.9 : SUGGESTED READINGS

1. Analytic Philosophy, Barry R. Gross, Oxford and IBH. Publishing” Co. New Delhi. Bombay. Calcutta.
2. Philosophies of Education, A.S. Seetharamu, Ashish Publishing House. New Delhi.
3. Language, Truth and Logic, A. J. Ayer.
4. Classics of Analytic Philosophy, R. Ammerman (ed), Me Graw Hill. New York.

5. The Cambridge Dictionary of Philosophy, Robert Audi (ed) [Second Edition]. Cambridge University Press.

6.1.10 : ASSIGNMENTS

1. State and explain Logical analysis as a new movement in Philosophy.
2. 'Logical analysis or Language analysis is essentially a method and technique to solve philosophical problems, and not a school of thought' - Explain with reference to the basic tenets of Logical analysis.
3. Explain the fundamental tenets of Logical Positivism.
4. What is Relativism? Explain Cognitive relativism and Ethical relativism as found in contemporary Philosophy.
5. Write your own understanding about the influences of analytic philosophical outlooks on educational philosophy.
6. Write in brief:
 - (a) Few contentions of Logical/Language analysis.
 - (b) Verifiability Criterion of meaning.
 - (c) Anthropological Relativism.
 - (d) Descriptive Relativism and Normative Relativism.
 - (e) Post-modern relativism.
 - (t) Salient feature of analytic philosophies in context of educational discourse.

NOTES

Two-Year
POST GRADUATE DEGREE PROGRAMME
in
E D U C A T I O N

SEMESTER-II

EDC-06

Educational Psychology-2

Self-Learning Material



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UNIVERSITY OF KALYANI
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Director's Message

Satisfying the varied needs of distance learners, overcoming the obstacle of distance and reaching the unreached students are the threefold functions catered by Open and Distance Learning (ODL) systems. The onus lies on writers, editors, production professionals and other personnel involved in the process to overcome the challenges inherent to curriculum design and production of relevant Self Learning Materials (SLMs). At the University of Kalyani a dedicated team under the able guidance of the Hon'ble Vice-Chancellor has invested its best efforts, professionally and in keeping with the demands of Post Graduate CBCS Programmes in Distance Mode to devise a self-sufficient curriculum for each course offered by the Directorate of Open and Distance Learning (DODL), University of Kalyani.

Development of printed SLMs for students admitted to the DODL within a limited time to cater to the academic requirements of the Course as per standards set by Distance Education Bureau of the University Grants Commission, New Delhi, India under Open and Distance Mode UGC Regulations, 2017 had been our endeavour. We are happy to have achieved our goal.

Utmost care and precision have been ensured in the development of the SLMs, making them useful to the learners, besides avoiding errors as far as practicable. Further suggestions from the stakeholders in this would be welcome.

During the production-process of the SLMs, the team continuously received positive stimulations and feedback from Professor (Dr.) Sankar Kumar Ghosh, Hon'ble Vice- Chancellor, University of Kalyani, who kindly accorded directions, encouragements and suggestions, offered constructive criticism to develop it within proper requirements. We gracefully, acknowledge his inspiration and guidance.

Sincere gratitude is due to the respective chairpersons as well as each and every member of PGBOS (DODL), University of Kalyani. Heartfelt thanks is also due to the Course Writers-faculty members at the DODL, subject-experts serving at University Post Graduate departments and also to the authors and academicians whose academic contributions have enriched the SLMs. We humbly acknowledge their valuable academic contributions. I would especially like to convey gratitude to all other University dignitaries and personnel involved either at the conceptual or operational level of the DODL of University of Kalyani.

Their persistent and co-ordinated efforts have resulted in the compilation of comprehensive, learner-friendly, flexible texts that meet the curriculum requirements of the Post Graduate Programme through Distance Mode.

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Director
Directorate of Open and Distance Learning
University of Kalyani

SEMESTER-II		
EDC-06 : EDUCATIONAL PHILOSOPHY-2		
Block	Contents	Study hours
Block-1 Intelligence	Unit-1 : Intelligence : Basic concepts 1.1 : Concept of intelligence. 1.2 : Meaning & Nature of intelligence. 1.3 : Definition of intelligence. 1.4 : Characteristics of intelligence.	1 Hour
	Unit-2 : Intelligence theories & their educational significance -1 2.1 : Cattell 2.2 : Guilford	1 Hour
	Unit-3 : Intelligence theories & their educational significance-2 3.1 : Stenberg 3.2 : Gardner	
	Unit-4 : Measurement of intelligence 4.1 : Early test of intelligence. 4.2 : Modern intelligence Test. 4.3 : Intelligence Scores and its Distribution. 4.4 : Criticisms of intelligence tests.	1 Hour
	Unit-5 : Logical thinking and Problem solving 5.1 : Logical thinking : Concept & meaning 5.2 : Problem solving : Concept & meaning 5.3 : General Problem Solving Models 5.4 : Strategies of Problem based learning	
	Unit-6 : Emotional intelligence 6.1 : Meaning & concept of Emotional intelligence. 6.2 : Features of Emotional intelligence.	1 Hour
Block-2 Creativity	Unit-1 : Introduction to Creativity 2.1.1 : Meaning and nature of Creativity. 2.1.2 : Creativity as a constellation of abilities. 2.1.3 : Types of Creativity 2.1.4 : Creativity and Intelligence	1 Hour
	Unit-2 : Factors and Development of creativit 2.2.1 : Factors of Creativity 2.2.2 : Development of Creativity 2.2.2.1 : Sources of Creativity 2.2.2.2 : Stimulating Creativity	1 Hour
	Unit-3 : Measurement of Creativity 2.3.1 : Concept and categories of creativity measurement.	1 Hour

Block	Contents	Study hours
Block-3 Theories of Learning	Unit-1 : Behaviouristic approach to learning 1.1 : Concept of behaviouristic approach to learning. 1.2 : Hull's theory of learning. 1.3 : Skinner's theory.	1 Hour
	Unit-2 : Cognitive approach to learning 2.1 : Concept of cognitive approach to learning. 2.2 : Tolman's theory of learning. 2.3: Lewin's theory. 2.4 : Bruner's theory. 2.5 : Gagne's theory.	1 Hour
	Unit-3 : Constructivist approach to learning 3.1 : Concept of Constructivist approach to learning. 3.2 : Piaget's theory. 3.3 : Vygotsky theory.	1 Hour
Block-4 Personality	Unit-1 : Personality : concepts and theories 1.1 : Concept and Meaning and of personality. 1.2 : Nature of personality. 1.3 : Determinants of Personality 1.4 : Theory of Cattell, Eysenck, Jung, Erikson. 1.5 : Theory of Rogers, Big five factors.	1 Hour
		1 Hour
	Unit-2 : Measurement of personality 2.1 : Concept of personality measurement. 2.2 : Personality inventory. 2.3 : Projective techniques.	1 Hour
Block-5 Individual Differences and Group dynamics	Unit-1 : Individual differences and education 1.1 : Concept and types. 1.2 : Role of heredity, Environment and culture. 1.3 : Implications of individual differences for organizing educational programmes.	1 Hour
	Unit-2 : Group dynamics in classroom 2.1 : Concept, Process and Characteristics of Group 2.2 : Group dynamics and Classroom interaction 2.3 : Sociometric Grouping 2.4 : Socio-emotional Climate of Classroom 2.5 : Teachers characteristics about Influencing it.	1 Hour

SEMESTER-II**EDC-6****EDUCATIONAL PHILOSOPHY-2**

EDC-06	Unit	Title	Page
Block-1	1	Intelligence: Basic concepts	3
	2	Intelligence theories & their educational significance-1	6
	3	Intelligence theories & their educational significance-2	11
	4	Measurement of intelligence	15
	5	Logical thinking and Problem solving	19
	6	Emotional intelligence	23
Block-2	1	Introduction to Creativity	31
	2	Factors and Development of creativity	36
	3	Measurement of Creativity	41
Block-3	1	Behaviouristic approach to learning	50
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Block-4	1	Personality: concepts and theories	90
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Block-5	1	Individual differences and education	117
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EDC-06
EDUCATIONAL PSYCHOLOGY-2
Block-1
Intelligence

CONTENT STRUCTURE

Introduction

Objectives

1.1 : Intelligence-Basic concepts

1.1.1 : Concept & Meaning of intelligence

1.1.2 : Definition of intelligence

1.1.3 : Characteristics of intelligence

1.2 : Theories and their EducationalSignificances-1

1.2.1 : Cattell's Fluid and CrystallizedIntelligence

1.2.2 : Guildford's Theory of Intelligence (SOI)

1.3 : Theories and their EducationalSignificances-2

1.3.1 : Sternberg's Triarchic Theory ofIntelligence

1.3.2 : Gardner's Theory ofMultiple Intelligence

1.4 : Measurement ofIntelligence

1.4.1 : Early test of intelligence

1.4.2 : Modern intelligence Test

1.4.3 : Intelligence Scores and its Distribution.

1.4.4 : Criticisms of intelligence tests

1.5 : Logical thinking and problem solving

1.5.1 : Logical thinking : Concept & meaning

1.5.2 : Problem solving : Concept & meaning

1.5.3 : General Problem Solving Models

1.5.4 : Strategies of Problem based learning

1.6 : Emotional Intelligence

1.6.1 : Meaning & concept of Emotional intelligence

1.6.2 : Features of Emotional intelligence

Let us Sum Up

Suggested Readings

Assignments

Answer to Check Your Progress

INTRODUCTION

The term ‘**intelligence**’ is an often-used terminology of our daily conversations, especially in educational institutions or discussions. People have the tendency to think that ‘being intelligent’ is the key to any kind of success. Do you think this is true? This Unit will try to familiarize you about the meaning and nature of intelligence. Intelligence is measured by many different kinds of tasks. Likewise, this ability is expressed in many aspects of a person’s life. Intelligence draws on a variety of mental processes, including memory, learning, perception, decision-making, thinking, and reasoning. After reading this unit you will be able to explain the four theories of intelligence, formulated by Cattell, Guilford, Sternberg and Gardner and also their educational significances. Since the beginning of the previous century, man has been trying to measure intelligence. This Unit makes you acquainted with the measuring techniques of intelligence. It also highlights the concept of logical thinking and problem solving. The meaning of emotional intelligence will also be dealt within the later part of this Block.

OBJECTIVES

By the end of this Block you will be able to—

- define and explain the meaning and nature of intelligence;
- describe the theories of intelligence (by Cattell, Guilford, Sternberg and Gardner);
- criticize and explain the educational significance of these theories;
- list, describe and distinguish different intelligence tests;
- explain the meaning and nature of logical thinking and problem solving;
- explain the nature of emotional intelligence.

Block-1

Unit-1

Intelligence : Basic concepts

1.1.1 : INTELLIGENCE-CONCEPT & MEANING

Most people have an intuitive notion of what intelligence is, and many words in the English language distinguish between different levels of intellectual skill, such as bright, dull, smart, stupid, clever, slow, and so on. Yet no universally accepted definition of intelligence exists, and people continue to debate about what exactly it is. Intelligence as a term usually refers to a general mental capability to reason, solve problems, think abstractly, learn and understand new material, and profit from past experience. Whenever scientists are asked to define intelligence in terms of what causes it or what it actually is, almost every scientist comes up with a different definition. For example, in 1921 an academic journal asked 14 prominent psychologists and educators to define intelligence. The journal received 14 different definitions, although many of these experts unanimously emphasized the ability to learn from experience and the ability to adapt to one's environment. In 1986 researchers repeated the experiment by asking 25 experts for their definitions of intelligence. The researchers received many different definitions: general adaptability to new problems in life; ability to engage in abstract thinking; adjustment to the environment; capacity for knowledge and knowledge possessed; general capacity for independence, originality, and productiveness in thinking; to acquire capacity; apprehension of relevant relationships; ability to judge, to understand, and to reason; deduction of relationships; and innate, general cognitiveability.

Intelligence-A Biological Perspective: Intelligence in the biological concept refers to the linking of neurons. Neurons are the brain cells that are linked by connective tissues referred to as dendrites, which are found in the brain. Each person has millions of neurons that store information and create thousands and thousands of connections. This whole process of storing information and connecting neurons makes up intelligence. Biologically speaking, the more neurons that are connected, more information and ideas are formed. The more connections there are in the brain, the greater is the person's intelligence.

1.1.2 : DEFINITION OF INTELLIGENCE

The psychologists have sought to define intelligence exactly in order that understanding of this fundamental concept may be clarified. A variety of definitions have come up. The simplest definition (**Operational definition**) proposed that intelligence is whatever intelligence tests measure (Boring, 1923). But this definition does not characterize the ability well, and it has several problems. First, it is circular, i.e., the tests are assumed to verify the existence of intelligence, which in turn is measurable by the tests. Second, many different intelligence tests exist, but all of them do not measure the same thing. In fact, the makers of the first intelligence tests did not begin with a precise idea of what they wanted to measure. Finally, the definition says very little about the specific nature of intelligence. In recent years, a number of theorists have argued that standard intelligence tests measure only a portion of the human abilities that could be considered as aspects of intelligence. In contrast, a **real definition** of intelligence tells us the true nature of intelligence. Prominent researchers have given many real definitions. Some of them are given below :

Spearman (1904, 1923) : a general ability that involves mainly the education of relations and correlates.

Binet and Simon (1905) : the ability to judge well, to understand well, to reason well

Terman (1921) : the ability to carry out abstract thinking.

Wechsler (1931) : the aggregate, or global capacity to act purposefully, think rationally, and deal effectively with the environment.

Garrett (1965) : “Intelligence means a set of abilities demanded in the solution of problems which require the comprehension and use of symbols i.e. words, numbers, diagrams, equations, formulas ect..”

Sternberg (1985, 1986) : the cognitive ability to learn from experience, to reason well, to remember important information, and to cope with the demands of daily living.

Gardner (1986) : the ability or skill to solve problems or fashion products that are valued within one or more cultural settings.

A. Anastasi : “Intelligence is not a single, unitary ability, but rather a composite of several functions. The term denotes that combination of abilities required for survival and advancement within a particular culture.”

All Words Dictionary, (2006) : “The ability to use memory, knowledge, experience, understanding, reasoning, imagination and judgement in order to solve problems and adapt to new situations.

Longman Dictionary of Contemporary English, (2006) : “The ability to learn, understand, and think about things.”

From the above definitions, you can see that two themes recur again and again, that is, intelligence is the capacity to learn from experience and the capacity to adapt to one's environment.

1.1.3 : CHARACTERISTICS OF INTELLIGENCE

In matters of definition, it is difficult to argue that there is an objective sense in which one definition could be considered to be the correct one. Nevertheless, some definitions are clearly more concise, precise and general than others. Furthermore, it is clear that many of the definitions listed above are strongly related to each other and share many common features.

If we scan through the definitions pulling out commonly occurring features, we find that intelligence is :

- A property that an individual agent has as it interacts with its environment or environments.
- Is related to the agent's ability to succeed or profit with respect to some goal or objective.
- Depends on how able to agent is to adapt to different objectives and environments.
- Intelligence is an innate natural endowment of the child.
- It helps the child in maximum learning in minimum period of time.
- By it the child is able to foresee the future and plan accordingly.
- The child is able to take advantage of his previous experiences.
- The child faces the future with compliance.
- Intelligence develops a sense of discrimination between right or wrong.
- The developmental period of intelligence is from birth to adolescence.
- There is a minor difference in the development of intelligence between boys and girls.
- There are individual differences with regard to the intelligence between boys and girls.
- Intelligence is mostly determined by heredity but a suitable environment necessary to improve it.

Putting these key attributes together produces the informal definition of intelligence that we have adopted, "Intelligence measures an agent's ability to achieve goals in a wide range of environments." S. Legg and M. Hutter Features such as the ability to learn and adapt, or to understand, are implicit in the above definition as these capacities enable an agent to succeed in a wide range of environments.

Question :

Check Your Progress 3

Note : Write your answer and compare it with unitend answers.

1. How intelligence is operationally defined?
2. Point out four features of Intelligence?

Block-1

Unit-2

Theories and their Educational Significances-1

INTRODUCTION :

Do you think that there is just one 'intelligence' that equips us to solve all kinds of problems and answer all questions, regardless of their nature? Or are there different intelligences that help us to deal with particular problems and solutions? The scientific community is divided on this issue. Over the past century, theories of intelligence have gone down one of the two paths. Either, that there is a single underlying factor that accounts for all intelligent behaviour—a '**general intelligence**' (g) or alternatively, that there are multiple factors, with specific ones applying to specific situations and different forms of intelligence. On the 'general intelligence' path, we find the theories of Spearman, Jensen, Eysenck, Anderson and Herrnstein and Murray. The pluralist viewpoint is supported by the theories of Thurstone, Guilford, Gardner and Sternberg. Others such as Vernon, Horn and Cattell, and Carroll utilize hierarchical models, which have a 'general intelligence' type concept at the top and then many subfactors (Gardner, Kornhaber and Wake, 1996).

Another issue of argument is whether intelligence is determined primarily by heredity or by one's environment? The strictest adherent of a genetic view of intelligence believes that every person is born with a fixed amount of intelligence. They argue that there is little one can do to improve intelligence. Although it is known that environmental factors can be potent forces in shaping intelligence, it is not understood exactly how they contribute to intelligence. Environmental factors comprise all the stimuli a person encounters from conception to death, including food, cultural information, education, and social experiences. In fact, scientists have identified few specific environmental variables that have direct, unambiguous effects on intelligence viz., schooling, early intervention programme etc. Although the nature-nurture debate has raged for some time, research points to a conclusion that appeals to common sense: Intelligence is about half due to nature (heredity) and about half due to nurture (environment). The exact mechanisms by which genetic and environmental factors operate remain unknown. For better understanding the nature and meaning of intelligence the following theories will be of help to you.

1.2 : THEORIES AND THEIR EDUCATIONAL SIGNIFICANCES-1

Though there exist a number of theories, which go on to, explain the nature and meaning of intelligence, four different theories will be discussed here.

1.2.1 : CATTELL'S FLUID AND CRYSTALLIZED INTELLIGENCE

American psychologists Cattell and Horn applied factor analysis to study the structure of intelligence and concluded there are two kinds of intelligence :

1. **Fluid intelligence** (gf) and
2. **Crystallized intelligence** (gc).

Fluid intelligence drives the individual's ability to think and act quickly, solve novel problems, and encode short-term memories. It was described as the source of intelligence that an individual uses when s/he does not already know what to do. Fluid intelligence is grounded in physiological efficiency, and is as such, relatively independent of education and acculturation. Measures of fluid intelligence include criteria such as speed of reasoning and memory, increase into adulthood and then decline due to the aging process.

Cattell defined fluid intelligence as “the ability to perceive relationships independent of previous specific practice or instruction concerning those relationships.”

The other factor, encompassing crystallized intelligence has its base in learning and acculturation, and is reflected in tests of knowledge, general information, use of language (vocabulary) and a wide variety of acquired skills. Personality factors, motivation and educational and cultural opportunity are central to its development, and it is only indirectly dependent on the physiological influences that mainly affect fluid abilities. As long as opportunities for learning are available, crystallized intelligence can increase indefinitely during a person's life.

Crystallized intelligence is based upon facts and rooted in experiences. As we age and accumulate new knowledge and understanding, crystallized intelligence becomes stronger.

In addition to identifying the two subtypes of general intelligence, Cattell also developed what he called **investment theory**. This theory was propounded to logically link the previous types of intelligence and to explain how an investment of biological endowments (fluid intelligence) could contribute to learned skills and knowledge (crystallized intelligence). As one might expect, it is very difficult to separate the biological basis of intelligence from what is learned. Cattell believed that nearly all mental tests draw on both crystallized and fluid intelligence. Consequently, crystallized and fluid abilities were correlated with each other.

1.2.2 : GUILDFORD'S THEORY OF INTELLIGENCE (SOI)

In the 1950s Guilford, following the model of factor analysis, created his three-factor structure of intellect, commonly known as **Structure of Intellect** or **SOI**. In his cubic model there are three separate factors (**Operations, Content, and Products**) that make up any intellectual activity. Operations are the intellectual process that an individual does; contents are the things that the individual works with and performs his operations on; and products are the ways in which information is organized. The three dimensions are discussed below :

The Operation Dimension : This is the basic intellectual process used by a person. There are five kinds of operations or general intellectual processes :

Cognition : the ability to understand, comprehend, discover, and become aware.

Memory : the ability to recall information.

Divergent Production : the process of generating multiple solutions to a problem.

Convergent Production : the process of deducing a single solution to a problem.

Evaluation : the process of judging whether an answer is accurate, consistent, or valid.

The Content Dimension : It includes the broad areas of information in which operations are applied. It is divided into five categories :

Visual : images presented to the eyes.

Auditory : sounds presented to the ears.

Symbolic : comprises of information organized as symbols or signs that have no meaning by themselves, eg. numbers and letters of the alphabet.

Semantic : includes verbal thinking and communication.

Behavioral : includes all the behavioral-psychological acts of an individual.

The Product Dimension : As the name suggests, this dimension contains results of applying particular operations to specific contents. There are six kinds of products, they are :

Unit : it represents a single item of information.

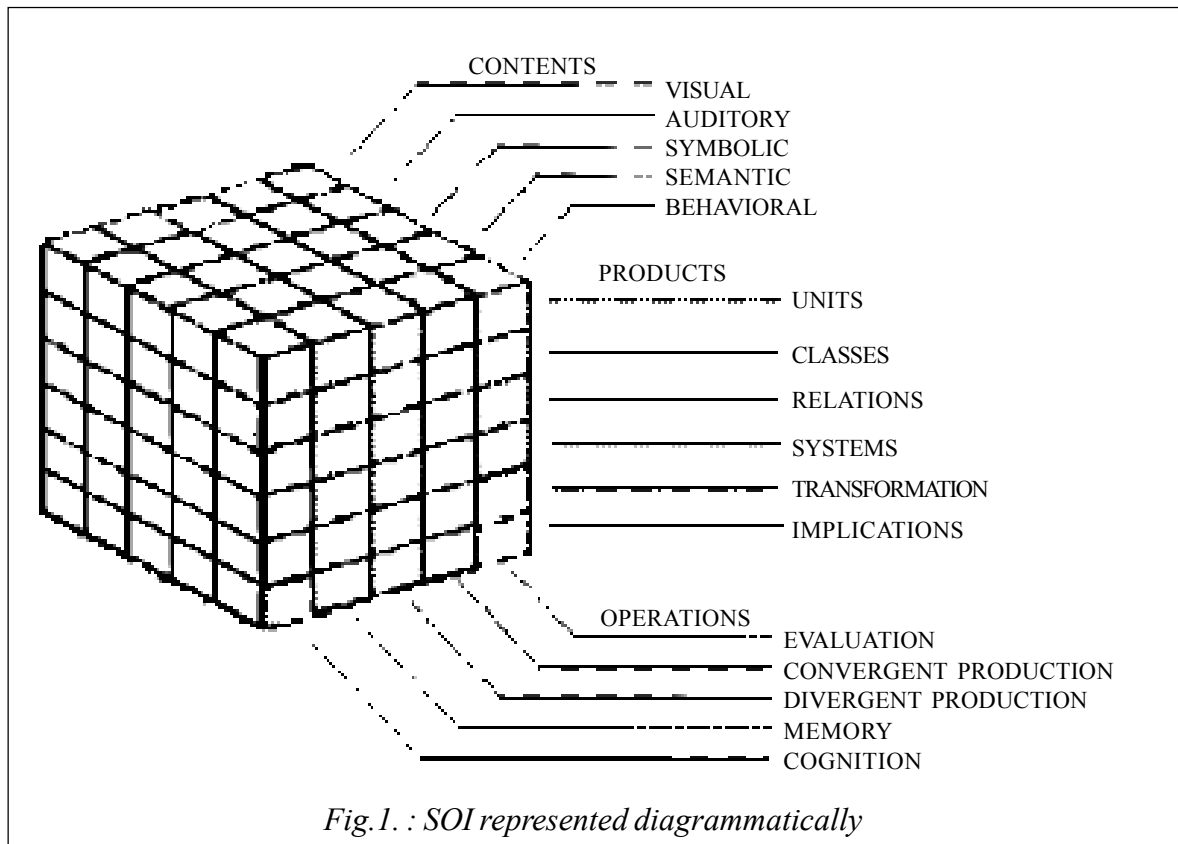
Class : is a set of items that share some attributes.

Relation : represents a connection between items or variable.

System : is an organization of items or networks with interacting parts.

Transformation : changes in an item's attributes.

Implication : is an expectation or prediction.



Therefore, according to Guilford, there are 5 kinds of operations, 6 kinds of products and 5 kinds of contents. Since each of these dimensions is independent, there are theoretically $5 \times 5 \times 6 = 150$ different components of intelligence. Each component stands for a particular operation in a particular content area resulting in specific product.

Guilford's approach was taxonomic in nature and this model completely disapproved the possibility of general intelligence (g). Though SOI model was criticized on several grounds but currently this model is being used in many aspects of educational field. In every learning situation assumptions are made about the learner's cognitive abilities. These cognitive abilities are very specific and very specifically related to different learning tasks. If the learners are capable of meeting these assumptions, learning is relatively easy, if not, learning can be difficult or even impossible. In order to best equip a student for learning s/he has to develop these cognitive abilities assumed by the learning situation. Such factors, which are very important for learning, have been identified by the SOI method. First of all an individual's strengths and weaknesses are determined with this method. The results will indicate what areas need to be improved and what areas need to be appreciated. The next step is remediation. SOI not only determines what is missing but also offers lessons or remedial programmes to turn these weaknesses into strengths. Therefore SOI method is not just

tutoring, it is a cure for learning. Currently SOI model is being used for gifted students, children with learning disorder, adults with learning problems and also career counseling.

In 1938 American psychologist Thurstone proposed that intelligence was not one general factor, but a small set of independent factors of equal importance. He called these factors primary mental abilities. He identified seven primary mental abilities : (1) verbal comprehension-the ability to understand word meanings; (2) verbal fluency-speed with verbal material, as in making rhymes; (3) number-arithmetic ability; (4) memory-the ability to remember words, letters, numbers, and images; (5) perceptual speed-the ability to quickly distinguish visual details and perceive similarities and differences between pictured objects; (6) inductive reasoning-deriving general ideas and rules from specific information; and (7) spatial visualization-the ability to mentally visualize and manipulate objects in three dimensions.

Question :

Check Your Progress 3

1. Mention three separate factors of intelligence as proposed by Guilford.
2. What Crystallized Intelligence?

Block-1

Unit-3

Theories and their Educational Significances-2

1.3.1 : STERNBERG'S TRIARCHIC THEORY OF INTELLIGENCE

According to Sternberg's Triarchic Theory (1985, 1986), intelligence consists of three categories, or types. The first category consists of **analytic**, or **componential** intelligence. Componential intelligence emphasizes effectiveness in information processing. This category also has three subcategories, which will be discussed later. The second category is called either **creative** intelligence, or the **experiential** dimension of intelligence. Experiential intelligence emphasizes insight and the ability to formulate new ideas. Again with this category as with the componential dimension, there are subcategories. The third and final portion of Sternberg's Triarchic Theory is known as the **practical**, or **contextual** aspect of intelligence. Contextual intelligence emphasizes intelligence in a practical sense.

Analytic or Componential Dimension-The methods people use to process and analyze information to solve problems. It seeks to explain how we conceptualize problems, plan how to solve them, select strategies, monitor the success and perform the basic mental operations necessary to reach the solution. Sternberg considers, that this reflects how an individual relates to his internal world. This aspect of intelligence can be further divided into Metacomponents, Performance components, and Knowledge-acquisition components.

Metacomponents : This subcategory consists of the higher-order, or executive processes such as the planning, monitoring, and evaluation of the performance of a task.

Performance Components : This category includes the execution of plans and strategies developed by the metacomponents, and plays a role in relating new information to novel situations through previously inferred concepts.

Knowledge-acquisition Components : These lower-order processes consist of selective encoding, when relevant information is separated from irrelevant, selective combination, when new and old information is organized, and selective comparison when new information is compared to previous cognitive constructs to update the metacomponents.

Creative or Experiential Dimension : This aspect of intelligence examines how people approach new and unfamiliar tasks. This is also considered the insightful dimension to a person's intelligence. Sternberg has considered that this aspect of intelligence reflects how an individual connects the internal world to external reality. The experiential dimension can be further divided into two categories: novelty and automatization.

Novelty : This is how a person reacts with the first exposure to a new scenario.

Automatization : This is how a person handles repeated tasks, or practice.

Practical or Contextual Dimension : This intelligence relates individuals to their environment and sociocultural context. How an individual adapts to their current environment, shapes their current environment, and selects a better environment all make up this practical aspect of intelligence. This involves the ability to grasp, understand and deal with everyday tasks. This aspect of intelligence reflects how the individual relates to the external world about him or her.

Sternberg believes that traditional intelligence tests tell us little about performance in everyday life. He also suggests that if intelligence is properly defined and measured, it must translate into real life success. The important aspect of this theory is to avoid defining intelligence in terms of intelligence tests rather than performance in everyday world. Sternberg is developing 'Sternberg Triarchic Ability Test', 'Sternberg Multidimensional Ability Test' and other such tests for measuring intelligence. According to Sternberg, practical intelligence is made up of mostly action-oriented tasks. This is more likely to be learned during everyday life than through regular schooling. Recently Sternberg has designed a programme for developing practical intelligence. This programme also helps in career choice or developing social skills. Analytical intelligence, especially knowledge acquisition components helps in learning and creative intelligence helps in insightful learning.

1.3.2 : GARDNER'S THEORY OF MULTIPLE INTELLIGENCE

Dr. Howard Gardner, a psychologist and professor of neuroscience from Harvard University, developed the theory of **Multiple Intelligences (MI)** in 1983. The theory challenged traditional beliefs in the fields of education and cognitive science. For Gardner, intelligence is :

- ❖ the ability to create an effective product or offer a service that is valued in a culture;
- ❖ a set of skills that make it possible for a person to solve problems in life; and
- ❖ the potential for finding or creating solutions for problems, which involves gathering new knowledge.

He has challenged the notion of general intelligence and the way intelligences are tested and summed up in one number, the Intelligence Quotient (IQ). He says that each intelligence has a separate index that is independent of the others.

According to Gardner, human beings have **at least seven different kinds of intelligence** that reflect different ways of interacting with the world. Each person has a unique combination, or profile.

Although we all have each of the seven intelligences, no two individuals have them in the same exact configuration—similar to our finger prints. These different types of intelligence are discussed below :

Linguistic Intelligence : the capacity to use language to express what's on your mind and to understand other people. It involves sensitivity to spoken and written language, the ability to learn

languages, and the capacity to use language to accomplish certain goals. This intelligence includes the ability to effectively use language to express oneself and language as a means to remember information. Writers, poets, lawyers and speakers are among those that Gardner sees as having high linguistic intelligence.

Logical-Mathematical Intelligence : consists of the capacity to analyze problems logically, carry out mathematical operations, and investigate issues scientifically. In Gardner's words, it entails the ability to detect patterns, reason deductively and think logically. This intelligence is most often associated with scientific and mathematical thinking. It also means the capacity to understand the underlying principles of some kind of causal system, the way a scientist or a logician does; or to manipulate numbers, quantities, and operations, the way a mathematician does.

Musical/Rhythmic Intelligence : The capacities to think in music, to be able to hear patterns, recognize them, and perhaps manipulate them. People who have strong musical intelligence don't just remember music easily, they can't get it out of their minds, and it's so omnipresent.

Bodily/Kinesthetic Intelligence : entails the potential of using one's whole body or parts of the body to solve problems, make something, or put on some kind of production. It is the ability to use mental abilities to coordinate bodily movements. The most evident examples are people in athletics or the performing arts, particularly dancing or acting.

Spatial Intelligence : the ability to represent the spatial world internally in your mind. It involves the potential to recognize and use the patterns of wide space or more confined areas, the way a sailor or airplane pilot navigates the large spatial world, or the way a chess player or sculptor represents a more circumscribed spatial world. It enables human beings to recognize, categorize and draw upon certain features of the environment.

Intrapersonal Intelligence : entails the capacity to understand oneself, to appreciate one's feelings, fears and motivations. In Gardner's view, it involves having an effective working model of us, and to be able to use such information to regulate our lives.

Interpersonal Intelligence : is concerned with the capacity to understand the intentions, motivations and desires of other people. It allows people to work effectively with others. It's an ability we all need, but is especially important for educators, salespeople, religious and political leaders and counselors—anybody who deals with other people.

Recently, Gardner (1998) has added three more types of intelligences to his list. These are-

Naturalistic : the ability to discriminate among living things and sensitivity to other features of the natural world,

Spiritual : a concern with cosmic and spiritual issues in one's development; and

Existential : the ability and tendency to pose questions about life, death, and ultimate realities.

Some people deny Gardner's claim of interpersonal and intrapersonal as intelligences. They say

that it is merely a personality trait or some other behaviour that has nothing to do with intelligence. Others say that many of his intelligences (viz. musical) are merely special talents as opposed to intelligences, bringing the discussion back to the original dispute about the definition of intelligence. However, it is true that his theory of multiple intelligences is quickly gaining popularity, especially in school instruction. With his theory, Gardner is pushing for reforms in the way students are taught and tested. Currently tests such as the SAT and even IQ actually test the logistical-mathematical and linguistic intelligences, ignoring the other intelligences. Many educators, whether unintentionally or not, take the same approach and focus on the logical-mathematical and the linguistic intelligences. So a child with higher levels of spatial or interpersonal intelligences may not be getting as much out of school as a linguistic learner to whom the educational system is geared towards. While he does advocate more personalized instruction, he does not advocate teaching material in nine ways, or separating the students into classes according to his own strength in intelligence. Gardner merely desires a better understanding of the differences. If one student turns in a particularly bad essay or project, he might not be particularly gifted in his linguistic abilities and would not be entirely to blame for consistently scoring low on his essays. But all is not hopeless for the person who is linguistically behind, or unable to grasp spatial concepts. Each intelligence can be strengthened, but to different degrees and with different amounts of effort. Each intelligence index simply measures a different potential level, not an absolute amount. The most remarkable feature of this theory is how it provides eight different pathways to learning. If a teacher is having difficulty to reach students in more traditional linguistic or logical ways of instruction, this theory suggests several other ways in which the material can be presented to facilitate effective learning. Gardner is also the co-director of **Project Zero**, a programme that promotes the enhancement of thinking, learning, and creativity. This programme focuses on the arts, as well as on the humanities and sciences, but altogether serves to cultivate these types of intelligences that are normally not considered intelligences by many. Using his intelligence theories, this program is quickly being used in classrooms in the United States. Another project named **Project SUMIT** (School Using Multiple Intelligence Theory) has examined the performance of a number of schools and concluded that those schools, which used Multiple Intelligence Theory, have been significant gainers in respect of academic scores, parental participation, discipline, etc.

Question :

Check Your Progress 3

(Write your answer and compare it with the Unit end answers)

1. What is Gardner's position on 'g'?
2. What element of intelligence helps individual to cope up with environment as proposed by Sternberg?

Block-1

Unit-4

Measurement of Intelligence

1.4 : MEASUREMENT OF INTELLIGENCE

1.4.1 : EARLY TEST

Interest in measuring individual differences in mental ability began in the late 19th century. Galton was among the first to measure these differences. In the 1890s American psychologist Cattell developed a battery of 50 tests that attempted to measure basic mental ability. Both of them focused on measurements of sensory discrimination and reaction times. In 1905, Alfred Binet and Simon were the first to develop an intelligence test. They developed the test considering that practical knowledge, memory, reasoning, vocabulary, and problem solving worked better at predicting school success. Some of the items of this test were to perform simple commands and gestures, repeat spoken digits, name objects in pictures, define common words, tell how two objects are different, and define abstract terms. Similar items are also used in today's intelligence tests. Simon and Binet revised this test in 1908 and 1911.

Henry Goddard, Director of a New Jersey school for children with mental retardation, brought it to the United States. This test was first translated into English by Goddard to test people for mental retardation. An American psychologist, Lewis Terman, revised the test by adapting some of Binet's questions, adding questions appropriate for adults. Terman's first adaptation, published in 1916, was called the Stanford-Binet Intelligence Scale (due to the affiliation of the Stanford University). Subsequently this test was revised in 1937, 1960, 1986 and 2003.

During World War I (1914-1918) Yerkes and his colleagues developed two intelligence tests for army recruitment viz., the Army Alpha test (for literate recruits) and the Army Beta test (for non-English speakers and illiterate recruits). Both these tests were group tests and administered to large groups of recruits at the same time. The Alpha test included arithmetic problems, tests of practical judgment, tests of general knowledge, synonym-antonym comparisons, number series problems, analogies, and other problems. The Beta test required recruits to complete mazes, complete pictures with missing elements, recognize patterns in a series, and solve other puzzles.

1.4.2 : MODERN INTELLIGENCE TESTS

The most widely used modern individual tests of intelligence are the Stanford-Binet 5th Edition (SB-5), the Wechsler Intelligence Scale for Children-III (WISC-III), the Wechsler Adult Intelligence

Scale-III (WAIS-III), the Kaufman Brief Intelligence Test (K-BIT) and Kaufman Assessment Battery for Children (Kaufman-ABC). Each of the tests consists of a series of subtests like-vocabulary similarities, digit span, information, object assembly, mazes, and simple arithmetic problems. Items on each subtest are given in order of difficulty until the person being tested misses a certain number of items. Each subtest provides a score. The subtest scores are then added together to calculate the total IQ score. Some tests, such as the Wechsler tests, give separate verbal and performance (nonverbal) IQ as well as an overall IQ. But some other intelligence tests, like the Peabody Picture Vocabulary Test or Raven's Progressive Matrices, comprise of only one type of item. In the Peabody Picture Vocabulary Test, a person has to define a word by deciding which picture out of four pictures best represents the meaning of the word said by the examiner. In Raven's Progressive Matrices, the individual being tested is shown a matrix of patterns with one pattern missing. The person must figure out the rules governing the patterns and then use these rules to pick the item that best fills in the missing pattern. The Raven's test was designed to minimize the **influence of culture** by relying on nonverbal problems that require abstract reasoning and do not require knowledge of a particular culture.

The tests mentioned above are all individual in nature. But there are also some group-administered tests. The Army Alpha and Beta tests were the earliest group-administered tests. The new revised form of the test is now known as the Armed Services Vocational Achievement Battery (ASVAB). Some popular group tests are Otis-Lennon School Ability test, Henmon-Nelson tests, Cognitive Abilities Test, Shipley Institute of Living IQ Scale. All these tests can be administered to a large number of persons at the same time. Though group tests usually are not as reliable as individually administered tests but these tests are very effective to test a large number of people in a short time and at a relatively low cost.

1.4.3 : INTELLIGENCE SCORES AND ITS DISTRIBUTION

Binet Simon created the concept of **mental age** for measuring intelligence of an individual. Terman, in his Stanford-Binetre vision introduced the concept of **intelligence quotient, or I Q** (term coined by W. Stern) for converting the performance of a person into a single score, by dividing mental age with a person's actual chronological age. This calculation has proven problematic when the children get older. To overcome this problem, another concept was introduced i.e. **Deviation IQ**. This concept is based on statistical comparisons of an individual's score with the average score of others of the same age group. Deviation IQ is a number that compares an individual's score with average group that means it tells how much above or below a person scored than the average. Some modern intelligence tests use **verbal IQ** and **nonverbal IQ** separately to calculate overall IQ. Like many other psychological characteristics IQ scores are distributed according to a normal

distribution, which forms a normal curve, or bell curve if plotted graphically. The normal distribution is defined by its mean and its standard deviation. To interpret the score of any test, it is important to know the mean and standard deviation of the test. Usually the mean of an IQ test is arbitrarily set at 100 with a standard deviation of 15.

● Uses of Intelligence Tests

The Flynn effect : Are we getting smarter?

In the 1980s, a New Zealand-based political scientist, James Flynn, noticed that IQ was increasing in all countries all the time, at an average rate of about 3 IQ points per decade i.e. the average IQ across the world has risen over 1 standard deviation (i.e. 15 points) since World War II—predominantly due to environmental effects.

Originally intelligence tests were designed for use in schools. In schools, teachers and educators use these tests to assess a student's performance in academic subjects and to determine if special educational programmes are necessary. Some of the common uses of intelligence tests are discussed below :

- ❖ These tests help to identify students with learning difficulties and to select a suitable educational programme for them.
- ❖ These tests may also be used for assessing the gifted or talented.
- ❖ Intelligence and aptitude tests are used to select job applicants. The major reason intelligence tests work in job selection is that they predict who will learn the new information required for the job quickly.
- ❖ In medicine, physicians use such tests to assess the cognitive functioning of patients, such as those with brain damage or degenerative diseases of the nervous system.
- ❖ Psychiatrists and psychologists also use intelligence tests to diagnose the mental capacities of their clients.

1.4.4 : CRITICISMS OF INTELLIGENCE TESTS

Intelligence tests can provide valuable diagnostic information and insights about intellectual ability. However, intelligence testing has become controversial. Like any psychological test, intelligence test must also have some criteria like reliability, validity etc. In case of reliability the result is quite satisfactory. But validity of these tests is somewhat controversial. A valid intelligence test should measure intelligence and not some other capability. However, making a valid intelligence test is not a straightforward task

because there is little consensus on a precise definition of intelligence. Some criticize that intelligence tests do not really measure intelligence but only a narrow set of mental capabilities. IQ scores are generally misinterpreted and misused. Because IQ tests reduce intelligence to a single number, many people mistakenly regard IQ as if it were a fixed, real trait such as height or weight, rather than an abstract concept that was originally designed to predict performance in school. Another criticism is that there may be some culture centeredness in intelligence test. Though some intelligence tests claim to be culture-fair but practically it is impossible.

Question :

Check Your Progress 3

(Write your answer and compare it with the Unit end answers)

1. IQ = ?
2. What is deviation IQ?
3. What are the subtests generally used in modern intelligence tests?

Block-1

Unit-5

Logical thinking and Problem solving

1.5 : LOGICAL THINKING AND PROBLEMSOLVING

1.5.1 : LOGICAL THINKING

Logical thinking is the process in which one uses reasoning consistently to come to a conclusion. It is not a magical process or a matter of genetic endowment, but a learned mental process. Problems or situations that involve logical thinking call for structure, for relationships between facts, and for chains of reasoning that “make sense”. All logical thinking is **sequential thought**. This process involves taking the important ideas, facts, and conclusions involved in a problem and arranging them in a chain-like progression that takes on a meaning in and of itself. To think logically is to think in steps. This means that logical thinking is thinking in terms of causes and consequences, which in its turn means that it is sequential thinking. It is like looking into and predicting the future : if this happens, then that will happen. It is based on the interpretation of certain prevalent conditions and then predicting what will happen if the same conditions continue to prevail. Logical thinking is in a way the opposite of short-term memory. Short-term memory is the skill that enables one to keep track of the immediate past. Logical thinking allows one to keep track of the immediate future. The two skills are closely connected. They are like a painter sweeping his brush-the beginning-sweep naturally leads to the end-sweep. The person who has a poor short-term memory will therefore naturally have a weak ability to think logically because one leads to the other. Logical thinking, in Piaget’s developmental scheme, is operational, which means that it does not appear before the concrete operations stage.

Logical thinking is a very important skill. Like all other skills, it must be taught. There are many everyday life situations in which the ability to think logically is of great importance. It has been proven that specific training in logical thinking processes can make people “smarter.” The ability to think logically is of immense practical importance in our daily lives. Day after day, from moment to moment, we are busy interpreting available evidence and making predictions on what will happen next. Logical thinking is not only of great importance in our everyday lives, but is also a skill that is indispensable for children in school. Logical thinking allows a child to reject quick and easy answers, such as “I don’t know,” or “this is too difficult,” by empowering him to look into deeper into his thinking processes and understand better the methods used to arrive at a solution. Logical thinking is also an important foundational skill of math. Learning mathematics is a highly sequential process.

For example, to understand fractions you must first understand division. To understand simple equations in algebra requires that you understand fractions.

1.5.2 : PROBLEM SOLVING

As you get matured it is expected that you must solve your own problem. But the question is what is a problem? A problem is the difference between your current state and your goal state. Developing a positive attitude towards problem can transform you into a happier and more confident person who feels much more in control of life. Therefore train yourself to respond to problems with enthusiasm and eagerness because a problem is an opportunity for improvement. Problem solving ability is considered to be the most complex of all intellectual functions. It has been defined as higher-order cognitive process that requires the modulation and control of more routine or fundamental skills (Goldstein & Levin, 1987). Problem solving is usually defined as formulating new answers, going beyond the simple application of previously learned rules to achieve a goal. Problem solving is a process in which we perceive and resolve a gap between a present situation and a desired goal, with the path to the goal blocked by known or unknown obstacles. In general, the situation is one not previously encountered, or where at least a specific solution from past experiences is not known. It occurs if an organism does not know how to proceed from a given state to a desired goal state. It is part of the larger problem process that includes problem finding and problemshaping.

An argument on the issue of whether problem solving is specific or whether there exist some general problem strategy is a long-standing debate. It is considered that there are some general problem solving methods, like the ones discussed below.

1.5.3 : GENERAL PROBLEM SOLVING MODELS

During the 1960s and 70s, researchers developed general problem solving models to explain problem solving processes (Newell & Simon, 1972; Polya, 1957; Bransford & Stein, 1984). One example of this general problem-solving model is Bransford's **IDEAL** model :

- I** Identify the problem
- D** Define the problem through thinking about it and sorting out the relevant information
- E** Explore solutions through looking at alternatives, brainstorming, and checking out different points of view
- A** Act on the strategies
- L** Look back and evaluate the effects of your activity

This model is similar to many of the general problem solving models that were common then and that are still used with many general problem solving courses found in academic and corporate training settings. Recent research in cognitive field has led to a different model of problem solving. Today we know problem solving includes a complex set of cognitive, behavioral, and attitudinal components. In 1983, Mayer defined problem solving as a multiple step process where the problem solver must find relationships between past experiences (schema) and the problem at hand and then act upon a solution. Mayer suggested three characteristics of problem solving :

- ❖ Problem solving is cognitive but is inferred from behavior.
- ❖ Problem solving results in behavior that leads to a solution.
- ❖ Problem solving is a process that involves manipulation of or operations on previous knowledge

One frequently used model of the problem solving process (Gick, 1986) identifies a basic sequence of three cognitive activities :

- ❖ Representing the problem includes calling up the appropriate context knowledge, and identifying the goal and the relevant starting conditions for the problem.
- ❖ Solution search includes refining the goal and developing a plan of action to reach the goal.
- ❖ Implementing the solution includes executing the plan of action and evaluating the results.

Problem solving is a basic skill needed by today's learners. As education has come under criticism from many sectors, educators have looked for ways to reform teaching, learning, and the curriculum. Today there is a strong movement in education to incorporate problem solving as a key component of the curriculum. The need for learners to become successful problem solvers has become a dominant theme in many national standards. The rationale of problem-based learning is simple-it encourages students to take responsibility for their own learning by providing a problem that needs solving. Unlike traditional information driven curricula, problem based learning begins with a problem, often based on real facts or simulation of a real situation, and requires students to work alone and in groups to find solutions. The information, resources and skills developed come directly from the requirements and specifications of the problem. As such the learner develops skills of retrieval, selection and discrimination and applies these in an holistic way. The advantage of the problem based learning approach over traditional models of instruction is that students are elevated to the position of analyst and problem-solver and have a specific deadlines to meet. Research into student learning tells us that students learn best when they perceive assessment as real and relevant, when the fear of failure is reduced and when appropriate and timely feedback is available. Problem based learning can offer all of this.

1.5.4 : STRATEGIES OF PROBLEM BASED LEARNING

The following strategies would be helpful for problem based learning :

- ❖ using stimulus material to help students discuss an important problem, question or issue;
- ❖ presenting the problem as a simulation of professional practice or real life situation;
- ❖ appropriately guiding students critical thinking and providing limited resources to help them learn from defining and attempting to resolve the given problem;
- ❖ having students work co-operatively as a group, exploring information in and out of class, with access to a tutor who knows the problem well and can facilitate the groups learning process;
- ❖ getting students to identify their own learning needs and appropriate use of available resources;
- ❖ reapplying this new knowledge to the original problem and evaluating their processes.

Question :

Check Your Progress 5

1. What do you mean by problem solving?
2. Mention three strategies of problem based learning.

Block-1

Unit-6

Emotional intelligence

1.6.1 : MEANING & CONCEPT OF EMOTIONAL INTELLIGENCE

Psychologists have identified a variety of intelligences over the years. Most of these can be grouped into one of three clusters, “**abstract**”, “**concrete**” or “**social**” intelligence (Thorndike, 1920). Social intelligence is an ability to understand and relate to people. Emotional Intelligence has its roots in social intelligence (Young, 1996). The term emotional intelligence first appeared in 1985, in Wayne Payne’s doctoral thesis,—A study of emotion: Developing emotional intelligence. Goleman, a psychologist and behavioral science journalist, later popularized the term and developed related concepts in his influential book, Emotional Intelligence (1995). Emotional Intelligence (EI), often measured as an **Emotional Intelligence Quotient (EQ)**, describes an ability, capacity, or skill to perceive, assess, and manage the emotions of one’s self, of others, and of groups. Mayer and Cobb defines it as “the ability to process emotional information, particularly as it involves the perception, assimilation, understanding, and management of emotion.” According to Hein emotional intelligence is the innate potential to feel, use, communicate, recognize, remember, learn from, manage and understand emotions. It is an innate ability, which gives us our emotional sensitivity and our potential for learning healthy emotional management skills. Salovey & Mayer define emotional intelligence as “a type of social intelligence, which involves the ability to monitor one’s own and others’ emotions, to discriminate among these emotions and to use this information to guide one’s thinking and actions”. They argued that emotional intelligence subsumes both inter and intrapersonal intelligences, as proposed by Gardner.

1.6.2 : FEATURES OF EMOTIONAL INTELLIGENCE

The concept ‘Emotional Intelligence’ Has been defined by various educationist and psychologists through different angles. Their proposal indicates that emotional intelligence has five principal features :

- ❖ being aware of one’s own emotions;
- ❖ being able to manage one’s own emotions;
- ❖ being sensitive to the emotions of others;
- ❖ being able to respond to and negotiate with other people emotionally;
- ❖ being able to use one’s own emotions to motivate oneself.

Mayer and Salovey described the “four branch model” of emotional intelligence. The Four branches and the corresponding abilities are outlined below :

Perception Appraisal and Expression of Emotion

- ❖ The ability to perceive and identify emotions in faces, tone of voice, body language.
- ❖ The capacity for self-awareness : being aware of your own feelings as they are occurring.
- ❖ The capacity for emotional literacy. Being able to label specific feelings in yourself and others; being able to discuss emotion and communicate clearly and directly.

Emotional Facilitation of Thinking

- ❖ The ability to incorporate feelings into analysis, reasoning, problem solving and decision-making.
- ❖ The potential of your feelings to guide you to what is important to think about.

Understanding and Analyzing Emotions

- ❖ The ability to solve emotional problems.
- ❖ The ability to identify and understand the inter-relationships between emotions, thoughts and behavior. For example, to see cause and effect relationships such as how thoughts can affect emotions or how emotions can affect thoughts, and how your emotions can lead to the behaviour in yourself and others.
- ❖ The ability to understand the value of emotions to the survival of the species.

Reflective Regulation of Emotions to Promote Emotional and Intellectual Growth

- ❖ The ability to take responsibility for one’s own emotions and happiness.
- ❖ The ability to turn negative emotions into positive learning and growing opportunities.
- ❖ The ability to help others identify and benefit from their emotions.

Generally speaking, emotional intelligence improves an individual’s social effectiveness. The higher the emotional intelligence, the better the social relations. Emotionally intelligent people are particularly good at establishing positive social relationships with others, and avoiding conflicts, fights, and other social altercations. They’re particularly good at understanding, psychologically healthy living and avoiding such problems as drugs and drug abuse. It seems likely that such individuals, by providing coaching advice to others, and by directly involving themselves in certain situations,

assist other individuals and groups of people to live together with greater harmony and satisfaction. Finally, emotional intelligence can be utilized in problem solving. Emotionally intelligent individuals are superior in regulating emotion. Salovey and Mayer (1990) proposed that individuals tend to differ greatly in their ability to organize their emotions, in order to solve problems. Both emotions and moods have a subtle influence over the strategies involved in problem solving. They came to the conclusion that positive mood enables a greater degree of flexibility in future planning, which enables better preparation for making the most of future opportunities. Similarly, they claimed that a good mood is beneficial in creative thinking, as it increases an individual's ability for developing category-organizing principles.

Question :

Check Your Progress 3

(Write your answer and compare it with the Unit end answers)

1. Logical thinking is in a way the opposite of_____.
2. IDEAL is a model of_____.
3. EQ means_____.

LET US SUM UP

Intelligence is difficult to define; psychologists usually come up with two different types of definitions—real and operational. Two debates usually ensue on the issues of whether Intelligence is inherited or acquired and the other being on the existence of one or many types of intelligence. The true nature of intelligence is reflected through different theories. Cattell proposed that intelligence consists of two factors viz., fluid and crystallized. Fluid intelligence is largely nonverbal and culture-reduced form and crystallized intelligence is highly culture-dependent. Guilford described intellectual abilities along three dimensions viz., operations (5 categories), content (5 categories) and product (6 categories), thus in all 150 different kinds of intelligence. Sternberg's Triarchic theory highlighted intelligence as three different categories—analytic (responsible for intelligent behaviour), creative (the ability to deal effectively with novel tasks), and contextual (adaptation to, shaping of, and selection of real world environments). Gardner's multiple intelligence theory proposed that any individual has at least seven types of intelligences, which are relatively independent e.g., linguistic, logical-mathematical, spatial, musical, etc. Binet and Simon developed the first intelligence test and subsequently this test was revised several times by Terman and others. Generally intelligence tests are classified as individual and group test. There are several modern intelligence tests e.g., the Stanford-Binet 5th Edition (SB-5), the Wechsler Adult Intelligence Scale-III (WAIS-III), the Kaufman

Brief Intelligence Test (K-BIT), Raven's Progressive Matrices, Henmon-Nelson tests, Cognitive Abilities Test, Shipley Institute of Living IQ Scale etc. Most of the scales consist of several subtests like-vocabulary similarities, digit span, information, object assembly, and simple arithmetic problems. Logical thinking is a sequential thought by which an individual tries consistently to come to a conclusion. It means thinking step by step. It helps a person to keep track of the immediate future. Problem solving ability is higher order cognitive process, which helps a person to formulate new answers, going beyond the simple application of previously learned rules to achieve a goal. There are some general problems solving models as proposed by Bransford or Gick. Learner should be helped to acquire this skill so that they are able to cope up with the changing society. Emotional intelligence is considered as cluster of abilities relating to emotional side of life. Emotional Intelligence has five principal features-being aware of one's own emotions, being able to manage one's own emotions, being sensitive to the emotions of others, being able to respond to and negotiate with other people emotionally, being able to use one's own emotions to motivate oneself. Emotional Intelligence has its roots in social intelligence and it helps an individual to live healthy with oneself and also others.

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ASSIGNMENTS

1. Define and explain the meaning of intelligence.
2. Comment on the nature of intelligence and mention the views of different psychologists in this respect.
3. Is there one intelligence or many ? Highlight mentioning different views.
4. Differentiate fluid and crystallized intelligence as proposed by Cattell.
5. Draw Guilford's model of SOI and explain the three dimensional categories.
6. Explain the educational implications of SOI.
7. Describe the main features of Triarchic theory of intelligence proposed by Sternberg with its educational significance.
8. Summarize Gardner's multiple intelligence theory. What are the criticisms of this theory? How can you apply multiple intelligences in teaching learning process?
9. State different types of tests to measure intelligence. Mention the uses and misuses of intelligence testing.
10. Explain the meaning of logical thinking and problemsolving?
11. Describe the steps generally considered for problem solving.
12. What are the importance of logical thinking and problem solving in educational field?
13. Explain the meaning of emotional intelligence. What are the four branches of emotional intelligence?

ANSWERS TO 'CHECK YOUR PROGRESS'

Check your Progress 1

1. General intelligence as proposed by Spearman
2. According to Boring, intelligence is what ever intelligence tests measure.
3. Learn from experience, to reason well, to remember important information, and to cope with the demands of daily living.

Check your Progress 2

1. Operation, content and product
2. Gardner disapproved the existence of 'g'
3. Practical or contextual

Check your Progress 3

1. $(\text{mental age} / \text{chronological age}) \times 100$
2. Deviation IQ is a number that compares an individual's score with average group that means it tell show much above or below a person scored than the average.
3. Vocabulary similarities, digit span, information, object assembly, mazes, and simple arithmetic problems.

Check your Progress 4

1. Short-term memory
2. Problem solving
3. Emotional intelligence quotient

EDC-06
EDUCATIONAL PSYCHOLOGY-2
Block-2
Creativity

CONTENT STRUCTURE

INTRODUCTION

OBJECTIVES

2.1 : Creativity-Concept and Nature

2.1.1 : Meaning and nature of Creativity

2.1.2 : Creativity as a Constellation of Abilities

2.1.3 : Types of Creativity

2.1.4 : Creativity and Intelligence

2.2 : Factors and Development of creativity

2.2.1 : Factors of Creativity

2.2.2 : Development of Creativity

2.2.2.1 : Sources of Creativity

2.2.2.2 : Stimulating Creativity

2.3 : Measurement of Creativity

2.3.1 : Concept of creativity measurement

2.3.2 : Person based, product based and creative thinking based Measurement

2.3.3 : Intellectual Development : characteristics and educational programmes

LET US SUM UP

SUGGESTED READINGS

ASSIGNMENTS

INTRODUCTION

What comes to your mind when you think of **creativity**? People being imaginative, taking risks or challenging conventions? Possibly, you may think that you can only be creative if you are artistic-is it so? The term creativity is often used in education. This Unit makes you acquainted with the basic elements of creativity. It also highlights the different techniques of measuring creativity and ways of developing the same.

OBJECTIVES

By the end of this block you will be able to

- ❖ Define and explain the meaning and nature of creativity.
- ❖ Identify and explain the factors of creativity.
- ❖ Describe different techniques to develop creativity.
- ❖ Acquaint with different measures of creativity.

Block-2

Unit-1

Introduction to Creativity

2.1.1 : MEANING AND NATURE OF CREATIVITY

Creativity is the main force for the development of human culture. The advancement in the present day is possible through creativity. But what is the exact meaning of creativity? Let us try to understand the concept and nature of creativity.

Before going into detail, just go through some of the definitions of creativity given by eminent psychologists.

Drevdahl : Creativity is the capacity of a person to produce compositions, products or ideas, which are essentially new, or novel and previously unknown to producers.

Stagner and Karwoski : Creativity implies the production of a totally or partially novel identity.

Torrance : Creative Thinking refers to the process of sensing gaps or disturbing, missing elements; forming ideas or hypotheses concerning them; testing these hypotheses; and communicating the results, possibly modifying and retesting hypotheses.

Although creativity was initially considered as an artistic and aesthetic phenomenon, in more recent times the approach of defining creativity has broadened. The term is so widely used that its meaning has become diffuse and uncertain. But following different discussions on the matter we may consider some common core elements of creativity. The core elements are as follows-

Novelty- a creative product, course of action or idea that necessarily departs from what is familiar.

Effectiveness- it achieves some end.

Ethicality- creativity does not describe selfish or destructive behaviour.

The National Advisory Committee's has given the characteristics of creativity as-First, they [the characteristics of creativity] always involve thinking or behaving imaginatively. Second, over all this imaginative activity is purposeful : that is, it is directed to achieving an objective. Third, these processes must generate something original. Fourth, the outcome must be of value in relation to the objective.

4P CONCEPTION OF CREATIVITY

For better understanding of the term creativity, Rhodes (1961) and Brown (1989) have emphasized the 4P conception of creativity :

- **Product**-It refers to a product, or outcome, irrespective of what that product is. The product may be an idea, a song, a fractal algorithm, a race car or a recipe. The characteristics of a creative product are novelty, uniqueness and usefulness.
- **Process**-The creative process really concerns itself with how creativity occurs. It examines the thinking stages or operations that happen when people behave in a creative manner. Wallas (1926) described the creative process and suggested that it has four stages. They are : preparation, examining the challenge in all directions; incubation, thinking about the problem in a not-conscious manner; illumination, the emergence of a happy idea; and verification, a validity check on the idea and refining it to a more precise form.
- **Person**-In the early days of creativity research psychologists and most others were very interested in the people who demonstrated an ability to be creative. Creative persons share some common traits and abilities. This will be discussed later.
- **Press**-This approach considers the characteristics of congenial environment that facilitate creativity. Creative press refers to the environment the person is in, or the product is produced, or the process occurs. It is concerned with the climate and everything that affects the climate where creativity takes place.

Recently Simonton (1990) has added another dimension (**5th P**) for creativity, which is Persuasion of others about the value of the work.

2.1.2 : CREATIVITY AS A CONSTELLATION OF ABILITIES

Creativity is also considered as a constellation of abilities and traits. A creative person must have some **abilities** and **personality traits** in absence of which s/he does not show his/her creative personality. These personality traits are discussed below :

➤ **Abilities**

◆ *Divergent thinking* ability : It generally includes :

- Fluency—ability to generate many ideas for a given task.
- Flexibility—ability to generate varieties of ideas.
- Originality—ability to generate unique/ new ideas.
- Elaboration—ability to add rich elaborate details to an idea.

- ◆ *Sensitivity to problem*—ability to see or sense the problem.
- ◆ *Redefinition*—ability to redefine or gives up old interpretation and uses them in new ways.
- ◆ *Intuition*—ability to see relationship or make connection by going through all the steps of analytic thinking.

➤ **Personality Traits**

Following personality traits are related to creative persons-

- ◆ *Motivation*—their motivation is task-focused and intrinsic.
- ◆ *Imagination*—they are generally imaginative. Imagination is the backbone of creativity. Many creative ideas are first imagined and then translated in action.
- ◆ *Independence*—they are highly independent in thinking and their judgements.
- ◆ *Tolerance*—they have high ability of tolerance of ambiguity and they generally prefer complex tasks.
- ◆ *Curiosity*—they are more curious, open minded and receptive to new ideas. As a result, they have a wide range of interests.

There are also some other personality traits related to creative persons like—good sense of humour, risk taking, energetic, needs time for him/herself, etc.

Researchers have also highlighted some negative personality traits of creative individuals (Davis, 1997) :

- indifferent to conventions and courtesies.
- challenge rules and authority.
- careless and disorderly.
- absentminded, forgetful.
- egocentric.
- temperamental, emotional.
- overactive physically and mentally.
- sloppy and disorganized with unimportant matters.

Cognitive psychologists have emphasized the basic processes that underlie creative thoughts *i.e.*, retrieval of information from memory, association, synthesis, transformation, etc. to explain creativity. Treffinger, *et al.* (1990) produced a detailed cognitive definition of creativity as : A set of general cognitive processes, which contribute to specific creative or divergent thinking abilities and critical thinking skills, which lead to complex methods of problem solving and decision making.

2.1.3 : TYPES OF CREATIVITY

Ghiselin (1963) categorizes creativity into two levels-

1. primary and
2. secondary.

Primary creativity is characterized by introducing some new elements of meaning or some new order of significance or both. On the other hand, secondary creativity brings about further development of an existing knowledge.

According to Eisner (1971) there are four categories of creativity-

1. boundary breaking,
2. boundary pushing,
3. inventing and
4. aesthetic organizing.

Boundary breaking and boundary pushing are similar to Ghiselin's primary and secondary levels of creativity. In inventing, the ideas or things are combined in such a way that a new thing or idea is created. Aesthetic organizing emphasizes on aestheticsense rather than newness.

Cognitive psychologists try to distinguish between two types of creativity-

1. everyday creativity (mundane creativity) and
2. exceptional creativity.

Some psychologists mention two types of creativity- 'Big C' creativity (similar to exceptional creativity) and 'Little c' creativity (similar to mundane creativity).

2.1.4 : CREATIVITY AND INTELLIGENCE

Are all intelligent individuals necessarily creative? In general, there is a closer relationship between creativity and intelligence at the lower levels of IQ than at the higher levels. Which implies, low IQ individuals generally score low on divergent production ability and individuals who score highly usually have high IQs. But high IQ does not guarantee high divergent production ability. Wallach and Kogan (1965) found that the relationship varies with the type of tests used. If the creativity tests have time limits, then the correlation would be moderate to high. But if the testing is done in a playful and relaxed condition, this relationship almost drops to zero.

Getzels and Jackson (1962) selected 500 school students of high IQ (above 125) to find the relationship between intelligence and creativity. They noted a positive but low correlation. They

found that two-thirds of those who were in the top 20% in creativity were not in the top IQ and two-thirds of those who were most intelligent were not among those found to be creative. Therefore, it can be said, a certain minimum level of intelligence is a necessary prerequisite for creativity.

Question :

Let Us Check Our Progress I

(Write your answer in the space and compare it with the Unit end answers)

1. What are the core elements of creativity?
2. Name '4P's' of the '4P conception' of creativity.
3. What are the motivational characteristics of a creative person?

Block-2

Unit-2

Factors and Development of creativity

2.2.1 : FACTORS OF CREATIVITY

After considering all the above discussions on the concept and nature of creativity, it is considered that there must be some factors of creativity. Moreover, when different psychologists try to measure creativity, they also highlight some factors of creativity. The factors responsible for creativity are discussed below.

- Fluency :** the ability to produce many ideas or concepts for a given problem or task. In fact, this is the ability to think well and effortlessly.
- Flexibility :** the ability to produce ideas in different directions. In fact, this ability indicates variety in thinking.
- Originality :** the ability to produce ideas that are unique or new. In fact, this is the ability to think in unusual, remote and clever ways.
- Elaboration :** the ability to go into details when given a general idea.

2.2.2 : DEVELOPMENT OF CREATIVITY

Can creativity be developed or nurtured or fostered? What do you think? In fact, all pupils can be helped to become creative. Therefore teachers and parents must try to promote creativity in children. In this connection we first try to understand some of the causes, which hinder creativity. Davis, *et al.* in their book '*Blocks to Creativity*' highlight some obstacles to creative thinking like—fear of failure, allergy to ambiguity, touchiness, conformity, resource myopia (a feeling of resourcefulness), rigidity, *etc.*

2.2.2.1 : Sources of Creativity

According to 'Confluence Approach', creativity requires a confluence of six distinct resources (Lubart, 1994) :

- some specific *intellectual abilities*.
- enough *knowledge* about the field.
- certain *style of thinking*.
- specific *personality attributes*.
- intrinsic and task focused *motivation*.
- supportive *environment* for creative ideas.

Sternberg (2001) claims that everyone can become more creative and he suggests ten ways of enhancing creativity, some of them are-

- Redefining problems
- Analyzing one's own ideas
- Selling one's own ideas (trying to persuade others)
- Surmounting obstacles (expect to struggle)
- Taking sensible risks
- Believing in self
- Finding what one loves to do and do it, *etc.*

2.2.2.2 : Stimulating Creativity

Now there is another question-is it possible to foster or nurture creativity in the classroom? There are some techniques that help in stimulating creativity :

- Allow the learner to speak, think and work free of stress and anxiety. Generally, we expect routine or fixed responses from our children and thus we kill the creative potentiality in them. Therefore, we should allow and encourage them to think out as many ideas as they can while responding to a situation.
- Support the self-initiated questioning and learning of the children. It gives them satisfaction and helps to grow self-confidence, which is necessary for creative work.
- Avoid questions that require a simple yes/no answer and also allow errors and mistakes. Try to avoid and prevent negative reactions from others.
- Provoke and provide situations, which are challenging and requiring creative behaviour.
- Demonstrate tolerance and appreciation of their unusual thoughts and if necessary criticize but constructively.
- Try to avoid the blocks or obstacles to creative thinking like-fear of failure, touchiness, and rigidity *etc.*
- Provide time for relaxation. Creativity cannot be subjected to rigid time schedule, it takes its own time.
- Apart from the above points, there are some special idea-getting techniques, which enhance creativity. Some of them are discussed below :

Brainstorming :

Probably this is the best-known technique in this category. This technique can be an effective way to generate fluency of ideas. Brainstorming involves generating ideas in response to some question or problem, typically within a group. Each member of the group is encouraged to produce

ideas without any constraints and criticism is not allowed, no matter how implausible. The procedure for brainstorming is outlined below :

- ◆ Select the leader and recorder (may be some person).
- ◆ Define the problem or idea to be brain stormed clearly.
- ◆ Set up the rules-
 - allowing everyone to contribute;
 - ensuring that none will insult or evaluate another participant's responses;
 - stating that no answer is wrong;
 - recording each answer unless it is repeated;
 - setting a time limit.
- ◆ Start the brainstorming session. The recorder should write down all responses and if possible in such away so that everyone can see them.
- ◆ After finishing the session, go through the results and begin to evaluate the responses.

Synectics :

The term is derived from the Greek expression '*Synecticos*' means 'bringing different things into unified connection' and was first used by Gordon. This model involves two basic strategies : first to help students see the familiar in more creative ways (making the familiar strange); second to make unfamiliar ideas more meaningful (making the strange familiar). Synectics uses different types of analogies like-Direct, Fantasy, Personal and Symbolic analogy.

Attribute listing :

This technique was developed by Crawford (1954). In this technique, the first attempt is made to list the attributes or properties of a particular object and activity and then to generate alternatives to modify attributes to improve the object.

There are also some other techniques for stimulating creativity but are not discussed here like-morphological method, creative problem solving, mind maps, KI method *etc.*

● **Role of the Teacher in Fostering Creative Thinking among Students**

Besides the parents, the teacher has important role and responsibility in relation to nurturing creative thinking among the learners. There are many programmes developed by many experts of which E. Paul Torrance leads this field. As suggested by Torrance (1972) some characteristics of learning experiences that can, if a teacher uses in his/her classroom, facilitate development of creative behaviours among students in context of different sectors of school curriculum are being suggested below :

A. Activities to be promoted by the teacher before Lesson

- Confrontation with ambiguities and uncertainties.
- Anticipation and expectation heightened
- Awareness of the problem to be solved from more aspects
- Curiosity and wanting to know stimulated
- Familiar made strange or strange made familiar by analogy
- Looking at the same material from several different views
- Freedom from inhibiting set facilitated
- Provocating questions requiring learners to examine information in a different ways and in greater depth asked
- Purposefulness of activity made clear
- Predictions from limited information required
- Assignments structured only enough to give clues and directions
- Taking the next step what is known encouraged.

B. Activities to be promoted by the teacher before Lesson

- Creative and constructive (original, uncommon, divergent, extra sensitivity, remote association, etc.) rather than cynical acceptance of limitations in information, skills, etc. facilitated.
- Creative personality characteristics or predispositions (willingness to attempt the difficult, freedom to conform or nonconform, taking risks, etc.) encouraged.
- Exploration made deliberate and systematic.
- Incompleteness of information presented.
- Juxtaposition of apparently irrelevant elements precipitated
- Skills for asking unusual questions encouraged
- Skills for responding uncommonly and divergently encouraged
- Giving alternative answers to a problem encouraged
- Formulating hypotheses encouraged
- Mysteries explored and examined
- Open-endedness preserved
- Outcomes not completely predictable
- Prediction for limited information required

C. Activities of the teacher to be maintained after Lesson

- Awareness and acknowledgement by teacher of pupil potentialities based on response
- Concern about problem heightened
- Constructive rather than cynical acceptance of limitations encouraged
- Digging more deeply required, going beyond the obvious
- Divergent thinking made legitimate
- Elaborating about what has been done by the pupil encouraged
- Elegant solutions encouraged
- Future projection encouraged
- Knowledge from one field brought to bear on another
- Looking the same materials from different view points
- Multiple hypotheses encouraged
- Provocative questions used
- Self-initiated learning encouraged
- Manipulation of ideas, objects, information, experimentations encouraged
- Testing and revision of predictions provided.

Lastly, we may invite ideas of Renzulli (1998) in order to address this problem. He suggests, the learning situations that are designed to promote creative-productive giftedness (connotes those aspects of human activity and involvement where a premium is placed on the development of original materials and products that are purposively designed to have an impact on one or more target audiences) emphasize the use and application of information (content) and thinking processes in an integrated, inductive and real-problem-oriented manner. The role of the student is transformed from that of a learner of prescribed lessons to one of a first hand inquirer and constructor. Similarly, the teacher is required to be a constructivist co-learner as well as a mentor.

Why is creativity so important ?

Creativity improves pupils' self-esteem, motivation and achievement. Pupils who are encouraged to think creatively and independently become :

- ***more interested in discovering things for themselves more open to new ideas***
- ***keen to work with others to explore ideas***
- ***willing to work beyond lesson time when pursuing an idea or vision***

Block-2

Unit-3

Measurement of Creativity

2.3.1 : CONCEPT AND CATEGORIES OF CREATIVITY MEASUREMENT

Now the question is—how shall we measure or assess creativity? You have to keep in mind that no single measure will assess completely the diverse aspects of creativity. There are not less than 250 measures related to creativity. Therefore, it is easy to find an instrument for measuring creativity, but you have to understand what specific aspects of creativity you wish to measure.

Creativity measurement can be divided into three main categories. These are discussed below :

Person-based—This type is based on measuring personal properties involved in creativity. There are two major approaches in this category :

Personality tests—These instruments assess certain personality traits or characteristics associated with a creative mind like—flexibility, tolerance to ambiguity, extraversion, emotionality, as well as, attitudes, values and feelings.

Biographical inventories—This approach collects information on people's life history such as family background, hobbies and interests, education, career, *etc.*

Example of Person-based Creativity Measurement :

Schaefer and Anastasi (1968) developed a biographical inventory. It measures five areas : family background, intellectual and cultural orientation, pervasive and continuing enthusiasm (motivation), breadth of interest and drive towards novelty and diversity.

The Creativity Checklist (Johnson, 1979) assesses creative behaviour or eight dimensions—ingenuity, resourcefulness, independence, positive self-referencing and preference for complexity. It can be used for rating people at all age levels. Another example of the category is Creative Activities Checklist developed by Runeo (1987) which asks participants (children in grades 5 to 8) to mention how frequently they have participated in recent times in six areas : literature, music, drama, arts, crafts and science. Creative Behaviour Inventory (Kirschenbaum, 1989) is also another example which has two forms suitable for elementary and secondary level.

Product-based : This aspect assesses the work of an individual for creativity and innovation.

Example of Product-based Creativity Measurement :

Taylor (1975) developed a scale named Creative Product Inventory, which measures seven dimensions of a creative product—generation, reformulation, originality, relevancy, hedonics, complexity

and condensation. Another example is Creative Product Semantic Scale developed by Besemer and O'Quin (1987) which is based on three dimensions—novelty, resolution (valuable, useful) elaboration and synthesis.

Creative thinking based : This category highlights the thinking processes involved in creativity. Most of the tests in this category have some common dimensions like fluency, flexibility, originality, elaboration, *etc.*

Example of Creative thinking based Creativity Measurement :

The most widely used tests in this category is Torrance Tests of Creative Thinking (TTCT, 1999). The verbal activities of it include asking, guessing causes, guessing consequences, product improvement, unusual uses and just suppose. The figural activities involve picture construction, picture completion and lines. The scoring is generally done on the basis of divergent thinking dimensions like fluency, flexibility, originality, elaboration, *etc.* Taking cues from his definition of creativity (looked as creative thinking) E. Paul Torrance and his co-researchers at the Minnesota University, USA has designed the original The Minnesota Tests of Creative Thinking which assesses creativity under several factors like fluency, flexibility, originality, elaboration, *etc.* This is a timed test. No global score is calculated. This is actually a battery of several tests, called tasks, consisting of three main groups of tasks, namely :

Non-Verbal Tasks : Incomplete Figures Task, Picture Completion Task, Circles and Squares Tasks, and Creative Designs Task).

Verbal Tasks Using Non-verbal Stimuli : The Ask-and-Guess Test, Product Improvement Tasks, Unusual Uses (Toy dog/Money).

Verbal Tasks Using Verbal Stimuli : Unusual Uses (Tin Cans, Books), Impossibilities Task, Consequences, Just Suppose, Situations, Common Problems, Improvements, Mother Hubbard Problem, Cow Jumping Problem, and Imaginative Stories).

Afterwards several tasks have been included in this original test of creative thinking, such as picture Titles, Make-up Problems, Filling-in-Gaps, *etc.* Now the Torrance Test of Creative Thinking (TTCT) comprises 12 tests grouped into a verbal (called, Thinking Creativity with Words), a pictorial (named, Thinking Creatively with Pictures) and an auditory (labeled, Thinking Creatively with Sounds and Words) battery. In fact, this is the most widely used test for assessing creative thinking.

Another important test in this category is Wallach and Kogan Test (1965). The most widely applied subset of this test is the 'alternative uses', where respondents are asked to give as many unusual uses, as they can, for different common items like – newspaper, knife, button, *etc.* The scoring criterion is more or less same as TTCT.

The following is an example of a Creativity Test including the procedure for scoring and administration :

Guilford's Alternative Uses Task (1967)

In Guilford's Alternative Uses Task (1967) examinees are asked to list as many possible uses for a common house hold item (such as s brick, a paperclip, a newspaper)

Name all the uses for a

brick : apaper weight

a doorstop

a mock coffin at a Barbie

funeral to throw at a window

to use as a weapon

to hit my sister on the head with

Scoring :

Scoring is comprised of four components :

Originality-each response is compared to the total amount of responses from all of the people you gave the test to. Reponses that were given by only 5% of your group are unusual (1 point), responses that were given by only 1% of your group are unique-2 points). Total all the points. Higher scores indicatcreativity

Fluency-total. Just add up all the responses. In this example it is 6.

Flexibility-or different categories. In this case there are five different categories (weapon and hit sister are from the same general idea of weapon)

Elaboration-amount of detail (for Example "a doorstop" = 0 whereas "a door stop to prevent a door slamming shut in a strong wind" = 2 (one for explanation of door slamming, two for further detail about the wind).

Administration :

Any one can administer Guilford's Alternative Uses Task (1967). No training is required. Materials can be created by the examiner and individually administered to the examinees or shown on an overhead projector to a group of examinees.

Typically the test is administered in a classroom setting. However, the test can also been an unlimited time "take home" : since time is an issue. The majority of responses given by the examinees in the first few minutes tend to be their least creative.

Test of Creative Achievement

Tests developed by Guilford, Torrance and many others indicated earlier mainly give emphasis on divergent production but other abilities are undoubtedly needed for explaining the variance of creative achievement, especially in sciences. Of late, several cognitive and evaluative aptitudes have emerged from the Guilford research. Two tests of this genre are Kit of Factor-Referenced Cognitive Tests and Watson-Glaser Critical Thinking Appraisal.

Question :

Let Us Check Our Progress II

(Write your answer in the space and compare it with the Unit end answers)

1. Mention the factors of creativity.
2. What kind of activities Wallach and Kogan's Alternative Uses' Test demand?

LET US SUM UP

The development of human culture has been possible mainly because of human creativity. Initially considered as a predominantly artistic and aesthetic phenomenon, creativity in more recent times has been defined in a broader context with some common case elements of Novelty, Effectiveness and Ethicality.

The 4P conception of creativity emphasizes on four definite dimensions of creativity, viz., Product, Process, Person and Press. Recently another dimension (5th P) for creativity has been propounded which is persuasion of others about the value of the work.

Creativity is considered as a constellation of abilities and traits in the absence of which is unable to display his or her creative capabilities. Some negative personality traits of creative individuals have also been highlighted by researchers.

Different psychologists have described different types of creativity, cognitive psychologists distinguish between two types of creativity-everyday creativity (mundane creativity) also described by many as small 'c' creativity and exceptional creativity or big 'C' creativity.

In the context of intelligence and creativity, generally, it is noted that there is a closer relationship between creativity and intelligence at the lower levels of IQ than at the higher levels but a certain minimum level of intelligence is a necessary prerequisite for creativity.

The major factors responsible for creativity are Fluency, Flexibility, Originality and Elaboration. There exist some obstacles to creative thinking like –fear of failure, allergy to ambiguity, touchiness, conformity, resource myopia (a feeling of resourcefulness), rigidity, etc. Removal of

such blocks can stimulate creative thinking. There also exist a number of techniques for stimulating creativity, viz., brainstorming, synectics and attribute listing.

According to ‘Confluence Approach’, creativity requires a confluence of six distinct resources, which include intellectual abilities, knowledge, style of thinking, personality attributes, motivation and environment. Sternberg has claimed that everyone can become more creative and has suggested ten ways of enhancing creativity.

Creativity measurement can be categorized into three broad heads of person-based, product-based and creative thinking based.

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ASSIGNMENTS

1. Explain the meaning of creativity.
2. Discuss the concept and nature of creativity.
3. Describe the personality traits and abilities of a creative person.
4. Explain the different sources of creativity.
5. What are the common blocks to creativity? In this context explain how the blocks can be overcome.
6. Creativity can be assessed in different ways—explain.
7. Give some guide lines to stimulate creativity.
8. Discuss teacher’s role in fostering creative thinking among students.

EDC-06
EDUCATIONAL PSYCHOLOGY-2
Block-3

Theories of Learning and their Educational Implications

CONTENT STRUCTURE

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SUMMING UP

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ASSIGNMENTS

INTRODUCTION

In semester-1, paper-2 you have acquainted with the concept, nature, types and various influencing factors of learning. But the question arises—what goes into the process of learning? How does an individual learn a set of facts and figures, skills, habits, interests, attitudes and similar other things in his life? Such questions have always been a subject of enquiry and investigation for psychologists and, as a result a number of theories have come into existence.

Theories of learning describe and explain the conditions under which learning does and does not occur. A theory of learning is a general concept, which applies to all organisms, to all learning tasks, and to all situations where learning occurs and it considers the conditions that give rise to learning as the cause, and the learning itself as the effect. It explains, predicts and controls the way in which environmental conditions affect the learning of the organism. Therefore, learning theories are attempts to systematize and organize the observations, hypotheses, hunches, laws, principles and guesses that have been made about human behaviour and lead to new information. In brief, theories of learning are collections of related statements intended to summarize and explain important observations. These statements are seldom laws (verifiable fact; beyond reasonable doubt), but more often take the form of principles (statements relating to some general predictability) and beliefs (more personal convictions, sometimes accurate, and some times not).

The theories of learning may be broadly classified under two major heads : **behaviourist theories** and **cognitive theories**. But in recent decades, **constructivist theorists** have extended the traditional focus on individual learning to address collaborative and social dimensions of learning. Just as **cognitive learning psychology** began replacing the predominant **behavioural psychology** in the 1970's, **constructivist learning psychology** has been challenging the cognitive approach from the 1990's. But any particular theory of learning is not so complete to explain all kinds of learning.

Behaviourism

Behaviourism is based on observable changes in behaviour. It focuses on a new behavioural pattern being repeated until it becomes automatic. By the early 1900s an orientation toward behaviour rather than thought had begun to appear in the United States (it eventually became known as behaviourism). This orientation led to learning theories concerned mainly with objective events such as stimuli, responses and rewards. These theorists argued that stimuli (conditions that lead to behaviour) and responses (actual behaviour) are the only directly observable aspects of behaviour; hence, they are the objective variables that can be employed in developing a science of behaviour. They interpret learning in terms of connection or association between stimulus and response. Under this category, we may include theories like Thorndike's theory of connectionism (trial-and-error theory), Guthrie's contiguity theory of learning, Hull's drive reduction theory, Pavlov's classical conditioning,

Skinner's operant conditioning theory of learning etc. For Connectionist Theorists (like Thorndike), learning consists of the formation of bonds between stimuli and responses – bonds that take the form of neural connections (connectionism). Learning, connectionist theorists explain, involves stamping of S-R connections; forgetting involves stamping out connections. On the other hand, Conditioning is the formation of some sort of stimulus-response sequential relation that results in an enduring change in either the pattern of behaviour or the likelihood of a response of an organism. It takes either one or a combination of two forms called classical and instrumental (operant) conditioning.

Cognitivism

The theories that share many beliefs of the behaviourists, but in which there is greater use of mentalistic concepts are presented as a transition to the second major division of theories—cognitivism. Cognitivism is based on the thought process behind the behaviour. Changes in behaviour are observed, and used as indicators as to what is happening inside the learner's mind. Cognitive psychologists are typically interested in perception, decision-making, information processing, understanding and problem solving. In place of a purely mechanical or instrumental approach these theories emphasize the role of purpose, insight, understanding, reasoning, memory and other cognitive factors in the process of learning. Gestalt theories are among the first of the cognitive theories. Other examples include Tolman, Lewin, Bruner, Piaget, etc.

Constructivism

Constructivism may be considered as an epistemology (a philosophical framework or theory of learning (Jean Piaget, 1967). It is based on the premise that we all construct our own perspective of the world, through individual experiences and schema (schemas are the basic structures for organizing information). It focuses on preparing the learner to solve problem in ambiguous situations.

Constructivism in context of learning theories falls somewhere between cognitive and humanistic views. Behaviourism treats the organism as a black box, cognitive theory recognizes the importance of the mind in making sense of the material with which it is presented. "Constructivism is a psychological theory that constructs learning as an interpretive, recursive, building process by active learners interacting with the physical and social world" (Fosnot, 1996). Constructivism is often associated with pedagogic approaches that promote learning by doing. It is a theory about knowledge and learning; it describes what "knowing" is and how one "comes to know" (Fosnot, 1996). There are, two major strands of the constructivist perspective. – (i) Cognitive constructivism which is about how the individual learner understands things, in terms of developmental stages and learning styles, and (ii) Social constructivism, which emphasizes how meanings and understandings grow out of social encounters. Cognitive constructivism says that—an individual cannot be "given" information which he automatically understands and uses, he must "construct" his own knowledge while

constructivism, particularly in its “social” forms suggests that the learner is much more actively involved in a joint enterprise with the teacher of creating (“constructing”) new meanings.

The first major contemporaries to develop a clear idea of constructivism as applied to classrooms and childhood development were John Dewey and Jean Piaget. Among many others Ausubel (1968), Piaget (1972) and Bruner (1990) are considered as the chief theorists among the cognitive constructionists, while Vygotsky (1978) is the major theorist among the social constructionists.

Traditional divisions in theories of learning are based on the primary concerns of different theorists. Behaviourism describes an approach that deals mainly with the observable aspects of human functioning while cognitivism refers to a preoccupation with topics such as perception, information processing, concept formation, awareness and understanding. Constructivism supports that people learn best when they actively construct their own understanding.

In this block, you will study various theories of learning, which will enable while dealing you learn the elements of behaviouristic, cognitive and constructivist approaches to learning. And ultimately you will understand the answers to the above questions.

OBJECTIVES

At the end of this Unit, you should be able to :

- enumerate the classification of learning theories.
- explain, compare and contrast the behaviouristic, cognitive and constructivist approaches to learning.
- analyse the chief characteristics/principles and findings of various theories of learning.
- discuss critically the contributions and educational implications of different learning theories.
- express your own beliefs about how people learn.

Block-3

Unit-1

Behaviouristic approach to learning

3.1 : BEHAVIOURISTIC APPROACH TO LEARNING

Concept of Behaviouristic Approach to Learning

The theory of behaviourism concentrates on the study of overt behaviours that can be observed and measured (Good & Brophy, 1990). It views response to stimulus can be observed quantitatively, totally ignoring the possibility of thought processes occurring in the mind. The approach describes learning, as a connection between stimulus and response learning is observed as the overt behaviours of the learners. Here learning emphasizes that behaviour begins with reflexes i.e. natural responses and new behaviours result from the acquisition of new bonds of stimulus and response through experience. Its root rests on the associationistic school of psychology which believes that recollection of an item of knowledge is facilitated by associating that idea with another when the individual learns it.

Major characteristics of behaviouristic approach to learning are :

- Behaviourists believe in the objective study of behaviour—human and non-human both (objectively observable behaviour).
- This approach considers environment more important than heredity in the determination of behaviour.
- The chief method of learning is conditioning which is the key to understanding of behaviour that is composed of stimulus and response links and can be successfully analyzed by the objective scientific method.
- Behaviourists believe that one unit of knowledge gets associated with a new unit of knowledge by virtue of similarity, contrast or contiguity.

Let us now discuss some of the important behaviouristic theories of learning. Here we shall discuss Hull's behaviour theory and Skinner's operant (instrumental) conditioning theory of learning.

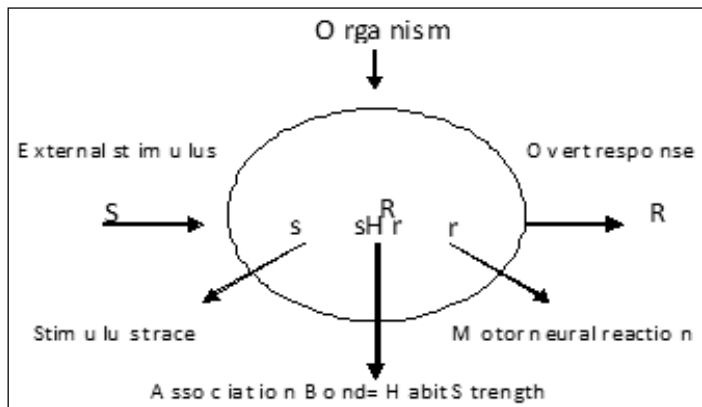
3.1.1: HULL'S SYSTEMATIC BEHAVIOUR THEORY OF LEARNING

Clark L. Hull (1884-1952) is credited with putting forth a systematic mathematical and scientific theory of human behaviour based on conditioning and connectionism of the earlier behaviourists.

He built his theory on a logical structure of postulates and theorems (17 postulates & 133 theorems). We shall discuss here a few major concepts and theoretical notions emerging from them. He intended to arrive at the basic laws of behaviour, at the laws of the behaviour of mammalian organisms, including the social behaviours of man.

A. Change in Traditional S-R Notion : Hull rejected the S-R formula given by Thorndike

where Thorndike made it out to be mechanical, a trigger-like function of stimuli-response. Hull introduced the concept of intervening variables (the processes which are thought to be taking place within the organism but are not directly observable). Accordingly, when a stimulus (S) impinges on the organism (O), it results in a sensory neural impulse



(s), a kind of stimulus trace, which ultimately causes a motor neural reaction (r) that results in an overt response (R). Thus we may have the formula S-s-r-R instead of the traditional S-R. However, there are so many other things within the inner mechanism of the organism like his interests, needs, drives and also the reinforcing mechanism that may influence his response. Consequently, the traditional S-R formula in Hull's approach was extended to S-O-R incorporating all intervening variables existing between environmental stimulation and over trespense.

B. Concept of Reinforcement and Drive Reduction : He viewed reinforcement in terms of the reduction of one's need or drive. For example, the thirst drive arises out of our body's need to take in water for its maintenance. If the response or reaction of the organism reduces the need or state of tension or drive, we then have a condition of reinforcement enabling the organism to repeat the S-R association and thus to habitually react in the same way in a particular situation.

Hull thought reinforcement of two kinds—(i) *Primary Reinforcements* i.e. satisfaction of basic biological needs like food, water, oxygen, sexual needs etc. (ii) *Secondary Reinforcements* i.e. originally neutral agent slike money, awards, praise, etc.

C. Habit Formation and Habit Strength : According to Hull, when a stimulus emits a certain type of response and it is accompanied by a reinforcer (capable of reducing the need or drive), the association between the stimulus and the response is strengthened. Eventually, it brings an

organization in the nervous system known as 'habit' (a particular response to a particular stimulus) and when this happens, we say that the behaviour is learned. The success of this learning behaviour is measured through a concept termed as habit strength (sHr).

Stimulus Generalization : Hull provided the term 'generalized habit strength', *sHr*? which means that if there are two or more similar stimuli, they can elicit the same or nearly the same response from the organism as was elicited by the original stimulus. *For example*, a child who fears a snake also fears a rope or any other thing, which looks like a snake.

Hull developed a version of behaviorism in which the stimulus (S) affects the organism (O) and the resulting response (R) depends upon characteristics of both O and S. Hull introduced concept of intervening variables such as initial drives, incentives, inhibitors, prior training (habit strength) etc. that affect behaviour. Like other forms of behaviour theory, reinforcement is the primary factor that determines learning. In Hull's theory, drive reduction or need satisfaction plays a much more important role in behaviour than in other frameworks (i.e., Thorndike, Skinner) and Hull's theoretical framework of learning consisted of many postulates & theorems, stated in systematic and mathematical form.

D. Reaction Potential : Reaction potential indicates the potential of an individual to react or respond. Hull defined it as the probability of the repetition of a learned response at any given moment and provided the following formula to explain its meaning and purpose.

$$\text{Reaction Potential} = sEr = sHr \times D \times V \times K$$

(Where **sHr** = habit strength, **D** = drive, **V** = intensity of a stimulus, and **K** = incentive)

Accordingly, reaction potential is known to depend upon these four factors. Since all the above four factors are multiplied in contributing towards the building of a reaction potential, if any one had a value of zero, reaction potential would be zero.

E. Inhibition : Inhibition exercises a regressive effect on reaction potential by decreasing or sometimes eliminating the possibility of the reoccurrence of a previously learned response. Hull describes two types of inhibitions : (i) reaction inhibition (**Ir**) and (ii) conditional inhibition (**sIr**). **Reactive inhibition (Ir)** is caused by long hours of work, the fatigue associated with muscular activity and is also caused by the internal physiological and biochemical nature of the individual and thus varies from individual to individual. On the other hand, **conditional inhibition (sIr)** is a result of learning and experience. It rests on psychological and environmental factors instead of internal and physiological factors.

F. Effective Reaction Potential : Inhibitions, reactive and conditioned, both tend to reduce the level of one's reaction potential. They result in the effective reaction potential sEr . So,

Effective Reaction Potential = sEr ?

$$= (sHr \times D \times V \times K) - (Ir + sIr) = \text{Reaction Potential-Inhibition}$$

G. Momentary Effective Reaction Potential : He presented the concept of an oscillation effect or '**sOr**' (continuously changing inhibitory potential of an individual from moment to moment). So the momentary effective reaction potential of an individual at a particular moment $= sEr = ((sHr \times D \times V \times K) - I) - sOr$

This momentary effective reaction potential is responsible for the occurrence of a learned response.

From this numerous postulates and theorems Hull systematically deduced that **learning depends on contiguity of stimulus and response closely associated with reinforcement** (needs reduction or insecondary reinforcement associated with a stimulus that has been associated with need reduction). That is, the growth of learning is based on increment of habit strength with each reinforcement and it is a constant fraction of the amount remaining to be learned. Hence, Hull's system is associationistic-association by contiguity though it admits intervening variables like Guthrie's.

Another mechanism, the habit-family hierarchy, not originating in the original postulates but an intermediate mechanism has been deduced from more basic principles. Hull observed that the natural environment of learning is not of the simple clear-cut and consists of a number of alternate means and the individual has to select the seemingly the correct path to reach the goal. These alternatives constitute a family of equivalent responses—**habit family**—because of an inferred integrating mechanism. The integration in to a family (in which the alternatives are put and arranged internally as a hierarchical structure) is by way of the fractional antecedent goal reaction, present as each alternative response is performed. The learner in any event of learning selects the most suitable/appropriate response from the hierarchical set up of the family ; the less favored routes are chosen only when the more favored are blocked. Hull maintains, if one member of a habit— family hierarchy is reinforced in a new situation, all other members of the family share at once in the tendency to be evoked as reactions in that situation. This makes possible the explanation of response equivalences and other appropriate reactions in novel and problematic situations.

Educational Implications

1. It attaches sufficient importance to the intervening variables such as needs, drives, incentives, reinforcement and adequate motivation for achieving satisfactory results in the process of teaching and learning.

2. It emphasizes for student-need-based, curriculum.
3. It extends the concept of reinforcement and advices to reduce need of the learner as it is treated as reward or positive reinforcement.
4. In practice, Hull reduced the art of learning to mere habit formation and its proper reinforcement. It suggests us to concentrate on adequate practice, drill and strengthening of reinforcement, in the process of learning.
5. Hull's theory presented a systematic and mathematical treatment of individual differences. It suggests teachers to look for alternate ways for learning strategies, i.e. stresses on habit-family hierarchy.
6. This theory emphasized the need for proper rest and other measures to reduce the ill effects of fatigue in any act of learning.
7. Hull's systematic behaviour theory stressed the prime need of minimizing or removing all types of inhibitions, internal or psychological and external or learned, for achieving good results in the field of education.

Discussion : We have learned from the above analysis that one of the most important concepts in Hull's theory is the habit strength hierarchy : for a given stimulus, an organism can respond in a number of ways. The likelihood of a specific response has a probability, which can be changed by reward and is affected by various other variables (e.g. inhibition).

Now we are going to discuss Skinner's conditioning theory of learning.

3.1.2 : SKINNER'S OPERANT CONDITIONING THEORY OF LEARNING

The theory of B.F. Skinner (1903-1991) is based upon the idea that changes in behaviour are the result of an organism's response to events (stimuli) that occur in the environment. A response produces a consequence (event that follow an action) such as pressing a key or button, defining a word, hitting a ball, or solving a math problem. When a particular Stimulus-Response (S-R) pattern is reinforced or rewarded, the organism is conditioned to respond. For example : when a dog is taught a trick, it is usually rewarded by food or by patting after it makes the appropriate behaviour. The distinctive characteristic of Skinner's System relative to previous forms of behaviorism (e.g., Thorndike, Pavlov, Hull) is that the organism can emit responses instead of only eliciting response due to an external stimulus. The organisms actively 'operate' on their environment to produce different kinds of consequences. These deliberate actions are called 'operants'. An operant is an act, which constitutes an organism's doing something, e.g., raising the head, walking about, pushing

a lever etc. The learning process involved in operant behaviour is called operant conditioning because we learn to behave in certain ways as we operate on the environment. Conceptually, we may think of a behaviour as sandwiched between two sets of environmental influences : those that precede it (its antecedents) and those that follow it (its consequences) (Skinner, 1950). Research in operant conditioning shows that operant behaviour can be altered by changes in the antecedents, the consequences or both.

Concept of Reinforcement and Reinforcer

A reinforcer is the stimulus the presentation or removal of which increases the probability of a response being repeated. In this type of conditioning, reward or reinforcement is not possible unless the response is emitted. Skinner recognizes two kinds of reinforcers—positive and negative. A positive reinforcer is any stimulus such as food, water, sexual contact etc. the introduction or presentation of which increases the likelihood of a particular behaviour. In the educational context, praise, grades, medals or other prizes awarded to students are examples of positive reinforcers. A negative reinforcer is any stimulus such as electric shock, loud noise etc. the removal or withdrawal of which increases the likelihood of a particular behaviour. In the educational context, one example may be a teacher's saying to the students that whoever does drillwork properly in the class would be exempted from homework. Negative reinforcement is often confused with punishment. The process of reinforcement (positive or negative) always involves strengthening the behaviour. But punishment, on the other hand, involves decreasing or suppressing behaviour.

Skinner proposes two types of responses and hence learning : Type-S and Type-R

The voluntary (and generally goal-directed) behaviour, emitted by a person or an animal is called operant behaviour and the process of learning that plays a part in learning such behaviour is termed as operant conditioning. In operant conditioning, voluntary behaviour is strengthened or weakened by consequences (events that follow an action) or antecedents (events that precede an action) and a reinforcer is anything that strengthens the occurrence of such desired behaviour or response.

Schedules of Reinforcement

Skinner put forward the idea of planning of schedules of reinforcement for conditioning the operant behaviour of the organism. Some important schedules are :

- ❖ **Continuous Reinforcement Schedule**—it is an arrangement of providing reinforcement after every correct response.

- ❖ **Fixed Interval Reinforcement Schedule**—in this schedule the organism is rewarded for a response made only after a set interval of time, e.g., every 3 minutes or every 5 minutes.
- ❖ **Fixed Ratio Reinforcement Schedule**—in this schedule the reinforcement is given after a fixed number of responses.
- ❖ **Variable Reinforcement Schedule**—when reinforcement is given at varying intervals of time or after a varying number of responses, it is called a variable reinforcement schedule. In this case, reinforcement is irregular.

The concept of schedules of reinforcement and their applications in the educational schemes are regarded as the platform for Educational Technology.

Skinner's Experiments on Operant Conditioning

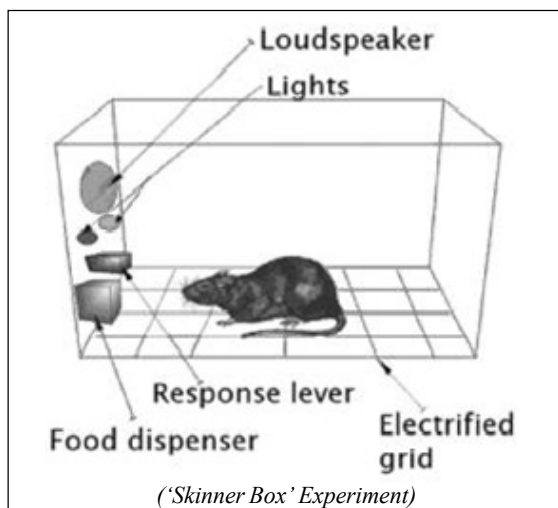
To demonstrate his theory of learning, in one of his earlier experiments, Skinner placed a hungry rat in a 'box' (known as 'Skinner Box'). The darkened sound proof box has a grid floor, a system of light or sound produced at the time of delivery of a pellet of food in the food cup, a lever and a food cup. It is arranged so that when a hungry rat presses the lever, the feeder mechanism is activated, a light or a special sound is produced and a small pellet of food is released into the food cup. For recording the observations of the experiment, the lever is connected to a recording system, which produces a graphical plotting of the number of lever presses against the length of time the rat is in the box. In this experiment, pressure on the bar in a certain way by the rat could result in the production of a click and emergence of a food pellet. The click sound acted as a cue or signal to the rat that if it were to respond by going to the food cup, it would be rewarded. The lever pressing responses having been rewarded, the rat repeated it and was again rewarded, which further increased

the probability of the repetition of the lever pressing response and so it continued.

Skinner used pigeons also as subjects where the operant investigation was pecking at a spot that acted as a key to trigger the reinforcement (food grains).

Based on the findings of his experiments, Skinner concluded that *"behaviour is shaped and maintained by its consequences. It is operated by the organism and maintained by its results."*

Entire Programmed Learning is based on Skinner's learning theory.



Mechanism of Operant Conditioning

Several processes are involved in the process of operant conditioning. Some of the important operations are :

- ❖ **Shaping** : Shaping refers to the judicious use of selective reinforcement to bring certain desirable changes in the behaviour of the organism. The basic process in shaping is successive approximation to the desired behaviour.
- ❖ **Chaining** : ‘Chaining’ refers to a process in the shaping of behaviour and the learning of a task where the required behaviour or task is broken down into small steps for its effective learning and subsequent reinforcement.
- ❖ **Discrimination and Cueing** : Discrimination, in Skinner’s theory may be defined as a process of using cues, signals or information to determine when behaviour is likely to be reinforced and/or punished.
- ❖ **Generalization** : ‘Generalization’ refers to the ability of an organism dealing with the perception of, and response to, similar stimuli.

Educational Implications

1. Learning objectives should be defined very specifically in terms of behaviours.
2. Objectives should be arranged in order of simple to complex.
3. The learning or training process and environment should be so designed as to create the minimum frustration and the maximum satisfaction in a learner to provide him with proper reinforcement for the desired training or learning.
4. The principle of operant conditioning may be successfully applied in behaviour modification.
5. For developing motivation in the students for classroom work, reinforcers like praise, blames, grades etc. should be used.
6. In the classroom, the principle of immediacy of reinforcement is beneficial.
7. Proper use of positive and negative gestures also serves as reinforcers to work.
8. Great care should be taken for the proper planning of the schedules of reinforcement so that the possibility of extinction of the desired behaviour is resisted.
9. Operant conditioning experiments suggested appropriate alternatives to punishment, in the form of rewarding appropriate behaviour and ignoring inappropriate behaviour, for its gradual extinction.
10. In its most effective application, the theory of operant conditioning has contributed a lot to the development of teaching machines and programmed learning.

Discussion : The principles originating from operant conditioning have revolutionized the training and learning programmes. As a result, mechanical learning in the form of teaching machines and computer-assisted instructions have taken root in place of usual classroom instruction. Some limitations in the Shinnerian model retatia to learning-performance distinction, observational learning, and linguistic out looks proposed by Chomsky.

Question :

Check Your Progress 2

1. How Hull's concept of reinforcement is different from that of Skinner?
2. List any four educational contributions of Hull's theory of learning.
3. Mention the various schedules of reinforcement.
4. Indicate the main principles of Skinner's theory of learning.

Block-3

Unit-2

Cognitive approach to learning

3.2 : COGNITIVE APPROACH TO LEARNING

Concept of Cognitive Approach to Learning

In the cognitive approach, learning is considered as inner psychological functioning such as perception, concept formation, attention, memory, problem solving etc. Cognitive approach emphasizes and gives importance to cognition (perception) in learning. According to this approach, learning is a complex process and is viewed as acquiring changes in the cognitive structure. These changes take place generally in three ways—(i) Differentiation, (ii) Generalization and (iii) Restructurisation.

We shall discuss these processes elaborately during discussing and illustrating the cognitive learning theories.

Major characteristics of cognitive approach to learning are :

- Earlier cognitivists gave emphasis on insight while the modern cognitivists place more importance on the human mental processes.
 - In cognitive approach, learning is considered a sanactive and dynamic process.
 - In this approach, the perception of the learner helps him/her in reacting to the specific cognitive structure to get a clear picture of the environment.
 - The learner is purposive and interacting with in the field of his/her goals.
 - It is most suited for concept formation, problem solving and other higher mental processes.
- From various cognitive theories, here, in this Unit, we shall discuss only

Tolman's signtheory, Lewin's field theory and Bruner's theory of cognitive development.

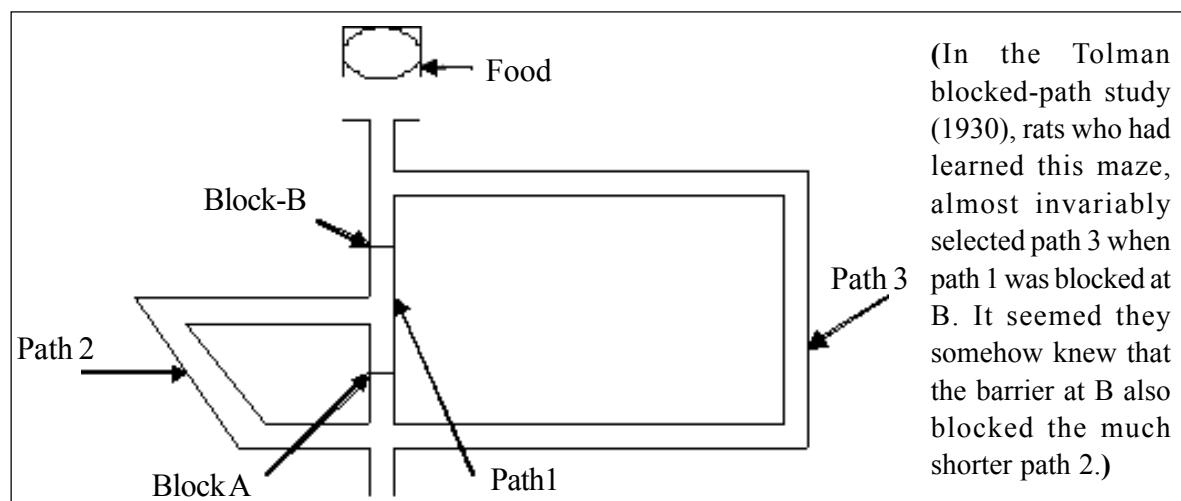
3.2.1 : TOLMAN'S SIGN THEORY OF LEARNING

Edward C. Tolman (1886-1959) propounded a theory of learning in 1932 (with the publication of his work Purposive Behaviour in Animals and Men), which is known as Tolman's sign learning or sign-gestalt learning. His theory stands midway between the behaviouristic S-R theories and cognitive gestalt or field theories. Tolman's purposive behaviourism has its roots in behaviourism in the sense

that (i) it recognizes the initiation of behaviour through stimulus situation, (ii) it rejects introspection as a method of studying behaviour, (iii) it is interested in precise measurement of behaviour and (iv) it has faith in modification of behaviour of men and animals. On the other hand, as a cognitive theorist, Tolman has serious differences with the behaviourists on the simple ground of their machine-like approach to human behaviour. Here we discuss the basic concepts of Tolman's learning theory.

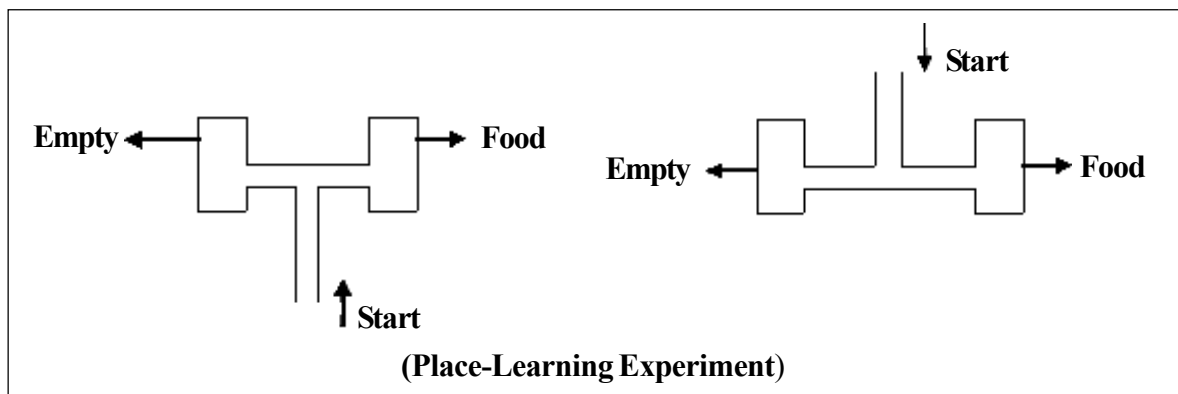
Main Formulations of Tolman's Sign Theory

- ❖ **Molar Approach :** Tolman's theory adopted the molar approach in the systematic study of behaviour. He has emphasized studying of behaviour as a complete purposeful and goal-directed exercise, e.g. a child hiding from a stranger, a man driving home to dinner, etc., instead of studying these acts in the form of certain sequences of mechanical muscle twitches.
- ❖ **Intervening Variables :** Tolman for the first time in the history of psychology, has introduced and highlighted the role of intervening variables, which lie midway between the independent variable (stimulus) and dependent variable (response). Heredity, previous learning, age, physiological drives, environmental stimuli, etc. are all examples of intervening variables. These variables, although not observed, are said to be the strong determinants of behaviour and these also differ from individual to individual.
- ❖ **Cognitive Maps and Sign-Gestalts :** Tolman put forward his concept of map-making and sign-learning on the basis of experiment (Blocked-Path Study) in which rats placed in a complicated maze with food at the end of it were able to find new routes when their initial routes were blocked. They did it Tolman explains, by constructing a mental map of their environment. Actually, they used their mental (cognitive) abilities to layout a mental map or picture of their environment to recognize what was available to them in a given situation for achieving their goal. This experiment illustrates that learning involves the development of cognitive maps.



- ❖ **Place Learning Ability :** Tolman stated that in the process of learning an individual does not learn specific responses to specific stimuli as mentioned by S-R theorists but tries to learn about the places, where things actually lie. In one of his place-learning experiments, Tolman used a T-maze in which a rat was first trained to get its food by turning to right.

The situation was changed by allowing its entry from the lower end. Consequently, it had to change its movements from right to left for getting food. The rat did it, proving that the animal learns places.



- ❖ **Reward Expectancy :** According to Tolman, our learning behaviour is goal-oriented rather than response-oriented. We learn to expect or gain something as a result of our efforts. Tolman conducted a number of experiments to demonstrate the importance of reward expectancy.
- ❖ **Latent Learning :** Tolman described another type of learning that remains dormant for a considerable period of time in an individual before it is displayed in his behaviour. What we learn is not always apparent in our behaviour. The individual is capable of demonstrating its existence when suitable motivation and opportunity arise. In a learning experiment, the rat in a maze may learn the correct path without getting food as a reinforcement.

Types of Learning—Tolman distinguished six types of learning :

- Cathexis :* This type of learning explains the connection between certain objects and certain drive states. For example, thirst drive of the people of cold countries can be satisfied by taking liquors instead of taking a simple glass of water.
- Equivalence Beliefs :* In this type of learning, a sub-goal like scoring of high grades provides the same motivation as might be provided by the main goal like winning love and appreciation.
- Field Expectancy :* Field Expectancy develops in the organism when certain environment set-up is repeatedly presented to it. Upon seeing a certain sign, for instance, one expects that a certain other sign will follow. The only reward in such a learning is the fulfillment of the expectation.

- (iv) *Field Cognition Modes* : This type of learning involves the learning of a strategy, or a way of approaching a problem-solving situation by arranging the perceptual field in a specific manner for application to each new field with which one is resented.
- (v) *Drive Discrimination* : In this type of learning, there is a specific relationship between the type of drive state and mode of response.
- (vi) *Motor Patterns* : Tolman admits that motor patterns are conditioned by behaviour.

Tolman's theory is often considered as the bridge between behaviouristic and cognitive theories and truly represents an eclectic approach towards learning. The six kinds of learning it advocated may be seen to have equations with the views of other major theories of learning. According to this theory, an organism learns by pursuing signs to a goal, i.e., learning is acquired through meaningful purposive behaviour. The major contribution of this theory is its emphasis on the study of cognitive processes thus making the task of learning an intelligent task rather than a mere telephone-like S-R operation or some routine habit formation or conditioning.

Educational Implications

1. Tolman's theory highlighted the importance of purpose in the task of learning. Therefore, the task of a child should be purposeful and should lead him towards some clear cut goals and objectives.
2. According to Tolman, attempts at learning are never in vain, although no immediate purpose may appear to be served through such efforts. Such unobservable learning proves beneficial sometimes.
3. This theory emphasized that an intelligent task is that in which the organizer has to draw a cognitive map of the environment to come out with a proper solution of a problem. Therefore, the children, while learning, should be encouraged to explore as many paths as possible for solving the problem and performing the task.
4. Though a reward or reinforcement is not essential for every step taken towards learning a particular behaviour, intrinsic motivation or value of the learning should be emphasized in the process of teaching-learning rather than some outside reinforcement.
5. Efforts should be made to take proper note of the intervening variables like environmental surroundings, drives, previous learning, age, etc. in every teaching-learning situation to derive maximum benefit.

Discussion : From the above discussion we observe that according to Tolman, a new stimulus (the sign) becomes associated with already meaningful stimuli through a series of pairings; there is no need for reinforcement in order to establish learning. For this reason, we can say that Tolman's theory is closer to the connectionist framework of Thorndike than the drive reduction theory of Hull or other behaviorists.

3.2.2 : LEWIN'S FIELD THEORY OF LEARNING

Kurt Lewin (1890-1947), unlike Hull, Skinner and Gestalt psychologists, put forward a theory named Field Theory in which perception is the key issue. It takes learning to be a process of perceptual organization or reorganization of one's life space or field involving insight. In addition to the field theory, his system of description is also known as topological psychology or vector psychology. We discuss here the main concepts used in Lewin's field theory.

Some Basic Concepts

Topology : Topological concepts are used to represent the structure of life space in such a way as to define the range of possible perceptions and actions. This can be achieved by showing the arrangement of functional parts of the life space as several regions and their boundaries.

Vector : The term vector represents a force, which is influencing movement towards a goal or away from it. If there is only one vector (force), then the movement must be in the direction of the vector. However, if there are two or more vectors acting simultaneously in different directions, the movement is in the direction of the resultant force.

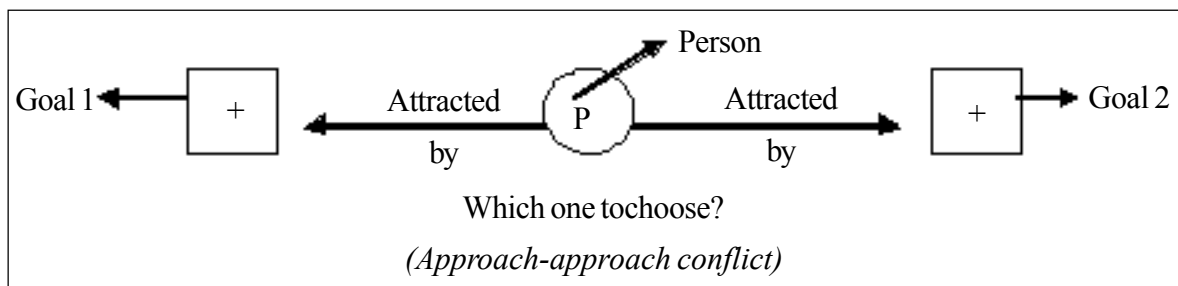
Life space : The psychological field or life space is one's psychological world or space, involving one's own perception in which one moves psychologically. It contains the whole of one's psychological reality—one's self and what one thinks of or what one gains from one's physical and social environment. The life space of two persons in an identical situation may be entirely different. For example, a snake in the corner of a room, not perceived by a person does not exist in his life space, while for his companion, who perceives it, the snake exists.

The Person in his Life space : The person in his life space represents his totality, mind, body and all that is essential for him to behave as a complete individual in a given situation. Diagrammatically, the person may be represented as a point moving about in his life space, affected by pulls and pushes and overcoming the barriers to reaching his goal.

Valence : Lewin describes two types of valences (positive and negative) operating in one's life space. When a person is attracted by an object that object is said to have a positive valence. On the other hand, when a person is repelled by an object, the object is said to possess a negative valence.

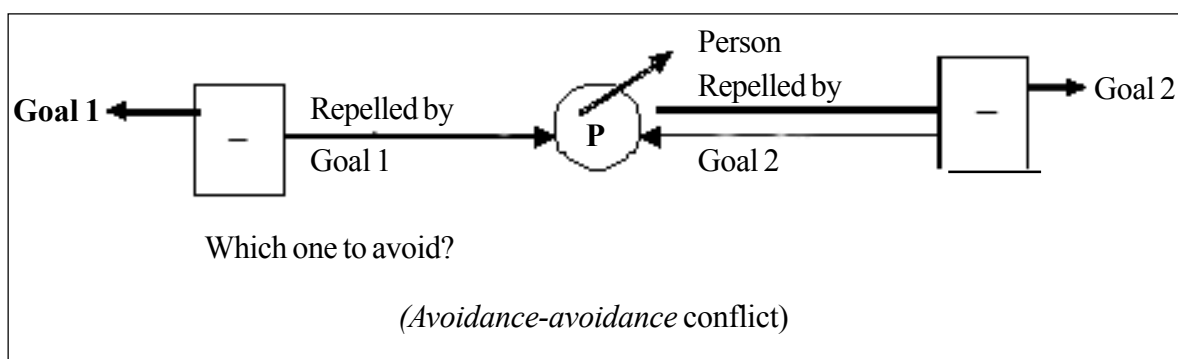
Since life space may contain regions with several valences active at a time, these give rise to conflict, especially when the opposing forces are approximately in balance. Lewin specifies three chief kinds of conflicts :

- (a) **Two Positive Valences** : Here two almost equally strong and equidistant positive valences give birth to **Approach-approach conflict** . This type of conflict arises in situations like the child having to choose between watching a movie of his choice on the video or going to a picnic with his friends. This type of conflict is diagrammatically represented as follows :

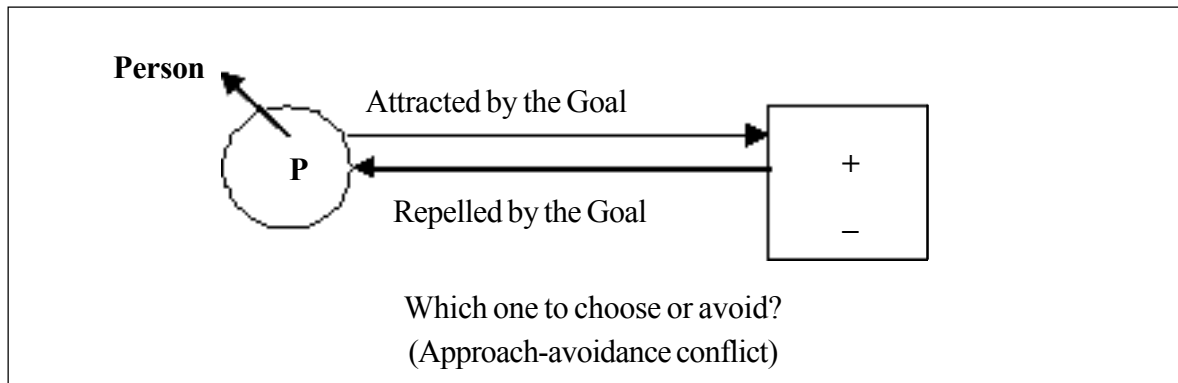


- (b) **Two Negative Valences** : Here, as illustrated below, two almost equally strong and equidistant negative valences work to force the individual to leave the field or escape from the situation, give birth to **Avoidance-avoidance conflicts**.

Example : when a child is threatened with punishment if he does not do a homework, which he is reluctant to perform.



- (c) **ASimultaneous Positive and Negative Valences** : Here, as illustrated below, when the person is equally attracted and repelled by the same goal for the desire to attain some object, **Approach-avoidance conflict** is then evolved. Example : when a child is offered a reward for the school task, which he is not willing to perform.



Cognitive Structure : It represents the perceptual field or environment including the individual as known and understood by the individual.

In the light of these concepts and terminology, let us now enumerate what has been conveyed by Lewin's field theory.

Meaning and Nature of Learning

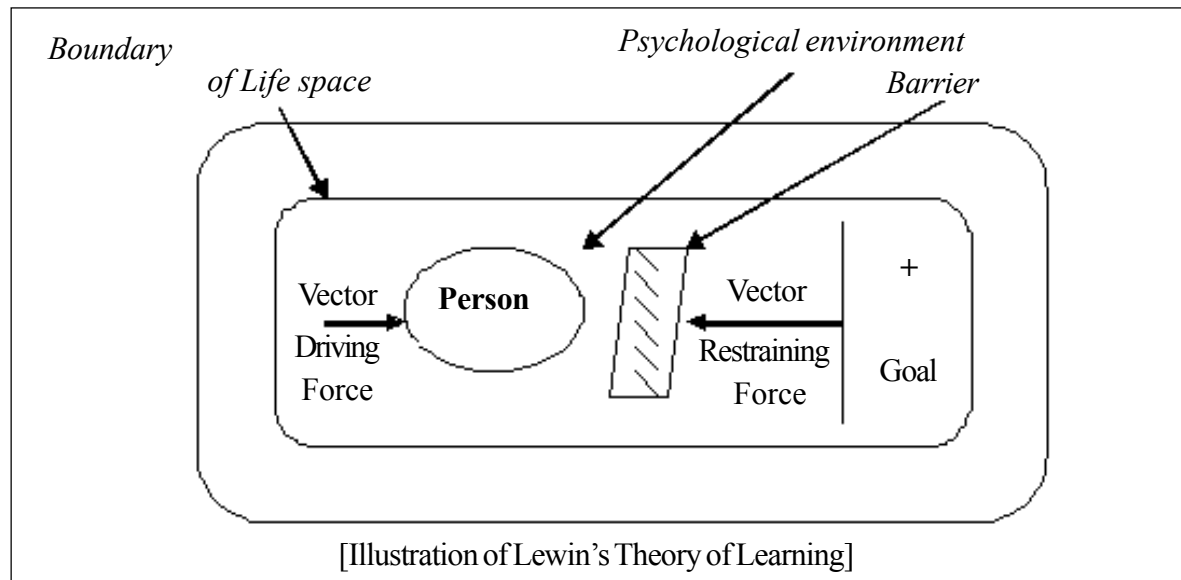
Learning, according to Lewin, is a relativistic process by which a learner develops a new insight or changes the old views that can be explained through the structuring or restructuring of his life space, i.e. the cognitive structure or field of his perception and understanding. Here, learning is, therefore, nothing but a change in one's cognitive structure, which is needed for achieving a particular goal or to meet there quirements of an individual in a particular situation.

This theory also states that learning is a process responsible for making the life space or field of perception as differentiated as possible.

The field theory proposes that human behaviour is the function of both the person and the environment : expressed in symbolic terms, $B = f(P.E)$. [When B represents behaviour, f is a function, P is the person and E is the total environment situation]. This means that one's behaviour is related both to one's personal characteristics and to the social situation in which one finds oneself.

The field theory explains the individual behaviour on the basis of life space that depends on individual's psychological force. Lewin represents his theory through the following diagram in which an individual is in the centre. He moves through his life space, which consists of the totality of facts that determine his behaviour at a given time. We have already learnt that a life space contains the individual himself, the goal he is seeking (+ ve valence) or avoiding (- ve valence), the barriers that restrict the individual's movements and the path he must follow to reach his goal. Desire creates tensions in the individual and tensions come to a balancing state and the person acts. This problem situation may activate the individual to organize or reorganize the regions of his life space or, in other

words, to work for the structuring of his life space to devise a new insight and understanding to solve his problem. When this is done, the problem can be solved and the method for solving the problem can thus be learnt. After the goal has been achieved, the individual returns to a state of response until a new desire activates him.



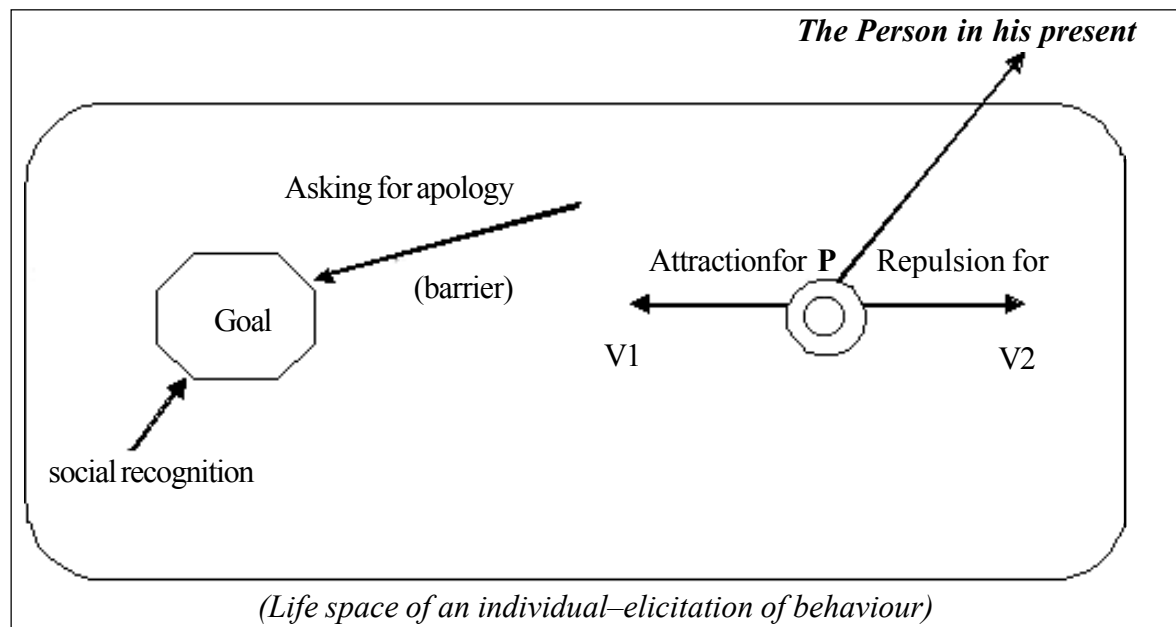
In Lewin's theory, threat, goal and barrier are the main factors. An individual who has to achieve some goal has to cross a barrier and the barrier may be physical or psychological. Because of the changes in the barrier in life space of an individual, continuous reconstruction takes place.

Lewin's field theory considers learning to be a process of perceptual organization or reorganization of one's life space or field involving insight. It attaches sufficient importance to motivation by equating it with the attraction towards a goal. One is supposed to structure one's life space into an appropriate pattern for achieving the desired goal. One's future behaviour depends upon the way one manages to bring about desirable changes in one's cognitive structure on the basis of previous learning and new insight

Elicitation of Behaviour—An Example

How one behaves, is explained by the field theory. Suppose a person *P* is moving towards a goal of getting social recognition. But to achieve the goal, he has to apologize. Now asking for apology is the barrier coming in this way. The barrier (may be physical or psychological force) preventing him from reaching the goal. These forces organize themselves into a pattern, which

determines his behaviour. The person himself, his goal (+ve valence), the thing he is avoiding (-ve valence), the barrier restricting his movements etc. illustrating his life space in this situation may be expressed through the following figure :



In case $V1$ (the valence representing the attraction of social recognition) is greater than $V2$ (the valence representing repulsion on account of the barrier of apologizing to the group) then the person will structure his life space in such a way as to act for reconciliation with the members of the group by overcoming the barrier, but if $V2 > V1$ the person will seek ways and means to remain isolated or cut off from the group.

Educational Implications

1. **Motivation :** Lewin's theory attaches much importance to motivation in the process of teaching and learning. He takes motivation as attraction towards a goal and clarifies its meaning through the role of valences, level of aspiration, needs and aroused tension.
2. **Rewards and Punishments :** The field theory highlighted the role of both rewards and punishment, in the process of teaching and learning. It also warns against their excessive and improper use. According to Lewin, the learner because of attraction to rewards may resort to improper methods like cheating in the examination. It is, therefore necessary to put some barriers over the reward situation for avoiding resort to such short cuts. Punishment should also be carefully introduced, as there is a likelihood of the individual withdrawing because of the unpleasantness introduced by the punishment.

3. **Success and Failure :** The field theory states that success or failure, from the psychological angle, depends upon one's ego involvement, the level of aspiration, the psychological satisfaction and resolution of one's aroused tension.

Success in easy task is not a success experience, since it does not involve the ego of the person.

Similarly, *failure* in a very difficult task may not be a failure experience.

4. **Memory :** The field theory draws the following conclusions about memory :

- (a) Tasks that have no sense in completion are not remembered.
- (b) Unfinished tasks are remembered better than finished tasks due to psychological tension.
- (c) Tasks, which lead to the satisfaction of many needs, are remembered better than tasks, which lead to the satisfaction of only one need.

Discussion : In this theory, we see how Kurt Lewin drew together insights from *topology* (e.g. life space), *psychology* (need, aspiration etc.), and *sociology* (e.g. force fields–motives clearly being dependent on group pressures). All the three concepts, comprise as in a well-integrated system.

3.2.3 : BRUNER'S THEORY OF COGNITIVE DEVELOPMENT

Jerome S. Bruner is a psychologist who developed a theory of cognitive development to help teachers promote student learning and thinking. Bruner (1961, 1966, 1983), one of the first to advocate who approaches educational psychology from a cognitive perspective. It laid the groundwork for the “rediscovery” of Piaget's work in America in the 1960s and 1970s.

Jean Piaget (1896-1980), a cognitive psychologist, is primarily concerned with understanding how children develop intellectually. He describes that all children develop by four stages [i.e. sensori-motor stage (from birth to about 2 years), pre-operational stage (from 2-7 years), concrete operational stage (from 7-11 years), and formal operation stage (about 12-15 years)] but Bruner is primarily concerned with understanding how intellectual development relates to learning and teaching. He holds that any child can be taught anything at any age if the subject matter is presented in terms that the child can understand. Bruner (1966) identifies six characteristics which he calls benchmarks of cognitive growth or intellectual development. Let us now discuss his standing :

Characteristics of Bruner's Cognitive Development

1. **Independency of response :** Growth is characterized by increasing independence of responses from the immediate nature of the stimulus.

2. **Internalizing events** : Growth depends upon internalizing events into a ‘storage system’ that corresponds to the environment.
3. **Increased capacity for language** : Intellectual growth involves an increasing capacity to say to one-self and others, by means of words or symbols, what one has done or will do.
4. **Systematic and contingent tutor-learner relationship** : Intellectual development depends upon a systematic and contingent interaction between a tutor and a learner.
5. **Language as an instrument for ordering the environment** : Teaching is vastly facilitated by the medium of language, which ends by being not only the medium for exchange but also the instrument that the learner can then use himself in bringing order into the environment.
6. **Increasing capacity to deal with multiple demands** : Increasing capacity to deal with several alternatives simultaneously, to tend to several sequences during the same period of time, and to allocate time, and attention in a manner appropriate to these multiple demands, marks intellectual development.

The developmental aspect of Bruner’s theory lies in his interest in stages of cognitive development, originally proposed by Piaget and he agrees that children develop by periods or stages but his periods are unlike to Piaget’s. In each of Bruner’s periods, a child has or acquires different ways of looking at and responding to the world or in Bruner’s word, of representing the world. By ‘representing’, Bruner means – ‘translating experience into a model of the world.’

Stages of Development/Representation

Bruner believes that people go through three modes of representation in a developmental sequence : the enactive stage, the iconic stage, and the symbolic stage. These developmental stages, however, are not irreversible and the characteristics of each remain with us through out our lives. As people get older, they typically use all three stages in acquiring knowledge.

1. **Enactive Stage** : Infants (from birth to about age three) are in the enactive stage and they acquire knowledge by actively engaging in activities. Young children need lots of opportunities to engage in “hands-on” activities with a variety of objects if they are to learn effectively.
2. **Iconic Stage** : In the iconic stage, children (between the ages of 3 and 7/8) learn through visual stimuli [the word icon means “picture”]. At this stage, children rely on visual representations to aid their thinking. Students’ visual perceptions determine how they understand the world. Teachers of students in the early grades should use many pictures and visual aids to promote learning. For example, in a lesson on animals, teacher should use pictures of different species to illustrate the differences among them. Similarly in a lesson on different countries,

teacher can show pictures of people in different countries to illustrate differences in styles of dress or appearance.

3. **Symbolic Stage :** In the symbolic stage, children (of 7/8 and above) can understand symbols (usually words), and mathematical and scientific notations. Once students have reached the symbolic stage, they are able to take in large amounts and varied types of information. Symbolic material includes written passages, scientific and mathematical formulas, and abstract charts. If students at this stage are studying a particular country, teacher may show a bar graph illustrating the pattern of population growth or a pie chart showing the religious or ethnic distribution of the population.

Educational Significance : According to Bruner, developmental growth involves mastering each of the increasingly more complex modes—enactive to iconic to symbolic. An implication of Bruner’s developmental theory is that children should be provided with study materials, activities, and tools that are matched to and capitalise on their developing cognitive capabilities. For example, a teacher wanting to help children learn about dinosaurs could use all three modes. Students could be asked to construct models of dinosaurs (enactive); they might watch a film about, or involving dinosaurs (iconic); or they could consult reference texts and then discuss their findings (symbolic).

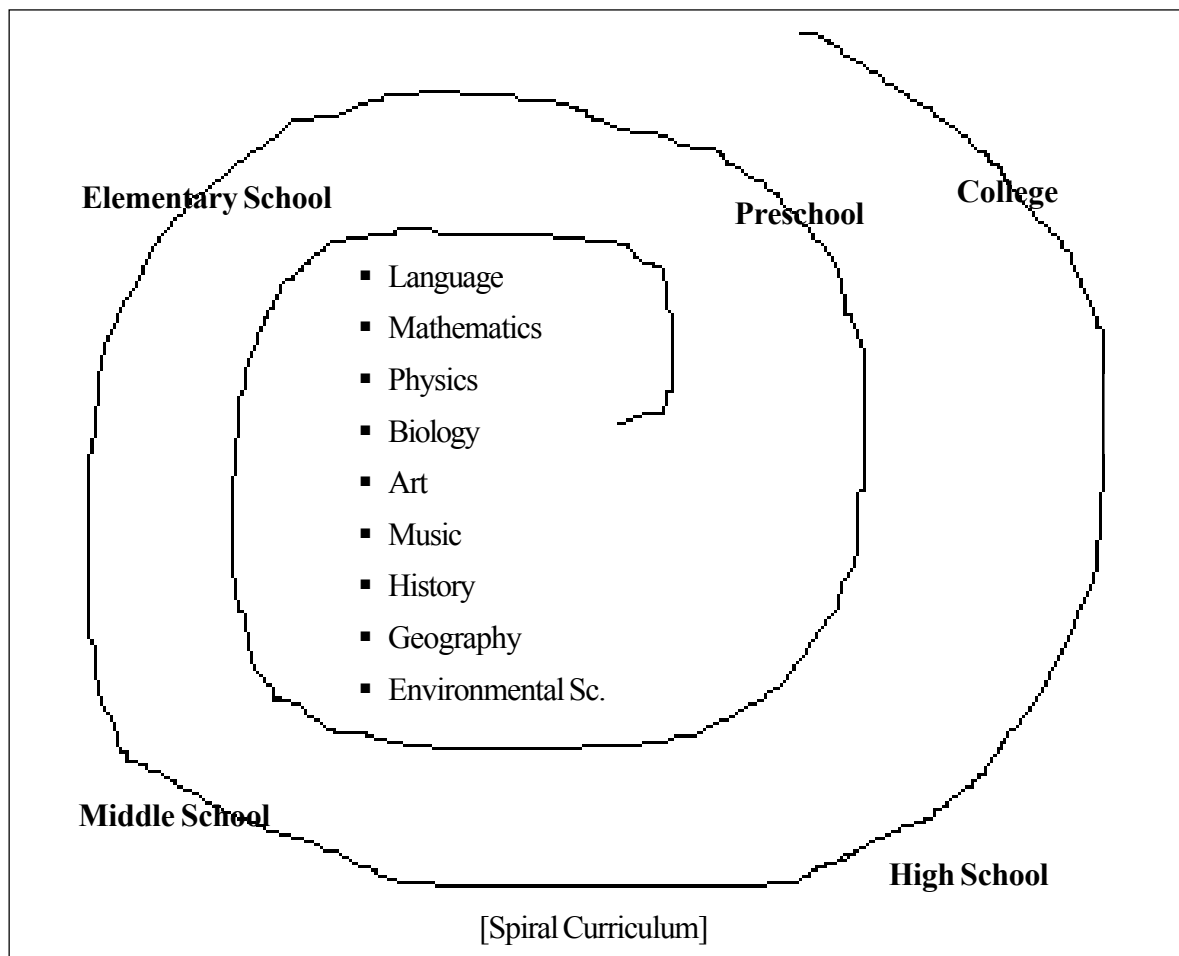
Bruner’s Approach to Learning and Instruction

A. Discovery Learning

Discovery Learning is Bruner’s term (1966) for learning that involves the rearrangement and transformation of material by a learner in a way that leads to insight and in such learning students work on their own to a very great extent to discover basic principles and guided discovery is that, in which the teacher provides some direction. Students are presented with intriguing questions, baffling situations or interesting problems. Instead of explaining how to solve the problem, the teacher provides the appropriate materials and encourages students to make observations, form hypotheses and test solutions.

B. The Spiral Curriculum

Bruner (1971) advocates the use of a spiral curriculum in which learners return periodically to a previously covered topic to study it within the context of information they have learned in the meantime. *For example :* A social studies teacher might begin a unit by identifying the oceans and explaining how oceans differ from rivers and seas. The teacher might return to the topic of during a unit on transportation, integrating knowledge about transportation by water with knowledge of oceans and again during a unit on preventing pollution. Each return provides an opportunity to link new knowledge with existing knowledge.



A constant theme in Bruner's work is that education is a process of discovery. As a cognitive theorist, Bruner believes that information or knowledge is most effectively gained by personal discovery, and then classified enactively, iconically or symbolically. He also proposes a spiral curriculum, which, starting from simple broad concepts, builds up more complex concepts. Bruner again suggests that any theory of instruction should be based on four broad features, which may be abbreviated to entry characteristics, structure of knowledge, sequence of presentation and rewards & punishments.

C. Importance of Motivation

Bruner emphasizes active learning. Students learn best by doing. Although extrinsic motivation, the use of rewards and reinforcers, may be useful when starting to teach an idea, Bruner stresses

that in the long run, meaningful learning depends on students' intrinsic motivation to know and understand. He therefore recommends that teachers should encourage students' curiosity and desire to explore.

D. Teaching Methods

Bruner believes—any theory of instruction should include four broad features, and his suggestions provide a basis for such a theory that can prove immeasurably helpful in planning day-to-day teaching.

1. **Predisposition to learn/Entry characteristics** : A theory of instruction must be concerned with the experiences and contexts that will tend to make child willing and able to learn when he enters school.
2. **Structure of Knowledge** : A theory of instruction must specify the ways in which a body of knowledge should be structured so that the learner can most readily grasp it. The structuring process must involve the enactive, iconic and symbolic modes of representation.
3. **Sequence of Presentation** : A theory of instruction should specify the most effective sequence in which to present the materials to be learned. Bruner suggests that the most effective sequence might follow the pattern of the three modes of representation.
4. **Rewards and Punishments/Reinforcements** : Finally, a theory of instruction should specify the nature and pacing of rewards and punishments in the process of learning and teaching.

Discussion : From the above analysis of Bruner's theory, we find that his four points concerning a theory of instruction, as a model can serve us in two ways. It can help us to construct the structure of knowledge as he intends, and it can guide us in planning our actual instruction of our students.

Question:

Check Your Progress 3

1. What is intervening variable? Give example.
2. Indicate the main points of Tolman's sign theory of learning.
3. Mention two major contributions of Bruner in the field of education.

Another theory that presents a systematic attempt to integrate many of the theories of learning is that advanced by Robert Gagne where he claims that people learn in many ways, including simple Pavlovian conditioning, Skinnerian conditioning and more cognitive processes. Let us now discuss the theory of **Gagné**, in brief, in the next section.

3.2.4 : GAGNÉ'S THEORY OF LEARNING AND INSTRUCTION

In more recent formulations, Gagné's emphasis has continued to shift more toward cognitive explanations, and especially toward their usefulness for instruction.

In developing his theory of learning and instruction, Gagné first describes five major outcomes of learning in terms of domains of learning capabilities. He next expands the meanings of the five learning outcomes or categories through the use of eight conditions or types of learning and finally he develops his nine principal instructional events.

(A) *The Outcomes of Learning* : Gagné declared that all types of human learning may result in the development of human capabilities in terms of five components—

- ❑ *Verbal information* : Through one's learning one may acquire different types of information in a verbal form (listening, viewing and reading) and one may then make use of such information for one's own purposes or transmit it to others through verbal means (spoken or written). [e.g., Stating Newton's laws of motions].
- ❑ *Intellectual skills* : Gagné has further classified these intellectual skills into three levels or types, i.e. discrimination [e.g., distinguishing printed letter 'd' from 'b'], concept formation [e.g., naming apple as fruit and distinguish it from other fruits] and rule learning [e.g., demonstrating and concluding that matter expands after heating]. According to him, these skills assist the learner in 'knowing how' in comparison to 'knowing that' of (verbal) information, i.e., how to convert decimals into fractions, etc.
- ❑ *Cognitive strategies* : Cognitive strategies are the specific means by which learners guide their intellectual functioning. These are the strategies that help them to acquire the tasks related to learning, remembering, thinking, reasoning, paying attention, synthesizing, problem-solving and so on. [e.g., thinking and discovering a novel strategy for the purification of water].
- ❑ *Motor skills* : Motor skills are the variety of organized, sequential activities that involve the use of muscles. They include all complex behaviours that require an organized pattern of controlled muscular movements. [e.g., learning to play harmonium or learning to drive a car.]
- ❑ *Attitudes* : Attitudes are affective (emotional) reactions that can generally be described as positive or negative and that have important motivational qualities. In Gagné's words, "An attitude is an acquired internal state that influences the choice of personal action." [e.g., choosing teaching as a noble profession].

(B) *Conditions/Types of Learning* : Gagné divided human learning into eight types or categories which are not completely independent from one another but are in fact hierarchical. He suggested

a hierarchical order based on their internal connections since one type of learning provides a prerequisite for the next higher order learning. Gagne's hierarchical structure of learning is enumerated below :

Type 1 : *Signal learning* : Learning to make a generalized response to a signal or stimulus is called signal learning. Example : A car horn blasts. A man jumps widely. The same man sees another car—a quiet one. He jumps widely again. Important theorists : Pavlov, Watson.

Type 2 : *Stimulus-response (S-R) learning* : In such learning, the learner has to give a precise response to a discriminated stimulus. Example : A dog learns to shake hands in response to a vocal stimulus provided by its master or by another friendly person. Important theorists are : Skinner, Thorndike, Hull.

Type 3 : *Chaining—Motor chains* : Connecting together in a sequence of two or more previously learned S-R behaviours is called chaining type of learning. Example : A man is seen removing his teeth. He reaches to his mouth with his hands, opens his mouth and inserts his hand, places the thumb and forefinger on the right upper canine, and pulls. He then does the same for his lower teeth. Important theorists are : Thorndike, Skinner, Guthrie.

[pull] fingers]

*[hand at mouth] [open mouth] [mouth open] [insert hand] [hand inserted] [position
[fingers positioned]*

Type 4 : *Chaining—Verbal association* : Verbal association is the learning of chains that are verbal. Example : One, two, three, four, five, etc. Important theorists are : Hull, Hebb, Bruner.

Type 5 : *Discrimination learning* : When an individual learns to make a number of different identifying responses to as many different stimuli, which may resemble each other in physical appearance to a greater or lesser degree that is called discrimination learning. Example : Teacher trying to call each of his students by their correct names. Important theorists are : Skinner, Bruner, Hebb.

Type 6 : *Concept Learning* : In this type of learning one learns to provide a common response to a class of stimuli. Example : Naming litchi as fruit and distinguish it from strawberry. Important theorists are : Skinner, Bruner, Piaget.

Type 7 : *Rule learning* : Rules or principles are generated through the chaining of one or more concepts. Example : 'Gases expand when heated', or ' $na + nb = n(a+b)$ '. Important theorists are : Bruner, Piaget.

Type 8 : Higher-order rules or Problem-solving : Two or more previously acquired rules are somehow combined to produce a new capacity or higher order rule that allows the solutions of problems. Problem solving type of learning is indeed a very superior kind of learning. *Example :* When a car driver maps his route through traffic, he is solving a problem. Important theorists are : Bruner, Piaget.

Gagné's theory of learning considers learning as a change in human performance or capabilities, which depend upon certain internal or external conditions and the outcome of learning is thus the development of such capabilities. As a result of systematization of learning, he proposed eight types of learning arranged in hierarchy. Finally, in his process of operationalizing learning, he divided the learning act into nine distinct phases that start from motivation to learning and end in feedback for the performance. He also proposed that any instructional plan must be chalked out by following these quence of learning events.

C. Events of Learning and Instruction :

Gagné, proposes that a theory of instruction must be based on the hierarchical structure of events of learning. What goes on inside the learner's mind (in shape of various cognitive processes) during the teaching-learning process may be termed as internal events, which must be fully taken into consideration (along with the external conditions/events in the shape of desired teaching learning environment) while planning the corresponding instructional procedures. Gagné outlines the following **learning events along with their corresponding instructional events.**

<i>Learning Event (Cognitive Process Instructional in a Learner's Mind)</i>	<i>Corresponding Event</i>
Reception	Gaining attention
Expectancy	Informing learners of the objective
Retrieval	Stimulating recall of prior learning
Selective perception	Presenting the stimulus
Semantic encoding	Providing learning guidance
Responding	Eliciting performance
Reinforcement	Providing feedback
Retrieval	Assessing performance
Generalization	Enhancing retention and transfer

Practical Application

Gagné's nine instructional events and corresponding cognitive processes can serve as the basis for designing instruction and selecting appropriate media (Gagné, Briggs & Wager, 1992, as cited in Kearsley 1994).

EXAMPLE : Here we can cite an example illustrating a teaching sequence related to the required instructional events for the topic: **'Recognition of an equilateral triangle.'** (example from Kearsley 1994).

❑ Methodology :

1. **Gain attention :** show a variety of computer generated triangles
2. **Identify objective :** pose question : "What is an equilateral triangle?"
3. **Recall prior learning :** review definitions of triangles
4. **Present stimulus :** give definition of equilateral triangle
5. **Guide learning :** show example of how to create equilateral
6. **Elicit performance :** ask students to create 5 different examples
7. **Provide feedback :** check all examples as correct/incorrect
8. **Assess performance :** provide scores and remediation
9. **Enhance retention/transfer :** show pictures of objects and ask students to identify equilateral triangles.

Discussion : From the above analysis, we notice that the theory of Gagné almost covers all aspects of human learning and, therefore, it can be safely applied to the design of instruction in all domains of human behaviour.

In the next section, we shall discuss the **constructivist approaches** to learning, which views that humans construct meaning from current knowledge structures. These arguments about the nature of human learning guide constructivist learning theories and teaching methods.

Question :

Check Your Progress 4

1. List the major learning outcomes suggested by Robert Gagné.
2. Mention the types of learning as given by Gagné.

Block-3

Unit-3

Constructivist approach to learning

3.3 : CONSTRUCTIVIST APPROACH TO LEARNING

Concept of Constructivist Approach to Learning

The constructivists believe that “learners construct their own reality or at least interpret it based upon their perceptions of experiences, so one’s knowledge is a function of one’s prior experiences, mental structures, and beliefs that are used to interpret objects and events.” (Jonasson, 1991).

The *constructivist approach* to teaching and learning is based on a combination of a subset of research within cognitive psychology and a subset of research within social psychology. The Constructivist school of thought attempts to link learning with situational variables such as, emotions, environment, social status and anticipated consequences. The idea is that designers and teachers cannot teach anyone, they can only present information and then the learner creates his or her own meanings or constructs.

Major Principles of Learning derived from Constructivism

Constructivism is a theory about learning, not a description of teaching. Learners construct knowledge for themselves. Each learner individually constructs meaning as he or she learns. There are nine general principles of learning that are derived from constructivism. These principles are :

- ❖ *Learning is an active process in which the learner uses sensory input and constructs meaning of it.*
- ❖ *People learn to learn as they learn.*
- ❖ *Physical actions and hands on experience may be necessary for learning, especially for children; but if not sufficient; we need to provide activities, which engage the mind as well as the hand. Dewey called this *reflective activity*.*
- ❖ *Learning involves language.*
- ❖ *Learning is a social activity.*
- ❖ *Learning is contextual.*
- ❖ *One needs knowledge to learn.*
- ❖ *Learning is not instantaneous, rather activity driven.*
- ❖ *The key component to learning is motivation.*

How Constructivism Influences Education

- ❖ *Curriculum* : Constructivism calls for the elimination of a standardized curriculum. Instead, it promotes using curricula customized to the students' prior knowledge. Also, it emphasizes hands-on problem solving.
- ❖ *Instruction* : Under the theory of constructivism, educators focus on making connections between facts and fostering new understanding in students. Instructors tailor their teaching strategies to student responses and encourage students to analyze, interpret, and predict information.
- ❖ *Assessment* : Constructivism calls for the elimination of grades and standardized testing. Instead, assessment becomes part of the learning process so that students play a larger role in judging their own progress. It calls for continuous assessment tools.

Types of Constructivism

We have already discussed in the first part of this Unit that there are, however, two major strands of the constructivist perspective. These two strands, ***cognitive constructivism*** and ***social constructivism*** are different in emphasis, but they also share many common perspectives about teaching and learning.

In the next section we shall discuss only Piaget's cognitive constructivist and Vygotsky's social constructivist theories of learning.

3.3.1 : PIAGET'S COGNITIVE CONSTRUCTIVIST THEORY

An Outline/Overview

Jean Piaget (1896-1980) was one of the cognitive psychologists who had a great influence on the theory of constructivism. Piaget's fundamental insight was that individuals construct their own understanding; learning is a constructive process. According to Piaget, at every level of cognitive development, the students are actively engaged in the learning process. You have already learned that the four developmental stages suggested by Piaget are : (i) *sensori-motor stage* (from birth to about 2 years), (ii) *pre-operational stage* (from 2-7 years), (iii) *concrete operational stage* (from 7-11 years), and (iv) *formal operation stage* (about 12-15 years). Piaget's constructivism was based on his view of the psychological development of children. In his words : "Knowledge is not a copy of reality. To know an object, to know an event, is not simply to look at it and make a mental copy or image of it. To know an object is to act on it. To know is to modify, to transform the object,

and to understand the process of this transformation, and as a consequence to understand the way the object is constructed.” (Piaget, 1964).

“The focus of Piaget’s theory is the various reconstructions that an individual’s thinking goes through the development of logical reasoning” (Green & Gredler, 2002).

Piaget’s theory has two major parts : an “ages and stages”, which predicts what children can and cannot understand at different ages, and a “theory of development” that describes how children develop cognitive abilities (Chambliss, 1996). Piaget’s theory of cognitive development suggests that humans cannot be “given” information that they automatically understand and use; they must “construct” their own knowledge through experience. Experience influences thinking and thinking influences knowledge. Experiences allow them to create mental images in their head. Cognitive constructivist theories focus on both what students learn and the process by which they do so (Fosnot, 1996).

Main Ideas/Themes

1. *People cannot know an objective reality.* Rather they construct their own subjective understanding of their experiences, interpreting everything in light of what has already been experienced and learned.
2. *Knowledge is subjective.* No two people have the same experiences, physiologies or environments; therefore, no two people will construct the same knowledge.
3. *The knowledge of two people can be said to be “taken-as-shared”* to the extent that their constructions seem to function in the same way in given situations.
4. *Knowledge is constructed through the process of adapting to the events and ideas one experiences.* A major influence on the cognitive constructions we build is experiencing conflict. Piaget stated that *cognitive conflict* leads to *cognitive disequilibrium*. People want to resolve the conflicts, and in doing so, engage in reflective abstraction about the conflict. As a result, existing knowledge structures are reconstructed and new knowledge structures are constructed.
5. *“Readiness to learn” has a different meaning for cognitive constructivists.* For cognitive constructivists, individuals are ready to learn about a concept when their cognitive constructions are able to incorporate some aspects of the concept.

These five central tenets describe the general idea of Piaget’s cognitive constructivism. Let us now discuss Piaget’s theory of constructivism in a nutshell.

To formalize the theory of cognitive constructivism, Jean Piaget articulated mechanisms by which knowledge is internalized by learners and he suggested that through processes of *assimilation*

(incorporating or fitting new information into existing *schemas* and *schemas* are mental systems or categories of perception and experience) and *accommodation* (altering or modifying existing schemas or creating new ones in response to new information), individuals construct new knowledge from their experiences. When individuals assimilate, they incorporate the new experience into an already existing framework without changing that framework. This may occur when individuals' experiences are aligned with their internal representations of the world, but may also occur as a failure to change a faulty understanding. According to this theory, accommodation is the process of reframing one's mental representation of the external world to fit new experiences.

As shown in the following figure, *cognitive conflict* leads to cognitive disequilibrium (the 'out-of-balance' state that occurs when a person realizes that his/her current ways of thinking are not working to solve a problem or understand a situation). Humans seek to resolve the conflicts, and in doing so, engage in reflective abstraction about the conflict. In other words, they think about things they don't understand. As a result, existing knowledge structures are reorganized i.e., reconstructed and new knowledge structures are constructed. *Adaptation* is essentially this process of moving from a state of *disequilibrium* to a state of *equilibrium*. In sum, assimilation & accommodation account for developmental change in schemas. A third possibility is that students respond to the cognitive conflict with *avoidance*, frustration, and abandonment of the effort to think. And since no two people have exactly the same experiences, no two cognitive constructions are the same (though they may be similar enough to be taken-as-shared for a specific situation).

Cognitive constructivism is based on two different senses of "construction." Firstly, on the idea that people learn by actively constructing new knowledge, not by having information poured into their heads. Secondly, constructivism asserts that people learn with particular effectiveness when they are engaged in "constructing" personally meaningful artifacts (e.g. computer programmes, animations).

Applicability of Cognitive Constructivism in Classroom

The following guidelines were developed by Brooks & Brooks (1993), which are useful for the teachers in thinking about how to adopt a constructivist approach in their classroom :

Teacher should :

- (i) pose problems of emerging relevance to students.
- (ii) structure learning activities around primary concepts.
- (iii) seek and value students' point of view.

- (iv) adapt curriculum to address students' current understandings.
- (v) assess student learning in the context of teaching.

Additional Suggestions of Piaget

1. **The role of the teacher and the classroom environment** are important parts of Piaget's theory. The role of the teacher is to provide a classroom full of interesting things to encourage the child to construct their own knowledge and to have the ability to explore.
2. Piaget promoted **discovery-based learning**. He advised the teachers to promote discovery learning, and for this teachers need to provide classroom environments that are rich in stimulation, complexity, and objects like interesting books, animals or pets, puzzles, musical instruments, etc. and students should be engaged in different **hand-on activities**.
3. According to Piaget, children differ in their rates of cognitive development and for this reason; all the children are not intellectually ready to learn the same lesson at the same time. To be sensitive to differences in students' readiness to learn, teacher should plan learning activities for individual student or for small group of students rather than for the whole class.
4. Piaget suggested that all **students need to interact with teachers and peers** in order to test their thinking, to be challenged, to receive feedback, and to watch how others work out problems.

Discussion : We see from cognitive constructivism that internal processes such as Piaget's organization (on going process of arranging information and experience into mental systems), assimilation and accommodation direct knowledge construction. New knowledge is abstracted from old knowledge. Knowledge is not a mirror of reality, but rather an abstraction that grows and develops with cognitive activity. Exploration and discovery are more important than teaching.

3.3.2 : VYGOTSKY'S SOCIAL CONSTRUCTIVIST THEORY

An Outline/Overview

In recent decades, constructivist theorists have extended the traditional focus on individual learning to address collaborative and social dimensions of learning.

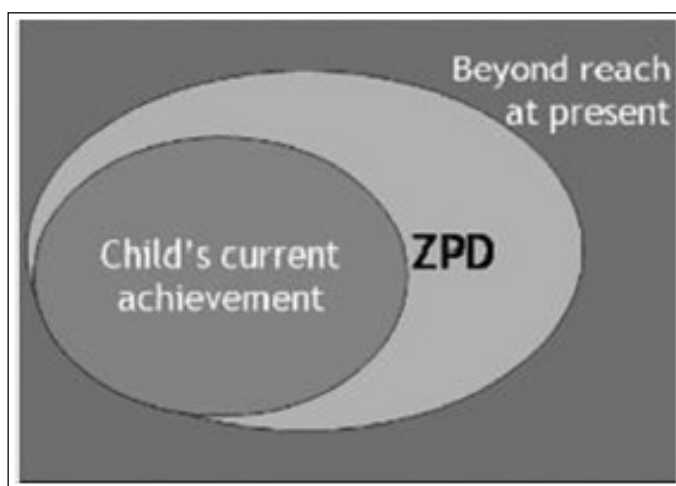
Social constructivism is a theory developed by psychologist Lev Vygotsky (1896-1934). Vygotsky's theory is very similar to Piaget's assumptions about how children learn, but Vygotsky places more emphasis on the social context of learning. Also, in Piaget's theory, the teacher plays a limited role where as in Vygotsky's theory the teacher plays a very important role in learning. We call

Vygotsky's brand of constructivism social constructivism because he emphasized the critical importance of culture as well as language development and the importance of the social context for socio-cultural development. Vygotsky's theory emphasizes the role in development of cooperative dialogues between children and more knowledgeable members of society. Children learn the culture (ways of behaving & thinking) of their community through these interactions. Social constructivism argues that students can, with help from teachers or adults or children who are more advanced, master concepts and ideas that they cannot understand on their own.

Let us analyze and assess the main themes of Vygotsky's theory of constructivism.

Basic Themes & Principles Propagated by Vygotsky

6. *Social Interaction* : The major theme of Vygotsky's theoretical framework is that social interaction plays a fundamental role in the development of cognition. Vygotsky (1978) states: "Every function in the child's cultural development appears twice : first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological)." In other words, higher mental processes appear first between people as they are co-constructed [a social process in which people interact and negotiate (usually verbally) to create an understanding or to solve a problem] during shared activities. Then the processes are internalized by the child.
7. *Zone of Proximal Development (ZPD)* : Vygotsky introduced the "zone of proximal development" (ZPD), which he defined as the area where the child cannot solve a problem alone but can be successful under adult guidance or in collaboration with a more advanced peer. This is the area where instruction can succeed, because real learning is possible. Full development of the ZPD depends upon full social interaction.



8. *Assisted learning and Scaffolding* : Vygotsky's theory suggests that *assisted learning* or guided participation in the classroom requires *scaffolding*—giving information, prompts, reminders, and encouragement at the right time and in right amounts, and then gradually allowing the students to do more and more on their own. *Scaffolding* means support for learning and problem solving. The support could be clues, reminders, breaking the problem down

into steps, providing an example, allowing revisions, asking questions, giving detailed feedback or anything else that allows the student to grow in independence as a learner. Scaffolding not only produces immediate results, but also instills skills necessary for independent problem solving in future.

9. *Language Development* : Vygotsky thought that language is a primary form of interaction through which adults transmit to the child the rich body of knowledge that exists in the culture.

Social constructivism suggests that students construct their knowledge through interacting with their peers, teachers, adults, and their contextual setting. When the child is presented with a preformed concept from the adult world, they will only memorize what the adult says about the idea. The child then works out their own ideas from the generalization that they have already introduced to. Vygotsky felt that the students need to be guided by adults, but he also thought that it was very important for the student to be influenced by their peers as well as discover things on their own.

These major themes describe the general idea of Vygotsky's social constructivism. Let us now discuss Vygotsky's theory of constructivism in brief.

According to Vygotsky, knowledge reflects the outside world as filtered through and influenced by culture, language, beliefs, interactions with others, guided discovery, direct teaching, models and coaching as well as the individual's prior knowledge. Because his theory relies heavily on social interactions and the cultural context to explain learning, most psychologists classify Vygotsky as a social constructivist. But during analyzing his theory, we see that he was primarily interested in the cognitive development within the individual. We observe that Vygotsky's concept of the zone of proximal development—the area where a child can solve a problem with the help (scaffolding) of an adult or a more adult peer—has been called a place where culture and cognition create each other (Cole, 1985). Culture creates cognition when the adult uses tools and practices from the culture (language, maps, computers, looms, or music) to steer the child toward goals the culture values (reading, writing, weaving, dance). Again cognition creates culture as the adult and child together generate new practices and problem solutions to add to the cultural group's repertoire (Serpell, 1993).

Vygotsky's Ideas about A Constructivist Classroom and a constructivist Teacher

All classrooms in which instructional strategies compatible with Vygotsky's social constructivist approach are used don't necessarily look alike. The activities and the format can vary considerably. However, four principles are applied in any **Vygotskian classroom** :

1. Learning and development is a *social, collaborative activity*.
2. *The Zone of Proximal Development* can serve as a guide for curricular and less on planning.
3. School learning should occur in a *meaningful context* and not be separated from learning and knowledge children develop in the “real world”.
4. *Out-of-school experiences* should be related to the child’s school experience.

Creating a constructivist classroom requires that the classroom teacher must be in position to :

1. influence or create motivating conditions for students,
2. take responsibility for creating problem situations,
3. foster acquisition and retrieval of prior knowledge, and
4. create a social environment that emphasizes that attitude of learning to learn.

A constructivist teacher has to guide and not tell and he should create a context for learning in which students can become engaged in interacting activities that encourages and facilitates learning. The teacher does not simply stand by, however, and watch children explore and discover. Instead, the teacher may often guide students as they approach problems, may encourage them to work in groups to think about issues and questions, and support them with encouragement and advice as they tackle problems, adventures, and challenges that are rooted in real life situations that are both interesting to the students and satisfying in terms of the result of their work.

Additional Vygotsky Suggestions :

1. **Curriculum**—The curricula should be designed to emphasize interaction between learners and learning tasks.
2. **Instruction**—Scaffolding—where the adult continually adjusts the level of his or her help in response to the child’s level of performance—is an effective form of teaching.
3. **Assessment**—Assessment methods must take into account the zone of proximal development. Assessment methods must target both the level of actual development and the level of potential development.

Remarks : A social constructivist learning intervention is thus an intervention where contextualised activities (tasks) are used to provide learners with an opportunity to discover and collaboratively construct meaning as the intervention unfolds. Learners are respected as unique individuals, and instructors act as facilitators rather than as teachers.

Types of Instruction of Social Constructivism through Uses of Technology

Below are a few examples of the way information technology can support social constructivist teaching and learning :

- ❑ Telecommunication tools such as e-mail and the Internet provide a means for social interaction through which students can talk with other students, teachers, and professionals in communities far from their classroom.
- ❑ Net worked writing program provides a unique platform for collaborative writing.
- ❑ Simulations can make learning meaningful by situating something to be learned in the context of a “real world” activity such as running a nuclear power plant, writing up “breaking” stories for a newspaper, or dealing with the pollution problems of local water ways.

Discussion : We feel that the social constructivist theory developed by Lev Vygotsky, is relatively more effective way for the child to learn. Social constructivism promotes increased social interaction and discussion in the classroom, both between teachers and students and between students. As we have seen in this theory that knowledge is constructed through the interaction of internal (cognitive) and external (environmental and social) factors. However, to the teachers and school managers, this theory poses much challenges.

Comparative Analysis between the Two Theories of Constructivism

Question :

Check Your Progress 5

1. Mention at least four general principles of learning, which are derived from constructivism.
2. What is the basic difference between the two types of constructivism?

There is a great deal of overlap between Piaget’s cognitive constructivism and Vygotsky’s social constructivist theory but there is also a great deal that is different. Vygotsky saw knowledge as being imparted by experienced adults or teachers who would inform or teach the inexperienced. In this way the young child was seen as an apprentice. This is in contrast to Piaget’s view where the young child was seen as a little scientist, inventing knowledge for him-self or her, unaided. You are also supposed to think of comparison of these two systems to a greater extent.

SUMMING UP

In this Unit, we have discussed, in brief, the classification of learning theories as well as the bases of such classification and also discussed similarities and differences of various approaches like behaviouristic, cognitive and constructivist approaches to learning.

Under the behaviouristic approach we have studied the concept of behaviourism and the basic characteristics of this approach to learning. Skinner’s operant conditioning theory and Hull’s systematic

behaviour theory have been described in brief to understand their main concepts, basic features, mechanisms and educational implications.

Under the cognitive approach to learning, you have studied basic tenets & meaning of cognitivism. You have also studied the basic thoughts & concepts, principles, mechanisms and operations of Tolman's sign theory, Lewin's field theory and Bruner's theory of learning as well as their approaches to cognitive development and contributions to learning & instructional design. There is another theory of Robert Gagne that presents a systematic attempt to integrate many of the theories of learning and we have discussed in brief Gagne's theory of learning and instruction that incorporates a behaviouristic eclectic approach to the psychology of learning and teaching.

Similarly, under the constructivist approach, we discussed the concept and types of constructivism with the major principles of learning, derived from constructivism. We have also tried to present the contributions and significances of Piaget's cognitive constructivism and Vygotsky's social constructivism in the field of learning and instruction and while analyzing these two theories; you have learned how constructivism impacts learning in different ways.

Lastly, we can say that different theories of learning have advocated different learning approaches. Both teaching and learning have immensely improved by the contribution of these approaches. Each of these in its own way has added something to the understanding of the learning process, which is so complex. 'No single approach' is adequate enough to give a thorough understanding of the different phases of various types of learning. To illustrate this, it can be said that principles of behaviourism, cognitivism and constructivism—each has its own use and value in describing and explaining what takes place in the learning process and how it could be made more effective and efficient by combining all these approaches rationally.

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2.2.2 : ASSIGNMENTS

1. Enumerate the principal differences between behaviourism and cognitivism. What is the role of perception in the cognitive approach?
2. State which theory of learning appeals to you most. Give reasons in support of your answer.
3. What are the main features of Hull's theory of learning? Explain its application to education.
4. Explain, in brief, the main points of Lewin's field theory of learning and in this context describe its education alimplications.
5. Critically estimate the theory of learning of Tolman. Why this theory is called 'sign-gestalt' theory of learning?
6. State in brief Bruner's approach to cognitive development and its contribution to instructional design.
7. How do Gagne's conditions of learning constitute more a method of instruction than a theory of learning?
8. What for Vygotsky is the nature of human learning ? How has Vygotsky dealt with children's development and learning?

EDC-06
EDUCATIONAL PSYCHOLOGY-2
Block-4
Personality

CONTENT STRUCTURE

INTRODUCTION

OBJECTIVES

4.1 : Personality : concept & nature

4.1.1 : Meaning and concept of personality

4.1.2 : Nature of personality

4.1.3 : Theory of Cattell, Eysenck, Jung, Erikson

4.1.4 : Theory of Rogers, Big five factors

4.2 : Measurement of personality

4.3.1 : Concept of personality measurement

4.3.2 : Personality inventory

4.3.3 : Projective techniques

SUMMING UP

SUGGESTED READING

ASSIGNMENTS

INTRODUCTION

Psychology which deals with the concept, nature, development, and any other related matter to personally is called personality psychology. Most basically it asks the questions like what does it mean to be a person? How are we unique as individuals? What is the nature of the self? Etc. Personality psychologists answer these interesting questions through systematic observations focusing on the thoughts, feelings, and behaviours of people. Consequently, there emerges different perspectives of personality psychology, and each and every perspective is adorable because of their scientific organized thoughts on the aspects they believe to be responsible for defining and explaining personality.

Thus, there is no one universally accepted definition of personality. There are different theories and a number of elucidations on ‘human personality’. Each one is correct and technically sound from its own point of view. Our task will be to follow each view scrupulously in order to understand it, and after having a number of views, to get a scientific idea about human personality-its nature and development.

Side by side, understanding how to measure personality will throw additional lights in developing comprehensive knowledge about personality and its nature.

OBJECTIVES

After going through this unit you will be able—

- To understand the nature and concept of human personality
- To understand different perspectives of personality psychology and their related theories
- To comprehend the importance of these theories, especially in the field of education
- To get some ideas about the measurement techniques of personality.

Block-4

Unit-1

Personality : concepts and theories

4.1.1 : CONCEPT AND MEANING OF PERSONALITY

As a general introduction to all of the theories and models of personality in broad-spectrum, it is important to become conscious that no-one fully knows the extent to which personality is determined by genetics and hereditary factors, compared to the effects of up-bringing, culture, environment and experience. Controversy regarding ‘Nature versus Nurture’ is not systematically clear. Most studies seem to indicate that it’s a bit of each, roughly half and half, although obviously it varies person-to-person.

Given that perhaps half our personality is determined by influences acting upon us after we are conceived and born, it is interesting and significant also that no-one actually knows the extent to which personality changes over time.

Certainly childhood is highly influential in forming personality. Certainly major trauma at any stage of life can change a person’s personality quite fundamentally. Certainly, many people seem to mature emotionally with age and experience. But beyond these sort of generalisations, it is difficult to be precise about how and when-and if-personality actually changes.

Till date what we have known is that personality is what makes a person a unique person, and that it is recognizable soon after birth. A child’s personality has several components : temperament, environment, and character. Temperament is the set of genetically determined traits that determine the child’s approach to the world and how the child learns about the world. There are no genes that specify personality traits, but some genes do control the development of the nervous system, which in turn controls behavior.

A second component of personality comes from adaptive patterns related to a child’s specific environment. Most psychologists agree that these two factors-temperament and environment-influence the development of a person’s personality the most. Temperament with its dependence on genetic factors is referred to as “nature” while the environmental factors are called “nurture.”

While there is still controversy as to which factor ranks higher in Meeting personality development. all experts agree that high-quality parenting plays a critical role in the development of a child’s personality. When parents understand how their child responds to certain situations. they can anticipate issues that might be problematic for their child. They can prepare the child for the situation or in some cases the) may avoid a potentially difficult situation altogether. Parents who know how to

adapt their parenting approach to the particular temperament of their child can best provide guidance and ensure the successful development of their child's personality.

Finally, the third component of personality is character-the set of emotional, cognitive, and behavioural patterns learned from experience that determines how a person thinks, feels, and behaves. A person's character continues to evolve throughout life, although much depends on inborn traits and early experiences. Character is also dependent on a person's moral development.

Thus, it is better to understand the nature and concept of personality from different theoretical approaches.

Personality is the product of the process of development. Personality development is the development of the organized pattern of behaviours and attitudes that makes a person distinctive. Its development occurs by the ongoing interaction of "nature" and "nurture". Historically, scholars have conceptualized personality in different approaches, viz. theories and models.

4.1.2 : NATURE OF PERSONALITY

There are various characteristics which throw light on the nature of Personality. Let me understand some of them to you :

- **Personality is a dynamic whole :** The definition of Personality given by Allport reveals that the personality is the dynamic whole. The constituents of Personality are organised into units which are not static but active.
- **Personality measures behavior :** Personality of an individual is more or less stable. It can be predicted by one's behavior.
- **Outcome interaction of heredity and environment :** Most of the psychologists review that Personality is the net result of the interaction of heredity characters and environment factors. The growth and the development of physical, social, emotional and moral are affected by environmental factors.
- **Motive Force :** There are many theories of motivation which contribute to the understanding of the dynamics of personality. Behavior is affected overall by motives, ego involvement, incentives, etc.

4.1.3 : DETERMINANTS OF PERSONALITY

Biological and environmental factors are responsible for the development of personality. Many things influence in the development of personality. Let me start with **Biological Factors :**

Biological factors are also known as heredity factors.

Biological Factors :

- ***Physique and Personality*** : Various things influence the development of the personality. Physical development infrequently influences the development of personality such as; height, weight, physical defects, etc.
- ***Intelligence*** : First I will define intelligence. Intelligence is the thinking power of human. Due to intelligence, human is now on the road towards development. Human beings can defeat anyone due to intelligence. Persons who are very intelligent can make better adjustment in around them. Intelligence is the hereditary. There is a relationship between intelligence and personality.
- ***Sex Differences*** : Generally boys are more assertive, tough minded and vigorous. They show interest in winning also in outdoor activities. Girls are interested in less vigorous games. They remain quiet and show interest in personal or physical appearance. That is why, most of the girls have a better sense of fine art. Thus, sex differences play a vital role in the development of individuals' personality.
- ***Nervous System*** : Other major system which plays an important role is nervous system. Nervous System controls or limits one's learning capacity. It is evident that development of personality is influenced by the nature of nervous system.

Endocrine glands also play a very important role in physical, intellectual, emotional and social development. In the words of **Ogburn and Nimkoof** "Biological heredity ushers infant actors on the stage of which physical environment, the group and culture have set. The dramatic actor now begins and new born baby transforms into a social person".

Environmental Factors

- ***Geographical environment*** : Individuals' personality is influenced by the geographical conditions.
- ***Childhood experiences*** : It is of vital importance. When in childhood, the individual is influenced by tensions and emotions, it influences its development.
- ***School*** : School plays a major role in the development of personality. Most precious thing is the teacher's personality. That is, the attitudes, beliefs, habits, etc. of teacher. It really affects the development of personality. Also, how teacher teaches to an individual. It plays a vital role.
- ***Culture*** : Personality is the image or mirror of culture. It plays a great role in the development of personality.

Other Environmental factors like clubs, cinemas, mosques, churches, etc., play a significant role.

Theories of personality and their educational implications

4.1.4 : R. B. CATTELL (1905-1998)

A trait approach to personality uses a basic, limited set of adjectives or adjective dimensions to describe and scale individuals. Trait approaches to personality are very old, tremendously influenced by Gordon Allport, and certainly common in the popular culture. Cattell was a follower of this perspective of personality. During the period of psychoanalytic interpretations of personality, personality psychology required earnestly quantification, objectification of structure of personality, and its simplification through statistical approaches. Some of the major steps along this path were taken by R.B.Cattell, starting in the 1940s. In a word, Cattell's factor analytic theory is a trait theory where organization and relations of traits to one another is studied. Cattell viewed personality as a complex and differentiated structure of traits. The theory encompasses surface traits and their underlying source traits where source traits are underlying variables that determine surface manifestations, and surface traits are clusters of overt behaviour responses that appear to go together. Source traits are important underlying traits, and surface traits are less important to personality. Further more, source traits refer to permanent traits which compose the basic factors of the personality, while surface traits are potentially unstable and susceptible to change according to the situation. The major goal of Cattell's personality theory is the prediction of the response of human behaviour to certain stimuli.

Besides the aforesaid two traits, Cattell introduced a variety of traits in his theory. He used the technique of 'factor analysis'. Different measurements on the responses emerged in Cattell's psychological testing were subjected to factor analysis so as to identify common factors through correlations, and

Temperament, with its dependence on genetic called these correlated factors, traits. Common traits were those seemingly possessed to some degree by all persons, while unique traits were those seemingly possessed by few. Ability traits referred to how efficiently one could skillfully work towards accomplishing a goal, while temperament traits referred to how one generally behaved as responses to the environment, and dynamic traits referred to motivations and interests. Constitutional traits on the other hand are source traits dependent upon physiological traits, and environmental-mold traits are source traits learned through social interactions. Finally, the central aspect of the theory are the ergs, which are permanent constitutional traits that provide energy for goal directed behaviors, as they are the innate units of motivation.

Based on his factor analytic findings, Cattell (1966) proposed that there are sixteen basic personality traits. In simple term of dichotomies, these sixteen are as follows :

outgoing-reserved	suspicious - trusting
more-lessintelligent	imaginative - practical
stable-emotional	shrewd - forthright
assertive-humble	apprehensive - placid
happy-go-lucky-sober	experimenting - conservative
conscientious-expedient	self-sufficient - group-tied
venturesome-shy	controlled - casual
tender-toughminded	tense - relaxed

These are typically assessed using the Sixteen Personality Factors Questionnaire (16PF).

Cattell, during his period, observed that personality traits and scales used to measure traits are numerous, and commonality amongst the traits and scales is often difficult to obtain. To curb the confusion and in order to develop a common taxonomy, he attempted to develop Sixteen Personality Factor Model based upon personality adjectives taken form the natural language. Cattell considered three major sources of data in his research concerning personality traits. L-Data, also referred to as the life record, included actual records of a person's behavior in society; Self-rating questionnaires, also known as Q-Data, gathered data by allowing participants to assess their own behaviors. The third source of data, the objective test, also known as T-Data, created a unique situation in which the subject is unaware of the personality trait being measured. Thus, the 16 Personality Factor Model aims to measure personality based upon sixteen source traits.

His empirical findings lead the way for investigation and later discovery of the 'Big Five' dimensions of personality. The five-factor model of personality (which we will discuss just a few topics later) based on the fundamental principles and goals of Cattell's 16 personality factor model.

Question :

Let Us Check Our Progress

1. Name in full the personality theory of Cattell.
2. What are the major sources of data for the development of 16PF?
3. What are the differences between source trait and surface trait?
4. Which model has emerged later from Cattell's?

4.1.5 : H. EYSENCK (1916-1997)

Eysenck's theory is based primarily on physiology and genetics. Although he is a behaviorist who considers learned habits of great importance, he considers personality differences as growing out of our genetic inheritance. He is, therefore, primarily interested in what is usually called temperament. Eysenck is also primarily a research psychologist. His methods involve a statistical technique called factor analysis. This technique extracts a number of "dimensions" from large masses of data.

For example, if you give long lists of adjectives to a large number of people for them to rate themselves on, you have prime raw material for factor analysis. Imagine, for example, a test that included words like "shy," "introverted," "outgoing," "wild," and so on. Obviously, shy people are likely to rate themselves high on the first two words, and low on the second two. Outgoing people are likely to do the reverse.

Factor analysis extracts dimensions—factors—such as shyoutgoing from the mass of information. The researcher then examines the data and gives the factor a name such as "introversion-extraversion." There are other techniques that will find the "best fit" of the data to various possible dimension, and others still that will find "higher level" dimensions—factors that organize the factors, like big headings organize little headings. Eysenck's original research found two main dimensions of temperament: neuroticism and extraversion-introversion. Let's look at each one...

Neuroticism

Neuroticism is the name Eysenck gave to a dimension that ranges from normal, fairly calm and collected people to one's that tend to be quite "nervous." His research showed that these nervous people tended to suffer more frequently from a variety of "nervous disorders" we call neuroses, hence the name of the dimension. But understand that he was not saying that people who score high on the neuroticism scale are necessarily neurotics—only that they are more susceptible to neurotic problems.

Eysenck was convinced that, since everyone in his data-pool fit somewhere on this dimension of normalityto-neuroticism, this was a true temperament, i.e. that this was a genetically-based, physiologically-supported dimension of personality. He therefore went to the physiological research to find possible explanations.

The most obvious place to look was at the sympathetic nervous system. This is a part of the autonomic nervous system that functions separately from the central nervous system and controls much of our emotional responsiveness to emergency situations. For example, when signals from the brain tell it to do so, the sympathetic nervous systems instructs the liver to release sugar for energy, causes the digestive system to slow down, opens up the pupils, raises the hairs on your body

(goosebumps), and tells the adrenal glands to release more adrenalin (epinephrine). The adrenalin in turn alters many of the body's functions and prepares the muscles for action. The traditional way of describing the function of the sympathetic nervous system is to say that it prepares us for "fight or flight."

Eysenck hypothesized that some people have a more responsive sympathetic nervous system than others. Some people remain very calm during emergencies; some people feel considerable fear or other emotions; and some are terrified by even very minor incidents. He suggested that this latter group had a problem of sympathetic hyperactivity, which made them prime candidates for the various neurotic disorders.

Perhaps the most "archetypal" neurotic symptom is the panic attack. Eysenck explained panic attacks as something like the positive feedback you get when you place a microphone too close to a speaker : The small sounds entering the mike get amplified and come out of the speaker, and go into the mike, get amplified again, and come out of the speaker again, and so on, round and round, until you get the famous squeal that we all loved to produce when we were kids. (Lead guitarists like to do this too to make some of their long, wailing sounds.)

Well, the panic attack follows the same pattern : You are mildly frightened by something—crossing a bridge, for example. This gets your sympathetic nervous system going. That makes you more nervous, and so more susceptible to stimulation, which gets your system even more in an uproar, which makes you more nervous and more susceptible.... You could say that the neuroticistic person is responding more to his or her own panic than to the original object of fear! As someone who has had panic attacks, I can vouch for Eysenck's description—although his explanation remains only a hypothesis.

Extraversion-introversion

His second dimension is extraversion-introversion. By this he means something very similar to what Jung meant by the same terms, and something very similar to our common-sense understanding of them : Shy, quiet people "versus" out-going, even loud people. This dimension, too, is found in everyone, but the physiological explanation is a bit more complex.

Eysenck hypothesized that extraversion-introversion is a matter of the balance of "inhibition" and "excitation" in the brain itself. These are ideas that Pavlov came up with to explain some of the differences he found in the reactions of his various dogs to stress. Excitation is the brain waking itself up, getting into an alert, learning state. Inhibition is the brain calming itself down, either in the usual sense of relaxing and going to sleep, or in the sense of protecting itself in the case of overwhelming stimulation.

Someone who is extraverted, he hypothesized, has good, strong inhibition : When confronted by traumatic stimulation—such as a car crash—the extravert’s brain inhibits itself, which means that it becomes “numb,” you might say, to the trauma, and therefore will remember very little of what happened. After the car crash, the extravert might feel as if he had “blanked out” during the event, and may ask others to fill them in on what happened. Because they don’t feel the full mental impact of the crash, they may be ready to go back to driving the very next day.

The introvert, on the other hand, has poor or weak inhibition : When trauma, such as the car crash, hits them, their brains don’t protect them fast enough, don’t in any way shut down. Instead, they are highly alert and learn well, and so remember everything that happened. They might even report that they saw the whole crash “in slow motion!” They are very unlikely to want to drive anytime soon after the crash, and may even stop driving altogether.

Now, how does this lead to shyness or a love of parties? Well, imagine the extravert and the introvert both getting drunk, taking off their clothes, and dancing buck naked on a restaurant table. The next morning, the extravert will ask you what happened (and where are his clothes). When you tell him, he’ll laugh and start making arrangements to have another party. The introvert, on the other hand, will remember every mortifying moment of his humiliation, and may never come out of his room again. (I’m very introverted, and again I can vouch to a lot of this experientially! Perhaps some of you extraverts can tell me if he describes your experiences well, too—assuming, of course, that you can remember your experiences!)

One of the things that Eysenck discovered was that violent criminals tend to be non-neuroticistic extraverts. This makes common sense, if you think about it : It is hard to imagine somebody who is painfully shy and who remembers their experiences and learns from them holding up a Seven-Eleven! It is even harder to imagine someone given to panic attacks doing so. But please understand that there are many kinds of crime besides the violent kind that introverts and neurotics might engage in!

Neuroticism and extraversion-introversion

Another thing Eysenck looked into was the interaction of the two dimensions and what that might mean in regard to various psychological problems. He found, for example, that people with phobias and obsessive compulsive disorder tended to be quite introverted, whereas people with conversion disorders (e.g. hysterical paralysis) or dissociative disorders (e.g. amnesia) tended to be more extraverted.

Here’s his explanation : Highly neuroticistic people over-respond to fearful stimuli; If they are introverts, they will learn to avoid the situations that cause panic very quickly and very thoroughly,

even to the point of becoming panicky at small symbols of those situations—they will develop phobias. Other introverts will learn (quickly and thoroughly) particular behaviors that hold off their panic—such as checking things many times over or washing their hands again and again.

Highly neuroticistic extraverts, on the other hand, are good at ignoring and forgetting the things that overwhelm them. They engage in the classic defense mechanisms, such as denial and repression. They can conveniently forget a painful weekend, for example, or even “forget” their ability to feel and use their legs.

Psychoticism

Eysenck came to recognize that, although he was using large populations for his research, there were some populations he was not tapping. He began to take his studies into the mental institutions of England. When these masses of data were factor analyzed, a third significant factor began to emerge, which he labeled psychoticism.

Like neuroticism, high psychoticism does not mean you are psychotic or doomed to become so—only that you exhibit some qualities commonly found among psychotics, and that you may be more susceptible, given certain environments, to becoming psychotic.

As you might imagine, the kinds of qualities found in high psychoticistic people include a certain recklessness, a disregard for common sense or conventions, and a degree of inappropriate emotional expression. It is the dimension that separates those people who end up in institutions from the rest of humanity!

Eysenck used factor analysis to generate 3 dimensions of personality and believed that differences in personality can be traced to structural differences in the brain. Eysenck maintains that all three factors are found in different studies across cultures and each one has an inherited component.

Eysenck viewed personality as organized in a hierarchy. At the most general level are broad dimensions, or types. At the next level are traits. Below this is a level of habitual responses, and at the bottom of the hierarchy are specific responses, the behaviour actually observed. His bio-psychological model of personality is based on evidences arising from rigorous empirical and statistical analyses of traits.

Question :

Let Us Check Our Progress

Note : We have gone through a number of concepts, with very short orientations, in order to understand Eysenck’s theory. Thus, it will be better to recapitulate the concepts

throughself-questioning–

1. What type of personality model is presented by Eysenck?
2. Name and number the dimensions of this model.
3. Why does a person become ‘neurotic’?
4. Who is ‘extravert’?

4.1.6 : C. G. JUNG (1875-1961)

Since it is practically impossible to understand the vast amount of intellectual thoughts of genius Jung in such a short space, we will try to get a very brief introduction about his views. This will help us to have an understanding of his basic personality theory.

In Analytical Psychology, as propagated by C.G. Jung, human psyche is divided into three parts - the ego (the conscious mind), the personal unconscious (includes anything, except instincts, which is not presently conscious, but can be), and the collective unconscious (the “psychic inheritance”). The contents of the collective unconscious are called archetypes. An archetype is an unlearned tendency to experience things in a certain way. There are a great number of archetypes. The most important ones are—

- The person a, one’s social mask or public personality.
- The shadow, the repulsive personal characteristics.
- The anima or animus, the female aspect present in the collective unconscious of men, and the male aspect present in the collective unconscious of women, respectively.
- The hero, basically the person’s ego identified with some story character.
- The self, the final and most central archetype, the striving for unity of all parts of personality. The goal of life is to realize the self.

Jung’s motivational theory introduced the concept of general complexes which are formed by clustering repressed desires, memories, and emotions in the personal unconscious. You have acquainted with this concept in Block-I, Unit-3.

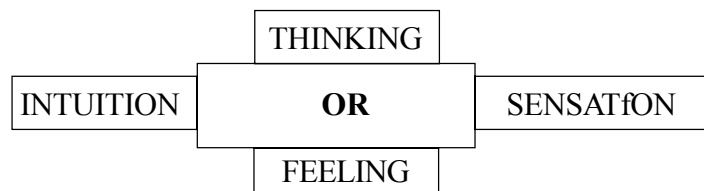
His psychological theory fundamentally underpins most of the popular and highly regarded personality systems today. His theory of Psychological Types was part of a wider set of ideas relating to psychic energy.

Jung asserted that a person’s psychological make-up is always working on two levels : the conscious and the unconscious, and that a person’s ‘psyche’ (a person’s ‘whole being’) is represented by its conscious and unconscious parts. Moreover, a person’s conscious and unconscious states are

in a way ‘self-balancing’, that is to say, if a person’s conscious side (or ‘attitude’) becomes dominant or extreme, then the unconscious. will surface or manifest in some way to rectify the balance.

Jung divided psychic energy into two basic ‘general attitude types’ : Introverted and Extraverted. The word ‘attitude’ here means a deeper more settled mode of behaviour than the common day-to-day use of the word. Both attitudes - extraversion and introversion - are present in every person, in different degrees. No-one is pure extravert or pure introvert, and more recent studies indicate that a big majority of people are actually a reasonably well-balanced mixture of the two types, although with a preference for one or the other. In extraverts, psychic energy is directed out of the person to the world outside them, where as in introverts the person’s psychic energy is internally directed. Thus, Jung’s ‘general attitudes’ of Introverted and Extraverted are clearly quite different.

In addition to the two attitudes of extraversion and introversion, Jung also developed a framework of ‘four functional types’. Jung’s Four Functions of the psyche are thinking and feeling which, he said, are the functions that enable us to decide and judge, (Jung called these ‘Rational’), and sensation and intuition which, Jung said, are the functions that enable us to gather information and perceive (Jung called these ‘Irrational’). In Jung’s theory, Thinking and Feeling are ‘Rational’ because both of these functions evaluate experience. Intuition and Sensation are ‘Irrational’ since they are concerned with perception and do not evaluate. Significantly Jung also asserted that each of us needs to be able to both perceive and to judge (gather information and decide) in order to survive and to carry on normal functioning behaviour. And he also said that in doing this, each of us prefers or favours one of the functions from each of the pairings. Jung accordingly arranged his four functional types as two pairs of opposites -



Jung said that each person has a main natural conscious orientation towards one of the four functions (their ‘superior’ or most ‘differentiated’ function), in which case the opposite function (the ‘inferior’ or unconscious function) would be represented and compensated within the person’s unconscious. Of the other two functions, either one could be next dominant, depending on the person, or generally would ‘serve’ as an auxiliary function in support of the person’s ‘superior’ function. The point here is that the auxiliary functions are not as polarised-into conscious-unconscious-as the superior and inferior functions, which are more strongly polarised into conscious-unconscious. So, a personality would generally be represented by a conscious dominant function from each opposite pair : one of these dominant functions being dominant overall (‘superior’) and the other dominant function being the supporting (‘auxiliary’) function. In this way, Jung presented his major

eight 'psychological types' as simple combinations of Introverted or Extraverted together with one 'superior' function. The eight psychological types do not include 'auxiliary' functions. Finally, add an auxiliary function to each of Jung's main eight Psychological Types, sixteen types have been emerged. Jung viewed the ultimate psychological task as the process of individuation, based on the strengths and limitations of one's psychological type.

We all have these functions-just in different proportions. Each of us has a superior function, which we prefer and which is best developed in us, a secondary function, which we are aware of and use in support of our superior function, a tertiary function, which is only slightly less developed but not terribly conscious, and an inferior function, which is poorly developed and so unconscious that we might deny its existence in ourselves. Most of us develop only one or two of the functions, but our goal should be to develop all four for the sake of selfhood.

Question :

Let Us Check Our Progress

We have gone through a number of concepts, with very short orientations, in order to understand Jung's theory. Thus, it will be better to recapitulate the concepts through self-questioning—

1. Which psychology is introduced by C.G.Jung?
2. Recall the Jungian archetypes.
3. Tick out the correct answer-

(a) Introversion is basic	attitude/function/personality
(b) Extraversion is	temperament/trait/type
(c) Thinking and Feeling are	rational/irrational/emotional
(d) Sensation and Intuition	rational/irrational/emotional
4. What is the difference between superior function and secondary function in Jungian psychological types?

4.1.7 : ERIK ERIKSON (1902-1994)

Erikson is a neo-Freudian ego-psychologist. He accepts Freud's ideas as basically correct, including the Oedipal complex, and accepts as well the ideas about the ego that were added by

other Freudian loyalists such as Heinz Hartmann and Anna Freud. However, Erikson is much more society and culture-oriented than most Freudians.

He is most famous for his work in refining and expanding Freud's theory of stages. Development, he says, functions by the epigenetic principle. This principle says that we develop through a predetermined unfolding of our personalities in eight stages. Our progress through each stage is in part determined by our success, or lack of success, in all the previous stages. Each stage involves certain developmental tasks that are psychosocial in nature. He called the process the *psychosocial crisis*.

The various tasks are referred to by two terms. The infant's task, for example, is called "trust vs. mistrust." In each stage, there is a balance we must learn. There is a time for each task, and each stage has a certain optimal time as well.

If a stage is managed well, we carry away a certain virtue or psychosocial strength which will help us through the rest of the stages of our lives. On the other hand, if we don't do so well, we may develop maladaptations and malignancies, as well as endanger all our future development. A malignancy is the worse of the two, and involves too little of the positive and too much of the negative aspect of the task, such as a person who can't trust others. A maladaptation is not quite as bad and involves too much of the positive and too little of the negative, such as a person who trusts too much.

Eight stages

The first stage, infancy or the oral-sensory stage is approximately the first year or year and a half of life. The task is to develop trust without completely eliminating the capacity for mistrust. If the proper balance is achieved, the child will develop the virtue hope, the strong belief that, even when things are not going well, they will work out well in the end.

The second stage is the anal-muscular stage of early childhood, from about eighteen months to three or four years old. The task is to achieve a degree of autonomy while minimizing shame and doubt. If the child gets proper, positive balance of autonomy and shame and doubt, then it will develop the virtue of willpower or determination.

Stage three is the genital-locomotor stage or play age. From three or four to five or six, the task confronting every child is to learn initiative without too much guilt. A good balance leads to the psychosocial strength of purpose. An even better word for this virtue would have been courage, the capacity for action despite a clear understanding of your limitations and past failings. At this stage the capacity for moral judgment has arrived.

Stage four is the latency stage, or the school-age child from about six to twelve. The task is to develop a capacity for industry while avoiding an excessive sense of inferiority. Children must "tame the imagination" and dedicate themselves to education and to learning the social skills their society

requires of them. A happier thing is to develop the right balance of industry and inferiority — that is, mostly industry with just a touch of inferiority to keep the child sensibly humble. Then the child will develop the virtue called competency.

Stage five is adolescence, beginning with puberty and ending around 18 or 20 years old. The task during adolescence is to achieve ego identity and avoid role confusion. It was adolescence that interested Erikson first and most, and the patterns he saw here were the bases for his thinking about all the other stages. Ego identity means knowing who the person is and how he / she fits in to the rest of society. It requires that you take all you've learned about life and yourself and mold it into a unified self-image, one that your community finds meaningful. If the adolescent successfully negotiates this stage, he / she will have the virtue Erikson called fidelity. Fidelity means loyalty, the ability to live by societies standards despite their imperfections and incompleteness and inconsistencies. Fidelity means that you have found a place in that community, a place that will allow you to contribute.

Stage six is young adulthood, which lasts from about 18 to about 30 years of age. The task is to achieve some degree of intimacy, as opposed to remaining in isolation. Intimacy is the ability to be close to others, as a lover, a friend, and as a participant in society. If you successfully negotiate this stage, you will instead carry with you for the rest of your life the virtue or psychosocial strength Erikson calls love. Love, in the context of his theory, means being able to put aside differences and antagonisms through "mutuality of devotion." It includes not only the love we find in a good marriage, but the love between friends and the love of one's neighbor, co-worker, and compatriot as well.

The seventh stage is that of middle adulthood. It is hard to pin a time to it, but it would include the period during which we are actively involved in raising children. For most people in our society, this would put it somewhere between the middle twenties and the late fifties. The task here is to cultivate the proper balance of generativity and stagnation. Generativity is an extension of love into the future. It is a concern for the next generation and all future generations. Erikson considers teaching, writing, invention, the arts and sciences, social activism, and generally contributing to the welfare of future generations to be generativity as well—anything, in fact, that satisfies that old "need to be needed." Stagnation, on the other hand, is self-absorption, caring for no-one. The stagnant person ceases to be a productive member of society. If you are successful at this stage, you will have a capacity for caring that will serve you through the rest of your life.

The last stage, referred to delicately as late adulthood or maturity, or less delicately as old age, begins sometime around retirement, somewhere around 60. The task is to develop ego integrity with a minimal amount of despair. Ego integrity means coming to terms with your life, and thereby coming to terms with the end of life. Despair associates with a detachment from society, a sense of biological uselessness, along with the illnesses and concerns of death. The virtue of this stage is wisdom. Someone who approaches death without fear has the strength Erikson calls wisdom. Wise man let

others understand his/her wisdom not by their wise words, but by their simple and gentle approach to life and death, by their “generosity of spirit.”

To Erikson, the ego is a relatively powerful, independent part of personality that works towards goals such as establishing one’s identity and satisfying a need for mastery over the environment. Basically, the principal function of the ego is to establish and maintain a sense of identity. Erikson’s approach to personality is often called egopsychology.

Question :

Let Us Check Our Progress

We have gone through a number of concepts, with very short orientations, in order to understand Erikson’s theory. Thus, it will be better to recapitulate the concepts through self-questioning–

1. How do you describe Erikson as a psychologist?
2. What are the important proponents of his theory of personality?
3. Match the following-

(a) First psychosocial stage	(i) Second psychosocial stage
(b) Autonomy	(ii) Intimacy and love
(c) Identity crisis	(iii) Trust vs. mistrust
(d) Sixth psychosocial stage	(iv) Fifth psychosocial stage
4. What is the significance of ‘old age’ in Erikson’s theory?

4.1.8 : CARL ROGERS (1902-1987)

Carl Rogers is a Humanistic Psychologist. The idea that we are responsible for our own lives, embodied in existentialism, is exemplified in the work of Carl Rogers. However Rogers’ approach was extremely optimistic. His personality theory was one based on empathy as he believed that the only way to understand someone’s personality was through that person’s own point of view, that the present feelings and emotions greatly impact personality, and that “the organism has one basic tendency and striving—to actualize, maintain, and enhance the experiencing organism”.

In his ‘self theory, the goal of existence is to satisfy this basic tendency, i.e. the need for ‘actualization’. This desire to preserve and enhance oneself is on one level, physical (staying alive by eating, keeping warm, avoiding physical danger etc.), and on a higher level, psychological, i.e. ‘self-

actualization' (testing and fulfilling our capabilities, seeking out new experiences, mastering new skills, quitting boring jobs and finding more exciting ones etc.).

In the course of pursuing self-actualization, people engage in what Rogers called the organismic valuing process. Experiences that are perceived as enhancing to oneself are valued as good and are therefore sought after. Experiences perceived as not enhancing are valued as bad and are avoided. In other words, we know what is good for us.

Rogers used the term Fully Functioning Person for someone who is self-actualizing. These people are open to experiencing their feelings; don't feel threatened by those feelings no matter what they are. They trust their own feelings. They are open to the experiences of the world. They live lives full of meaning, challenge and fulfillment.

According to Rogers, the main determinant of whether we will become self-actualized is childhood experience. Rogers believed it is important for us to receive unconditional positive regard that is affection and acceptance from the important people in our lives, particularly our parents, with no strings attached. Often however, this regard is conditional, it comes with strings attached. To be loved and approved the child must be well-mannered, quiet, assertive, boyish, girlish, whatever. These things are incorporated as conditions of worth. If the conditions are few and reasonable then the child will be fine but if the conditions of worth are severely limiting then self-actualization will be severely impeded. These external conditions of worth come to control more and more of a person's behaviour. We even start to apply these conditions to ourselves. This pattern of self-acceptance and self-rejection is called conditional self-regard. Eventually, a gap opens between a person's actions and his or her true self. The person automatically covers over the split with perceptual distortions, denying the conflict between self and reality. Rogers felt that these distortions can become so severe that they may lead to personality breakdown.

Rogers thought there were three selves in us: the self-concept, the ideal self, and the real self. The self-concept is the way a person sees himself or herself. Self-Concept encompasses all of the values, attitudes, and beliefs. It is a composite of self-percepts that influence perception and behavior. The ideal self is who one would like to be or ought to be. The real self is who one actually is. Congruence is the amount of agreement between the self-concept, the real self and the ideal self. The more congruence, the more psychological health there is within the person. If a person's idea of who she/he is bears a great similarity to what she/he wants to be, that person will be relatively self-accepting.

Rogers is a self-theorist. He assumed that the self doesn't exist at birth but that infants gradually differentiate self from non-self. The self is constantly evolving. In a self-actualized person there is congruence between the 'ideal self (the person like to be) and the 'actual self (what the person is

and thinks he is). There is a second kind of congruence between the actual self and experience. Incongruence is bad and leads to anxiety, whether the incongruence is between actual & real self or between actual self and experience. Rogers believed we defend ourselves against incongruence or even the perceptions of incongruence, and fell in the risk zones of neuroses or psychoses.

With regard to personality development, he described principles rather than stages. The main issue is the development of a self-concept and the progress from an undifferentiated self to being fully differentiated.

Self-concept is the organized consistent conceptual gestalt composed of perceptions of the characteristics of 'I' or 'me' and the perceptions of the relationships of the 'I' or 'me' to others and to various aspects of life, together with the values attached to these perceptions. Psychological adjustment exists when the concept of the self is such that all the sensory and visceral experiences of the organism are, or may be, assimilated on a symbolic level into a consistent relationship with the concept of self.

Question :

Let Us Check Our Progress

We have gone through a number of concepts, with very short orientations, in order to understand Roger's theory. Thus, it will be better to recapitulate the concepts through self-questioning—

1. Why Rogers' is called 'humanistic theory'?
2. What is Rogerian 'self-concept'?
3. Recall the differences-
 - (a) Actualisation and self-actualisation
 - (b) Unconditional positive regard and conditional self-regard
 - (c) Ideal self and real self
4. What is the significance of 'old age' in Erikson's theory?

4.1.9 : BIG FIVE FACTORS

Currently the most popular approach among psychologists for studying personality traits is the five-factor model or Big Five dimensions of personality. The five factors were derived from factor analyses of a large number of self- and peer-reports on personality-relevant adjectives and questionnaire

items. Here trait is considered as a temporally stable, cross-situational individual difference identifying characteristic.

‘The Big Five’ is the commonly used term for the model of personality which describes the five fundamental factors of our personality. The Big Five ‘super traits’ have been researched and validated by many different psychologists (WT Norman 1963, McCrae & Costa 1987, Brand & Egan 1989, LR Goldman 1990 and P Sinclair 1992) and are at the core of many other personality questionnaires. The Big Five Factors have been replicated in studies across the world and give us a confident summary of our mental building blocks, according to trait theory. Suffice it to say, validation studies were published and presented to the British Psychology Society by the end of the 1990’s, and the Big Five was established as a significant and fundamental personality testing model. This useful model was eventually developed through investigations into R.B. Cattell’s 16 Personality Factor Model of personality and is based on the fundamental principles and goals of such model. Thus, Cattell paved the way for the development of the five-factor model of personality.

Psychologists and psychometrics practitioners use the term ‘Factor’ to describe each of these five ‘large traits’ or scales. In turn, each of the Big Five Factors contains several behaviours, which are clustered under the five main Factor headings. Each main Factor can be further broken down into ‘sub traits’ or ‘facets’, for example, Extraversion could have sub-traits such as Sociable, Competitive, Energetic and Seeking Recognition. The Big Five according to McCrae & Costa (1987) is typically shown as :

- Neuroticism (vs Emotional Stability), where Neuroticism contrasts emotional stability and even-temperedness with negative emotionality, such as feeling anxious, nervous, sad, and tense.
- Extraversion (vs Introversion), where Extraversion implies an energetic approach to the social and material world and includes traits such as sociability, activity, assertiveness, and positive emotionality.
- Openness to experience (vs Closeness to experiences), where Openness to experience describes the breadth, depth, originality, and complexity of an individual’s mental and experiential life.
- Agreeableness (vs Disagreeableness), where Agreeableness contrasts a pro social and communal orientation toward others with antagonism and includes traits such as altruism, tender-mindedness, trust, and modesty.

- Conscientiousness (vs Lack of conscientiousness), where Conscientiousness describes socially prescribed impulse control that facilitates task and goal-directed behaviour, such as thinking before acting, delaying gratification, following norms and rules, and planning, organizing, and prioritizing task.

On the basis of several experimental findings, the following important characteristics of the five factors can be stated:

- These factors are dimensions, not types, so people vary continuously on them, with most people falling in between the extremes.
- The factors are stable over a 45-year period beginning in young adulthood.
- The factors and their specific facets are heritable (i.e., genetic), at least in part
- The factors probably had adaptive value in a prehistoric environment
- The factors are considered universal, having been recovered in languages as diverse as German and Chinese (McCrae & Costa, 1997).
- Knowing one's placement on the factors is useful for insight and improvement through therapy (Costa & McCrae, 1992).

Four of the big five are widely agreed, but there had been debate about Openness, with alternatives including Culture, Intellect, Imagination, and Openness to experience. And finally, 'openness to experience' has been accepted.

The Big Five represents taxonomy (classification system) of traits that some personality psychologists suggest. The most attractive feature of the Big Five is not that it is a comprehensive theory of personality, for the Big Five is not a personality theory at all. It is a datum, which any theory of personality must explain. Thus, its empirical atheoretical nature is not a handicap. Rather, by reducing the' plethora of psychological constructs to a manageable five it allows a personality theory the possibility of parsimoniously explaining of the facts of individual differences.

Recent criticisms of the five-factor model have looked at the possible inclusion of other universal personality factors to make it more comprehensive. Evidence for a sixth factor like 'Honesty' or 'Humility' is strong, and there is some evidence for a seven-factor in the name of 'Personal Attractiveness'. The numerous inclusions - exclusions marked by recent researches suggest that the foundations of the five-factor model should be reevaluated.

Question :

Let Us Check Our Progress

We have gone through a number of concepts, with very short orientations, in order to understand the theory of Big Five Factors. Thus, it will be better to recapitulate the concepts through self-questioning–

1. What do you mean by the ‘Big Five’?
2. Is it a factor-analytic or psycho-analytic theory?
3. Who are the propagators of this model?
4. Why do we need such model?

EDUCATIONAL IMPLICATIONS OF PERSONALITY THEORIES

You may quite innocently ask “why should we study ‘personality’ from the arena of Educational Psychology”? And the answer is so straight forward that convince you at least roughly. Point is that we “have” to study ‘personality’ in order to understand ourselves better and to make better impact on children’s personality development as a teacher, parent or significant adult in the society. It is said that the problem parents create problem child, and at the same time it is true that problem teacher cannot substantially contribute to developing personality of the child learner, and that problem behaviour is an all-time disturbance within and to others. Hence, for the sake of ourselves and for the other fellow beings in the society we have to be healthy in all respects. Thus, the significance of the study of personality in the field of education is realized.

This knowledge helps to develop self-awareness and also to understand others to a greater extent. Developing understanding of personality typology, personality traits, humanistic personality and ego psychology theories is also a very useful way to improve your knowledge of motivation and behaviour of self and others in the field of education, work place and beyond.

There are many different personality models and theories, and each one offers a different perspective. The more theories you understand, the better your appreciation of personality and behaviour. Personality theories are immensely helpful in helping yourself and others to develop personal potential, effectiveness and fulfillment, at work and in life as a whole.

Understanding personality types is helpful for appreciating that while people are different, everyone has a value, and special strengths and qualities, and that everyone should be treated with care and respect.

Knowing about people's preferred personality styles and strengths enables us to provide people with assistance, opportunities, direction and responsibilities that fit well with their needs and motivations.

Knowing about our own preferred personality styles and strengths enables us to decide how and when to adapt, so as to match our behavioural style and communications to best meet the needs of others, and also to seem or clearly our own true potential, and for some, our own destiny.

Side by side, from some particular theories, e.g., Jung, Rogers, Erikson, we get to know the teacher's role in the development of students' personality. Jungian archetypes relate to modern work on 'learning preparedness' which suggests that there may be a built-in tendency to learn some associations more readily than others, e.g. it is easier to learn fear of snakes (one archetype) than of say cars which our ancestors never encountered. Moreover, Jung's 'psychological types' structure continues to provide the basis of many of the leading psychometrics systems and instruments in use today.

Erikson cautioned the society about the role of careful teachers and accepting peers in the development of competence and industrious personality. Children must learn that there is pleasure not only in conceiving a plan, but in carrying it out. They must learn the feeling of success, whether it is in school or on the playground, academic or social. If the child is allowed too little success, because of harsh teachers or rejecting peers, for example, then he or she will develop instead a sense of inferiority or incompetence.

It is Rogers who flourished the field of education by his humanistic thoughts. He proposed for a teacher as 'facilitator' who will generate an interpersonal relationship in the facilitation of learning. 'Freedom to Learn' is a classic statement of educational possibility in this respect.

These theories provide the basis of psychometric systems and instruments. Consequently, this knowledge helps us developing new psychometric tests for the purpose of assessing culture impact on personality.

Personality theory and tests are useful also for management, recruitment, selection, training and teaching.

Block-4

Unit-2

Measurement of personality

4.2 : CONCEPT OF PERSONALITY MEASUREMENT

4.2.1 : MEASUREMENT OF PERSONALITY

All scientific theories require measurement of the constructs underlying the field. Personality theories are no different. Whether we are developing theories of species typical behavior, of individual differences in behavior, or unique patterns of thoughts and feelings, we need to be able to measure the responses in question. The fields of psychometrics and personality assessment are devoted to the study of the measurement of psychological constructs associated with personality. Psychometrics is the term used for the development and administration of psychological tests.

There are several ways of measuring personality. Accordingly, there are a number of different types of tests.

A method 'Of personality assessment based on a questionnaire asking a person to report feelings or reactions in certain situations is called 'personality inventory'. Personality inventories, also called objective tests, are standardized (containing reliability and validity) and can be administered to a number of people at the same time. A psychologist need not be present when the test is given, and the answers can usually be scored by a computer or a predetermined objective method. Scores are obtained by comparison with norms for each category on the test. These are "multiple choice" tests in which a person answers true/false, agree/disagree, or chooses from several possible answers to a question. They are "objective" mainly in terms of their scoring. They are self-report questionnaires which mean that a personality profile is drawn up from the very person's responses to a number of questions or statements.

Although the term "personality" is sometimes employed in a broader and varied, sense, in conventional psychometric terminology "personality tests" are instruments for the measurement of emotional, motivational, interpersonal, and attitudinal characteristics, as distinguished from abilities.

A personality inventory may measure one factor, such as anxiety level, or it may measure a number of different personality traits at the same time, such as the Sixteen Personality Factor Questionnaire (16 PF). The personality inventory used most often for diagnosing psychological disorders is the Minnesota Multi-phasic Personality Inventory, generally referred to as the MMPI. Another worthy mentioned inventory is Eysenck's Personality Questionnaire (EPQ).

Personality tests and inventories evaluate the thoughts, emotions, attitudes, and behavioral traits that comprise personality. The results of these tests can help determine a person's personality strengths and weaknesses, and may identify certain disturbances in personality, or psychopathology. These tests claim to be able to measure and describe personality. Most personality tests focus on determining whether a person ranks high or low on particular traits.

Another unique method of measuring personality is 'Projective techniques'. These are tests in which people create their own answers in response to ambiguous and unstructured stimuli (e.g., inkblots, pictures, incomplete sentences, etc.) Projective tests are named after Freud's defense mechanism of projection, in which people attribute (project) their own threatening unconscious thoughts and impulses onto something else. In projective testing, it is assumed that people project their unconscious conflicts and issues into the answers they provide. Expertises, especially psychoanalytic orientations, are required for scoring and interpretation of the data.

The best known projective test is the Rorschach test, created in the 1920s by Swiss psychologist Hermann Rorschach (1884-1922). It consists of a series of 10 cards, each containing a complicated inkblot. Some are in black and white, some in color. Subjects are asked to describe what they see in each card. Test scores are made systematically based on several parameters. Another widely used projective test is the Thematic Apperception Test (TAT) introduced at Harvard University in 1935 by Henry Murray. Test takers look at a series of up to 20 pictures of people in a variety of recognizable settings and construct a story about what is happening in each one. They are asked to describe not only what is happening at the moment shown in the picture but also what events led up to the present situation and what the characters are thinking and feeling. For the interpretation of results, psychoanalytic orientation is required. However, scoring methods have also been developed that focus on specific aspects of the subjects' responses, including aggression, expression of needs, and perceptions of reality. Another renowned type is word association tests, where the respondent reacts to words with other words; the respondent may also show signs of anxiety, and some kind of apparatus is often used to measure emotional state. Still other types of projective tests have been developed, including some that asks the subject to create drawings or complete a story or complete sentences.

Compared to the more objective questionnaire-type personality assessments, projective tests are difficult to score, and questions are often raised about their degree of reliability and validity. These tests also require more time and skill to administer than more objective testing methods. However, they continue to be employed because of their usefulness in helping psychologists obtain a comprehensive picture of an individual's personality.

Personality tests do not place you on dimensions that run from “good” to “bad” but make you more aware of yourself.

Personality tests are administered for a wide variety of reasons, from diagnosing psychopathology (e.g., personality disorder, depressive disorder) to screening job candidates. They may be used in an educational setting to determine personality strengths and weaknesses.

All tests - whether robust or otherwise, whether objective or projective - provide a reflection of personality of some sort, the use of which usually provokes thought, prompts discussion and possibly also invites a little self-discovery. Tests cause us to think about ourselves from a different perspective, which in itself is a beneficial exercise.

Question :

Let Us Check Our Progress

We have gone through a number of concepts, with very short orientations in order to understand the measurement of personality. Thus, it will be better to recapitulate the concepts through self-questioning.

1. How can personality be measured?
2. What is called ‘personality inventory’?
3. What do you mean by ‘projective tests’?
4. Name two PI and two PT.

4.2.2 : LET US SUM UP

“Personality” is a broad term that refers to a person's characteristic behaviors, actions, emotions, and thoughts. It is the distinctive way one approaches the world, as manifested in the typical actions, feelings, and cognitions that distinguish one person from another.

Psychologists, till date, do not hit upon anyone single definition of personality which is all comprehensive, and we find a number of theories of personality - each one is satisfactory from its

point of view. However, approaches to personality are not sanguine about the stability and change of personality. At the same time, there is still controversy regarding the impact of “nature” and “nurture” in the development of personality.

Cattell's 16 Personality Factor Model aims to construct a common taxonomy of traits using a lexical approach to narrow natural language to standard applicable personality adjectives. Through factor analysis, Cattell identified what he referred to as surface and source traits. The identified source traits became the primary basis for the 16 PF Model.

Eysenck in his bio-psychological model conceived of personality in terms of three continuums : extraversion versus introversion; neuroticism versus emotional stability; and psychoticism versus impulse control. Eysenck argued that extraverts and introverts differed in the basal levels of cortical arousal; whereas extraverts are oriented towards the outside world, introverts experience sufficient cortical self-stimulation. Individuals scoring high on the neuroticism continuum are more anxious, depressed, tensed, irrational, and moody, and demonstrate greater activity in the cerebral regions responsible for the control of the sympathetic nervous system. Individuals scoring high on the psychoticism scale demonstrate aggressive, antisocial, and egocentric traits.

Jung in his analytical psychology brought forth concepts like ‘collective unconscious’, extraversion and introversion, the eight psychological types, archetypes, persona, the shadow, as well as the anima and the animus. We have concentrated on his sixteen psychological types which have been emerged from the permutations and combinations of two different basic attitudes like introversion and extraversion with four unconscious functional constructs like thinking, feeling, sensation and intuition.

Erikson, a neo Freudian ego psychologist, developed his stage theory of psychosocial ego development on the basis of epigenetic principles. He believed that human species goes through eight psychosocial stages of life as we grow older and these stages are predetermined by genetics. However, the nature of the crisis is depending on social environment. He felt that development occurs across the lifespan rather than just during childhood. Each stage is characterised by two different ways to resolve the crisis : one maladaptive and one adaptive. After each stage the conflicts within the person resolves and increases the capacity to do well. If it is resolved in a healthy way it will generate a ‘virtue’.

Rogers believed that every person was driven by the innate tendency towards self-actualization, or what Rogers called a fully-functioning person, so as to develop physical and psychological abilities and potentials. Important proponents to Rogers' theory include : unconditional positive regard, positive self-regard, conditions of worth, and conditional positive-regard.

In the 1980s and 1990s, a trait model emerged that many consider definitive : the five-factor, or Big Five, model. Via the application of factor analysis (a statistical technique) to large pools of trait questionnaire items or descriptive adjectives, many psychologists concluded that the universe of personality traits can be subsumed under five broad dimensions. ‘The Big Five’ describes the five fundamental factors of our personality. These five factors are commonly alternatively represented by the OCEAN acronym as-Openness to experience, Conscientiousness, Extraversion-Introversion, Agreeableness, Neuroticism.

We also discussed the utility of studying ‘personality’ in general and in the field of education in particular. Generating self awareness and understanding others for the sake of healthy intra-and inter-relations respectively are the outstanding implications of the theories. Besides, to some extent, they also help educators in providing their services to the society.

Lastly, a brief orientation has been presented on the measurement of personality. Regardless of which approach to personality is adopted, the most widely used method of measurement is self-report. Most self-report personality instruments typically use questions or items, and they are generally termed as ‘inventories’. The best known objective tests are MMPI, 16PF, EPQ and the like. Another type of personality test is the projective personality assessment. Here, a series of ambiguous and unstructured stimuli, usually through pictures or inkblots, are presented in order to extract emotions, feelings, conflicts and complexes of the person under testing. The best known projective tests are Rorschach’s Inkblot and TAT.

In epilogue, we must remember that there are very many other personality models, psychometrics tests and concepts aside from those featured here. No perspective is ever completely accurate and reliable. The more perspectives we have, the more clearly we see and understand ourselves and others.

4.2.3 : SUGGESTED READINGS

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4.2.4 : ASSIGNMENTS

1. What do you mean by 'personality'?
2. Explain the nature of personality.
3. Present in detail the Sixteen Personality Factor model.
4. What is the nature of Eysenck's model? Explain its three dimensions.
5. Who is C.G. Jung? What are the basic concepts of his Analytical Psychology?
6. Present in detail the Jungian 'psychological types'.
7. How could you explain Eriksonian perspective of personality?
8. Name and explain the eight psychosocial stages.
9. What is the basic concept of Rogers regarding personality?
10. Present in detail the Self theory of Carl Rogers.
11. Explain the Big Five Factors model. What is its merit point?
12. How does the OCEAN arrive?
13. Why do we study 'personality' in the arena of education?
14. Give your acquaintances with the nature of different types of tests for assessing personality.

EDC-06
EDUCATIONAL PSYCHOLOGY-2
Block-5
Individual Differences and Education

CONTENT STRUCTURE

5.1 : Concept of individual differences

5.1.1 : Types of individual differences

5.1.2 : Role of heredity, environment and culture

5.1.3 : Implications of ID for organizing educational programmes

INTRODUCTION

The science of psychology studies people at three levels of focus captured by the well known quote : “Every man is in certain respects (a) like all other men, (b) like some other men, (c) like no other man” (Murray, H.A. & Kluckhohn, C, 1953). Individual differences psychology focuses on this second level of study. It is also sometimes called Differential Psychology because researchers in this area study the ways in which individual people differ in their behaviour.

Thus, “Individual Differences” is the research area of Psychology, not of Education. But, as you all know, Educational Psychology as an applied science and one foundation stone of education, adopts this concept and its associated research findings in order to make its own field effective and progressive. We, the learners of Education, will try to understand the concept and nature of “individual differences” and the contributing factors behind them especially from the point of view of Education, and with a sole objective to work out this knowledge in practice in our native field. To organize successful educational programmes and to conduct an effective teaching-learning process, the knowledge and understanding of “individual differences” is essential.

Differential psychology is a branch of psychology that deals with individual and group differences in behaviour. Charles Darwin’s studies of the survival capabilities of different species and Sir Francis Galton’s researches on individual visual and auditory skills, as well as more recent experiments, have shown that both individual and group differences are quantitative rather than qualitative.

OBJECTIVES

After going through this unit you will be able

- To understand the concept and types of individual differences
- To understand the different contributory factors behind individual differences
- To comprehend the importance of these individual differences, especially in the field of education
- To organize some educational programmes utilizing individual differences among learners.

Block-5

Unit-1

Individual Differences and Education

5.1 : CONCEPT OF INDIVIDUAL DIFFERENCES

Plato stated more than 2000 years ago: “No two persons are born exactly alike; but each differs from the other in natural endowments, one being suited for one occupation and the other for another.” Individual difference psychology examines how people are similar and how they differ in their thinking, feeling and behaviour. No two people are alike, yet no two people are unlike. So, in the study of individual differences we strive to understand ways in which people are psychologically similar and particularly what psychological characteristics vary between people. In psychological approach to individual differences, it is generally assumed that :

- people vary on a range of psychological attributes
- it is possible to measure and study these individual differences
- individual differences are useful for explaining and predicting behaviour and performance.

An interesting nature of individual differences psychology is that while individual differences are often conceived of, at least popularly, in terms of categories (“gifted,” “slow learner”), they are actually measurable on a continuum which, for most traits, follows the normal probability or “bell” curve first derived from the study of heights of soldiers. The majority of subjects cluster near the center with a gradual decrease toward the extremes.

The concept of individual differences is both interesting and challenging to not only teachers whose job is to help every student learn as much as possible despite all the ways in which students differ from one another, but to each and everyone who is somehow associated in the field of education. Richard Snow (1986) who has written extensively about individual differences in education and how to deal with them, has summarized the problem as follows: “Individual differences among students present a pervasive and profound problem to educators. At the outset of instruction in any topic, students of any age and in any culture will differ from one another in various intellectual and psychomotor abilities and skills, in both general and specialized prior knowledge, in interests and motives, and in personal styles of thought and work during learning. These differences, in turn, appear directly related to differences in the students’ learning progress”.

The significance of these observations on variability is that while it usually will be essential to plan lessons, assignments, and teaching techniques by taking into account ‘typical’ characteristics, it will also be necessary to expect and make allowances for differences between pupils.

Modern psychology has formalized the study of individual differences over the last 100 years starting with ‘phrenology’ and ending in ‘differential psychology’ through Darwinian concepts. Individual differences psychology is still a young science and a relatively recent development in modern psychology. There are still many debates and issues. Current knowledge will change and evolve. So, have an open-minded, but critical perspective as we go a long.

“Individual differences” is a corner stone subject area in modern psychology. In many ways, it is the “classic” psychology that the general public refers to—it refers the psychology of the person—the psychological differences between people and their similarities. We can classify people psychologically, according to their intelligence and personality characteristics, for example, with moderate success, however people are complex and much is still left unexplained. There are multiple and often conflicting theories and evidence about individual difference psychology.

Question :

Let Us Check Our Progress

We’ve tried to understand the nature of ‘Differential Psychology’ and the concept of ‘individual differences’. Let us review the topic by self questioning –

- (1) What do you mean by ‘individual differences’?
- (2) What is Differential Psychology?
- (3) Tick out the correct answer :
 - (a) Differential Psychology deals with the concept like all are same, all are different, all are same with differences
 - (b) Psychology of individual differences was introduced by Charles Darwin Francis Galton Charles Spearman
 - (c) Individual differences are : quantitative qualitative both
- (4) What are the significances of studying individual differences?

5.1.1 : TYPES OF INDIVIDUAL DIFFERENCES

When ‘variability’ is concerned, it is often considered in two broad categories—the first, **intraindividual variation** which means differences in a person’s behaviour over time and across

situations, and the second, **interindividual variation** which means differences between individuals at a given point in time. The former is related with the process of growth and development, and naturally with the development of individual personality. But the latter is in true sense associated with the concept of individual differences. So we are interested with the latter one. Keep in mind that some ways in which students differ from each other are more important than others. The ones we, the people of Education, want to pay special attention to are those that relate strongly to classroom achievement. Educational psychologists have suggested them in alphabetical order which is as follows :

Age	learning strategies	prior knowledge
Attention span	learning style	problem solving
Attitudes	memory capacity	self-concept
Cognitive style	mental health	social class
Emotionality	motivation	social competence
Ethnicity	perceptual skill	stage of cognitive-
Gender	personality	-development
Intelligence	physical growth	values
Interest	& development	

Most of the research on interindividual variation revolves around **scholastic aptitude (another term for intelligence) and achievement**, because large numbers of standardized tests have been constructed to measure these variables. These tests make it possible to identify both the range of variability among a group of students and the strengths and weaknesses of each student. Ideally school can use this information to select and place children in instructional programmes that match their characteristics or to adjust programmes to better meet individual needs.

There are individual differences on the basis of ‘ages and stages’. Developmental milestones give a general idea about what to expect from children of different ages. However, there will always be differences between individual children. Some children begin to walk at 10 months, some at 15 months. Some toddle along quickly and smoothly, getting the “hang of it” right away. Others fall down a lot, hesitate, or even give up for a few days. Some children talk before they are 2, others talk very little before they are 3 or so. Some will always be quiet people. Some abilities become clear in one child, but may never be very strong in another. In this way, individual differences have been recognized in the following areas:

- Sense of security : Some children need more consistency, more reassurance, and more confidence and trust-building than others. Insecurity sometimes can cause a child to withdraw or behave aggressively.

- Activity level: Some children need more active play than others. They need the opportunity to move around, jump, run, and bounce many times throughout the day. Other children need more quiet time or more rest.
- Response to stimulation: Children are inherently different in their tolerance to noise, activity, visual stimulation, or changes in the environment. An environment that is sensitive to this need in children will provide interesting activities as well as a quiet place to get away from the action.
- Thinking style: Some children think quietly through possible solutions to a problem; others push in and try the first idea that occurs to them. Some children are interested in experimenting to find out how objects work; others choose to ask friends or adults for help.

It should be borne in mind that developmental guidelines should be used as a general rule of thumb. In work with children, earlier or faster development should not be confused with better development. Development or the lack of it that falls outside the normal range may indicate a problem that requires attention.

Some differences in **metacognitive abilities** are the result of development. As children grow older they are more able to exercise executive control over strategies. But, not all differences in metacognitive abilities have to do with age or maturation. There is great variability even among students of the same developmental level, but these differences do not appear to be related to intellectual abilities.

There are both developmental and individual differences in **working memory**. Young children have very limited working memories, but their memory span improves with age. As children grow older, they develop more effective strategies for remembering information. Besides, there are individual variations in working memory and these differences have implications for learning. Some people seem to have more efficient working memories than others, and these differences may be associated with giftedness in math and verbal areas. On the other hand, the major individual differences that affects **long-term memory** is knowledge. Another factor related to developing domain knowledge and remembering it is **interest**, and there remain a lot of individual differences.

From the perspective of education it is important to note that there are large differences in the way individual learners respond to the demands of education. A long tradition in educational research has been to attempt pin down the **learning style or cognitive style**-the unique way of thinking and reasoning that characterises an individual learner-as a stable cognitive or personality attribute. At the same time, there are differences in **learning preferences** among learners. These are individual preferences for particular learning modes and environments. Even though cognitive style, learning styles and learning preferences are not related to intelligence or effort, they may affect school performance.

Another important variable which has great effects on individual differences is **culture**, more specifically, the cultural diversity. With a broad conception of culture as a basis, every student's identity is revealed through his/her social class, ethnicity, and gender. India has a tradition of "unity in diversity", and from the perspective of "culture", it signifies sensitivity as well as tolerance towards our enriched variety of cultures.

However, historically teachers are very much acquainted with the individual differences among learners on the basis of **mental ability**, and concerned with two broad and common strategies like ability grouping and special class placement in order to deal with pupil variability.

Pupils are different, and it is good practice to recognize and accommodate individual differences in the teaching–learning process. It is also good practice to present information in a variety of ways through more than one modality, but it is not wise to categorize learners on the basis of tests, and prescribe methods on the basis of their preferences. Remember that many tests have questionable technical qualities and that students, especially younger ones, may not be the best judges of how they should learn.

Question :

Let Us Check Our Progress

We've tried to understand the various types of 'individual differences'. Let us review the topic by self questioning–

1. What are the two broad categories of individual differences?
2. Recall at your best the types of individual differences.
3. Which differences are associated with the development?
4. Which differences are the educators'/teachers' important concerns?

5.1.2 : ROLE OF HEREDITY, ENVIRONMENT AND CULTURE

Role of heredity

Heredity is defined as the process by which the genetic code of parents is passed on to their children. There are certain traits that parents pass on to their children, including eye color, hair color, height, and other physical characteristics. The coding for these traits is contained inside DNA molecules that are present within all human cells. Since the discovery of DNA by James Watson in the 1950s, the science of genetics has focused on the study of DNA and the ways in which physical traits are

passed on from generation to generation. Within genetics, a special branch of DNA science - called quantitative, or biometrical, genetics - has emerged, which studies the heritability of such traits as intelligence, behavior, and personality.

In studying personality traits and intelligence, the latest research in quantitative genetics suggests that the heritability rate for many characteristics hovers around 50 percent. Other recent studies have compiled lists of traits most influenced by heredity. Physical characteristics that are most genetically determined include height, weight, tone of voice, tooth decay, athletic ability, and age of death, among others. Intellectual capabilities include memory, IQ scores, age of language acquisition, reading disabilities, and mental retardation. Emotional characteristics found to be most influenced by heredity are shyness, extraversion, neuroses, schizophrenia, anxiety, and alcohol dependence. It is important to note that these are tendencies and not absolutes. Many children of alcoholics, for instance, do not become alcoholics themselves. Many social and cultural factors intervene as humans develop, and the child of an alcoholic, who may be genetically vulnerable to acquiring the disease, may avoid drinking from witnessing the devastation caused by the disease.

Recent work has shown that genes can both be influenced by the environment and can even influence the environments in which we find ourselves. It is found that complex environments actually “turn on” sets of genes that control other genes, whose job is to build new cerebral structures. Therefore, living in an environment that provides challenges can genetically alter a person’s makeup. Additionally, a genetic predisposition to introversion can cause people to isolate themselves, thus changing their environment and, in the process, altering their development of social skills. This, then, contributes further to their genetic predisposition to introversion.

There also appears to be universal, inherited behavior patterns in humans. Common behaviors across diverse cultures include the patterns of protest among infants and small children at being separated from their mothers. Studies have found universal facial expressions for common emotions, even among pre-literate hunter-gatherer cultures that have had no exposure to media. It used to be thought that the human smile was learned through observation and imitation, but recently it is found that children who had been blind from birth began smiling at the same age as sighted children. Many of these behaviors are thought to be instinctual. Aside from the infant/developmental behaviors already mentioned, other inherited behavior patterns in humans include sex, aggression, fear, and curiosity/exploration. From the above discussion, it is clear that heredity does influence to some extent individuality causing individual differences but at the same time scientists are not sure till date how far it is. If genetics didn’t play a part, then fraternal twins, reared under the same conditions, would be alike, regardless of differences in their genes. But, while studies show they do more closely resemble each other than do non-twin brothers and sisters, they also show these same striking similarities when reared a part-as in similar studies done with identical twins.

The concept of heritability plays a central role in the psychology of individual differences. Heritability is defined as the extent to which genetic individual differences contribute to individual differences in observed behavior, i.e. phenotypic individual differences. The principal raw materials of individual personality- physique, intelligence, and temperament - are the result of heredity, which are genetically determined through structural inheritance. These raw materials, however, need to be patterned through environmental influences.

Environment is defined as the combination of physical, social, and cultural conditions that influence an individual's development and behavior. It is considered as an important determinant of individual differences. It is agreed that such human characteristics as sex, height, skin and hair color, and, to a certain extent, temperament, are genetically determined at conception. However, there is disagreement over the extent to which other aspects of human development—including behavior, personality, and intelligence—are influenced by such environmental factors as nutrition, emotional climate of the home, and quality of stimulation and parental feedback. In addition to the immediate family, many experts consider the social class and culture in which a child is raised as important environmental factors in determining his or her development.

While not discounting that genetic tendency may exist, supporters of the environment theory believe that our behavioral aspects originate only from the environmental factors of our upbringing. Studies on infant and child temperament have revealed the most crucial evidence for nurture theories. Orthodox environmentalists in psychology and strong proponents of environmental learning like Watson, Skinner and their followers believed that human behaviour could be conditioned and development depends on environment. New studies suggest that sense of humor is a learned trait, influenced by family and cultural environment, and not genetically determined. Environmentalists argue that if environment didn't play a part in determining an individual's traits and behaviors, then identical twins should, theoretically, be exactly the same in all respects, even if reared apart. But a number of studies show that they are never exactly alike, even though they are remarkably similar in most respects.

There is evidence that conditions in the prenatal environment have a profound influence on the rudiments of personality—the capacities of adjustment—in the form of hereditary potentials. How hereditary potentials develop before and after birth is determined largely by the environment. Unfavourable conditions in the post natal environment can likewise have a lasting and damaging influence on the individual if they occur at critical times in the developmental pattern. Another way in which the environment influences the individuals is by providing model to imitate.

Social learning theorists refer to another layer of complexity in the relationship between environment and human behavior : the self-generated environment. This concept refers to the fact

that a certain behavior or behaviors may produce environmental conditions that can affect future behavior. People who behave in a harsh manner, for example, help create a hostile social environment, which in turn leads to further hostility on their part. Similarly, the behavior of friendly persons will tend to generate a supportive environment that reinforces and perpetuates their original behavior. Thus, a group of persons who find themselves in the same “potential environment” may experience different “actual environments” as are sult of their contrasting behaviors.

Environment means what surrounds the organism and affects it from without, i.e. group of factors potentially capable of influencing an organism. It starts within as ‘prenatal’ and extends to post natalas ‘psychosocial’. Environmentability has an analogous interpretation to heritability. It is the proportion of phenotypic variance attributable to environmental variance or the extent to which individual differences in the environment contribute to individual differences in behavior.

Role of culture

Culture, as defined in Kroeber and Kluckhohn’s classic, *Culture: A Critical Review of Concepts and Definitions*, is the “patterned ways of thinking, feeling, and reacting, acquired and transmitted mainly by symbols, constituting the distinctive achievements of human groups, including their embodiments in artifacts; the essential core of culture consists of traditional (i.e., historically derived and selected) ideas and especially their attached values” (1952). In international management research, Hofstede defined culture as “...the collective programming of the mind which distinguishes the members of one group or category of people from those of another” (1991). Many other definitions of culture are available. Common elements in the definitions are the shared and dynamic nature revolving around norms, values, and beliefs that are expressed in different behaviors, artifacts, and interactions.

Human development starts before birth and ends with death. This development takes place in a given cultural context; it is both affected by culture and affects culture. Culture and human development are constantly interacting. Therefore, a culture-inclusive life-span view of human development should be taken into consideration. This culture-inclusive view is very modern as an approach to individual differences. Wilhelm Wundt, the founder of modern psychology, extensively elaborated on culture’s effect on human behavior. Also, at the beginning of the 20th century, early anthropological research demonstrated relationships between culture, socialization practices, and child development.

Different studies based on eco-cultural model reported that the socio-economic and cultural context gives rise to specific socialization conditions which influence the developmental outcomes of the child and determines differences among children. In contrast to the eco-cultural models, the causal relationships between the context and the person suggest that the child grows up under

“guided participation in cultural activity”. Cultural values and parental beliefs are seen as part of the developmental context which can be changed by activities of the child.

Two more aspects on the relation between culture and development are to be mentioned. First, socio-cultural conditions and changes affect human development. Second, human development affects the socio-cultural context and may contribute to cultural stability and change. Both sides have to be taken into account. To give an example, changes in adolescent and adult development on account of changing gender roles have affected the family system and in the long run affect the demographic structure of the population. This in turn will affect developmental options for the younger and the older generation, and at the same time this will affect socio-economic changes including the rise of newsocial institutions (e.g., care systems for the elderly), changing intergenerational relations, and related changes in individual development. Thus, the study of human development over the life span taking into account the cultural context may contribute to a better understanding of the relations between complex individual behavior and culture.

Cultural differences manifest themselves in different ways and differing levels of depth. People even within the same culture carry several layers of mental programming within themselves. Different layers of culture exist at the following levels:

- The national level : Associated with the nation as a whole.
- The regional level : Associated with ethnic, linguistic, or religious differences that exist within a nation.
- The gender level: Associated with gender differences (female vs. male)
- The generation level : Associated with the differences between grandparents and parents, parents and children.
- **The social class level** : Associated with educational opportunities and differences in occupation.
- **The corporatelevel** : Associated with the particular culture of an organization.

Culture in its broadest sense is cultivated behavior; that is the totality of a person's learned, accumulated experience which is socially transmitted, or more briefly, behavior through social learning. Each culture attempts to mold in its members a basic pattern that conforms to the larger group's values. Thus, common characteristics are found in the majority of people in a cultural group, and in turn, individual differences due to cultural diversity firms its ground.

Interactive role

The relative importance of heredity and environment in shaping human lives—nature versus nurture—has long been a topic of debate taken up by thinkers as diverse as John Locke, Charles

Darwin, and Sigmund Freud, and forms part of current policy debates in areas such as crime and education. Traditionally, this controversy pits those who believe that human nature and intelligence are biologically determined (eugenicists) against those who contend that, given a positive and enriching environment, most individuals have the potential for high levels of human development (euthenists). But, nowadays, this controversy is over. Most researchers are in agreement that heredity and environment both play significant roles in the development of various human traits. Researchers may disagree, however, on the extent to which heredity and environment contribute to the development of a particular dimension, and on how various factors may affect each other to create a certain human characteristic. Neither heritability estimates nor concordance rates provide useful information on the latter type of disagreement : how various hereditary and environmental factors interact with each other to result in a particular characteristic. Mental health, education, and applied psychology researchers are especially concerned about optimizing the developmental outcomes among people from all backgrounds. To this end, knowing that there is a .86 heritability estimate for IQ scores among identical twins, for example, is not particularly helpful in terms of establishing ways of maximizing the life choices and opportunities for individuals. In attaining such goals, it is crucial to understand how various factors relate to each other. Naturally, in order to do so, one must first identify which factors are involved in the development of a given trait. Unfortunately, researchers have had very limited success in identifying specific genetic patterns that influence particular psychological and behavioral characteristics.

Nevertheless, this is not to suggest that one should ignore the role of heredity as reflected in heritability estimates altogether and focus on optimizing the environmental factors for every child. Heredity, as has been examined, undoubtedly contributes to the development of various human traits. Also, researchers exploring environmental influences have found that contrary to what most theorists expected, environmental factors that are shared by reared-together twins do not appear to be relevant in explaining the development of particular traits. It is therefore unlikely that exposing every child to a “one size fits all” environment designed to foster a particular trait would benefit everyone equally. Some may react favorably to such an environment, while others may not react to it at all; there may be yet others who react negatively to the same environment. The notion of “range of reaction” helps us conceptualize the complex relationship between heredity and environment; people with varying genetically influenced predispositions respond differently to environments. There is no “recipe” for creating environments that facilitate the development of particular characteristics in everyone. Heredity via environment, rather than heredity versus environment, therefore, may better characterize this perspective.

It is all the same important to reiterate that individual differences, as opposed to group differences, ingenic predispositions are evident in the development of most emotional, behavioral, and cognitive traits. With this in mind, it is also important to realize that focusing on optimizing environmental influences while ignoring hereditary influences may lead to the neglect of the developmental needs of some individuals, and it may be just as harmful in some cases as focusing exclusively on hereditary influences.

On the basis of the above discussion, it is better to take “radical” attitude towards the contributions of heredity and environment including cultural influences in order to understand individual differences.

Heredity and sociocultural environment - both have important contribution in the development of individual. Heredity is the more potent factor for setting a suitable framework, and environment is the most significant factor for actualizing potentialities. Nature and nurture are inseparable correlatives. The ‘genotype’ or genetic potential can only be expressed by interacting with the environment. Thus, the behaviour actually observed - the ‘phenotype’ - results from the joint action of nature and nurture.

Question :

Let Us Check Our Progress

We’ve tried to understand the nature and role of determining factors of ‘individual differences’. Let us review the topic by self questioning -

1. Define heredity.
2. Make a list of genetically determined traits.
3. Define environment as a determinant of individual differences.
4. Point out the ways through which environment determines differences in individuals.
5. What do you mean by ‘culture’?
6. How does culture promote individual differences?
7. Match the following-

(a) Heredity	(i) is the determining factor in individual differences
(b) Environment	(ii) is the potential factor in individual differences
(c) Culture	(iii) is the significant factor in individual differences
(d) Interactive role	(iv) is the cultivated behaviour in individual differences
8. Show the relations in between nature, nurture, genotype and phenotype.

5.1.3 : IMPLICATIONS OF ID FOR ORGANIZING EDUCATIONAL PROGRAMMES

There are a variety of individual differences that must be of concern to classroom teachers. Some of the most prominent are academic ability (or intelligence), achievement level, gender, learning style, and ethnicity and culture. In general, there are three different approaches for dealing with individual differences among students.

First, you can develop events of instruction that take them into account as part of the instructional process. It is a direct instruction approach to teaching that utilizes research on brain lateralization dominance and learning style to identify specific instructional events that will be attractive to a specific type of student.

The second approach is to provide some sort of grouping, either between classes or within the classroom itself, in order to reduce or accommodate for the variability with respect to student background, achievement, ability or some other characteristic. There are four major approaches to grouping : between-class ability grouping (often referred to as leveling or tracking), within-class ability grouping, cooperative learning, and individualized instruction. When whole classes are formed based on ability, the process is called **‘between-class ability grouping’ or ‘tracking’**. But research does not support this strategy in terms of learning for all students. Students assigned to the top level (perhaps the top 10 to 15%) seem to benefit from this type of grouping, but middle- and lower-ability students do not. Recently, there has been a movement for **untracking** or teaching all students in mixed ability groups, but providing extra help for those who struggle and enrichment for those who learn quickly. This movement has been more successful at the elementary than the secondary level. Another two popular strategies are **nongraded elementary school and the Joplin Plan** wherein students are grouped by ability in particular subjects, regardless of their ages or grades. On the whole, research tends to support **‘within-class ability grouping’** as beneficial to the learning of most students. It seems to be more flexible and, consequently, less stigmatizing. In general, if within-class ability grouping is going to be considered, the teacher may want to have only two groups since it will make the grouping process easier to manage. **Cooperative Learning** is an instructional strategy in which students are placed in heterogeneous groups. It is one of the best researched educational innovations of the last two decades. When implemented properly, it can have dramatic effects on student achievement. While **individualized instruction** is logically the best way to deal with individual differences, in practice it is very difficult to accomplish. One innovation that may change that is computer-assisted instruction (CAI). On the whole, CAI has not yet delivered on its promise to revolutionize teaching and instruction.

Third, you can modify the conditions within which instruction is taking place. This is the approach used in **mastery learning**. In mastery learning, the teaching environment is structured so that students

develop mastery of prerequisite skills before they begin a new lesson. In practice, mastery learning has not demonstrated any superiority over traditional instruction when it is implemented on an individual classroom basis. However, it has been shown to dramatically improve student achievement when it is successfully implemented on a school basis. Therefore, have a look on the salient features of mastery learning.

Mastery Learning Basic Principles :

- Ninety percent of students can learn what is normally taught in schools at an A level if they are given enough time and appropriate instruction
- Enough time means : Time required demonstrating mastery of objectives.
- Appropriate instruction means : Break course into units of instruction.
Identify objectives of units.
Require students to demonstrate mastery of objectives for unit before moving on to other units.
- Grades may be determined by : Actual number of objectives mastered.
Number of units completed.
Proficiency level reached on each unit.
Any combination of above.
- Students can work at own pace if course is so structured, but mastery learning can be accomplished with group instruction.

Advantages :

1. Students have prerequisite skills to move to next unit
2. Requires teachers to do task analysis, thereby becoming better prepared to teach the unit
3. Requires teachers to state objectives before designating activities
4. Can break cycle of failure (especially important for minority and disadvantaged students)

Disadvantages :

1. Not all students will progress at same pace; this requires students who have demonstrated mastery to wait for those who have not or to individualize instruction
2. Must have a variety of materials for reteaching

3. Must have several tests for each unit

4. If only objective tests are used, can lead to memorizing and learning specifics rather than higher levels of learning.

However, mastery learning technique shows its rising popularity in terms of arresting individual differences in classrooms.

For handling differences in learning styles or cognitive styles, it would be convenient as an approach to education to tailor learning environments to which learners would then be matched according to the fundamental way they think. To a certain extent this already happens in the wide choice offered to students in the courses they take. However, it is by no means clear that observed individual differences in a learning situation may be attributed to stable cognitive factors. It seems more likely from the evidence that such differences are grounded in the social environment, expectations and the subject which is being learned. It is also not clear, in the cases when differences do emerge, that they are inherent in the individual and therefore should be aimed at and catered for. The other possibility is that students simply prefer a technique because that happens to be the one with which they are most familiar. In this case, we may want to encourage them to try learning in a new, unfamiliar way in order to gain a greater variety of learning skills. It is not suggested that everyone learns best from exactly the same instruction, and that many of the simplistic characterizations of “learning style” are not well substantiated. It is probably a safer bet to offer all students a variety of techniques for learning, if only to encourage them to gain experience with more than one.

Educators generally believe that in order to stimulate successfully and to guide properly the individual pupil, the classroom situation must be adjusted carefully to his ability to learn. There are several ways in which school work may be adapted to individual differences. Among them, homogeneous grouping, special classes, and the unit assignment have been found to be the core elements in a typically successful programme to provide for individual differences.

Several definite plans have been offered for adjusting the educational programme to the need, potentialities, aptitudes and interests of the individual child. Some of them attempt to keep pupils together in a given class but vary the manner of instruction for pupils of various capacities, and the others involve the definite breaking up of class organization for individual work. Among the better known and more widely used plans are (1) Ability grouping (placing together of pupils with similar mental ability for purposes of instruction), (2) the Morrison unit mastery plan (here the procedure is pre-test, teach, test, and test again to the point of actual mastery), (3) the Winnetka plan (aiming at

mastery learning through ‘individual work’ in one phase and ‘group and creative activity’ in another phase), and (4) the Dalton plan (aiming at job oriented experiences through laboratory-based individual instruction). As you have acquainted with the characteristics of these plans in your undergraduate courses under the heading of ‘instructional techniques’, these have not been dealt with here in detail.

Other supplementary devices which have been utilized to care for individual differences are—(1) supervised study, (2) diagnosis and remedial teaching, (3) workbooks, (4) differentiated assignments, (5) supplementary assignments, (6) opportunity classes, (7) adjustment or helping teachers, (8) differentiated curricula, and (9) guidance and pupil adjustment services. All of these plans and devices are based upon the recognition of individual difference sexisting among pupils.

At the same time, **group instruction** should not be undermined in order to emphasize these plans and devices. Group instruction is an essential feature of school work through which desirable social qualities are developed. Moreover, for the elicitation of individual differences group instruction is necessary.

For the ‘**exceptional children**’ having disabilities and impairments, executing IEP (Individualized Education programme) and providing LRE (Least Restrictive Environment) in regular classrooms are the two essentials in order to cater individual ‘special’ needs of these children.

In order to outfit students with ‘**cultural diversity**’ educators/teachers should have sufficient concept about ‘multicultural education’ and its ‘instructional tactics’.

However, one important point to be remembered is that in formal educational field, curriculum guides instructional methodology and organization of classroom learning experiences. Therefore, sound and scientific curriculum is required in favour of proper implications of Individual Differences for organizing educational programmes.

Two early attempts at dealing with pupil variability were ability grouping and special class placement. Ability grouping sorted normal students into separate classes according to mental ability tests cores, where as special class placement was used to separate normal students from those with mental and physical disabilities. Presently, there are a variety of approaches suggested by the educational researchers in order to nurture in the classroom pupil variability due to educational, physical, mentalas well associo cultural diversity.

5.1.4 : LET US SUM UP

Question :

Let Us Check Our Progress

We've tried to understand the implications of 'individual differences' for organizing educational programmes. Let us review the topic by self questioning –

1. Tick out the correct answer :

In order to work for individual differences in the classroom, teacher must concern with–

Question :

(a) pupils' ability	(b) pupils' physique	(c) pupils' behaviour
(i) parents' interest	(ii) school's interest	(iii) pupils' interest
(I) school administration	(II) school curriculum	(III) school resources
(A) instructional technique	(B) evaluation techniques	(C) none of the two
2. Name different 'grouping' techniques for catering individual differences in classroom.
3. What would you do for 'children with special needs' in regular classroom?
4. What is the principal aim of 'mastery learning'?

Human beings have been aware of individual differences like gender differences, intelligence differences, and personality differences throughout history. Modern psychology has formalized the study of individual differences over the last 100 years with a sole interest to verify that people are complex and that from multiple theories and evidence what the prevailing aspects of psychological differences are. Individual difference psychology examines how people are similar and how they differ in their thinking, feeling and behaviour. We, the people in the field of Education, are interested in 'individual differences' from the standpoint of working out ways and approaches of dealing with such in formal educational set up.

There are a variety of individual differences - psychological, social, cultural and academic point of views. But Educational Psychology concerns with those ones which have strong relations with classroom achievement.

Regarding the determinants of individual differences, it is understood that the 'individuality' pattern is inwardly associated with the maturation of the physical and mental characteristics which constitute the individual's hereditary endowment. It evolves from the potentials within the individual. Its raw materials - physique, intelligence, and temperament - are the result of heredity. How they will develop depends on environmental influences. This environment starts impinging on from the very beginning at prenatal stage and extends its life span impact through sociocultural experiences. In fact, heredity and environment including culture are correlative factors behind human variability.

With respect to educational implications for individual differences, variety of techniques and strategies have been suggested and developed by the educational researchers. Not all are all time best for nurturing individuality. Each one is worthy for some specific situation. Selection of method of teaching and devices of administration adapting different individual needs requires teacher's expertise, and knowledge and understanding of psychology of individual differences.

5.1.5 : SUGGESTED READINGS

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5.1.6 : ASSIGNMENTS

1. Explain the concept to find individual differences.
2. State the nature of individual differences.
3. Make a list of individual differences. Which ones are related to classroom achievement? Which ones are related to developmental stages?
4. Why do individuals differ? Justify the determining factors behind individual differences.
5. Why do teachers/educators need to study the psychology of individual differences?
6. Suggest some measures with which educational programmes at school level can be organized for catering individual differences.
7. What should be done in order to tackle
 - (a) special children and
 - (b) children from different cultures in regular classroom

Block-5

Unit-2

Group dynamics in classroom

CONTENT STRUCTURE

5.2.1 : Concept of Group

5.2.2 : Group Process

5.2.3 : Characteristics of Group

5.2.3.1 : Human Groups

5.2.3.2 : Classroom Groups

5.2.4 : Group dynamics and Classroom interaction

5.2.4.1 : Group Dynamics

5.2.4.2 : Classroom Interactions

5.2.4.3 : Group relationship and group structures in the class

5.2.4.4 : Leadership in the Classroom

5.2.5 : Sociometric Grouping

5.2.5.1 : Sociometry

5.2.5.2 : Sociogram

5.2.5.3 : Learning Groups

5.2.6 : Socio-emotional Climate of Classroom

5.2.7 : Teachers characteristics Influencing it

5.2.7.1 : Isolates and function of the teacher

INTRODUCTION

Group is essential for each creature in this vast universe. But for human beings group formation has some special significance. A child is born in a house. Every body loves him and gets VIP treatment in the family. It is a great source of joy to the parents, the family members and relatives. The child gradually grows up in the protection of the family and the society and starts going school. The school functions like a miniature society where the classes are the subsystems of the school. It functions like a social group.

This unit will discuss the group process, group characteristics, classroom interaction process, Sociometric grouping, socio-emotional climate in the classroom and the role of the teachers in developing the group formation and the developing socio-emotional climate of the classroom.

OBJECTIVES

After going through the Unit, you will be able to :

- Define the concept of group;
- Identify different types of groups;
- Explain the group process;
- Ascertain the characteristics of Human Groups and Classroom Groups;
- Analyse the nature and functions of classroom groups;
- Define Group Dynamics;
- Explain the importance of Group Dynamics in classroom;
- Interpret classroom interaction in groups;
- Discuss Sociometric Groupings and its importance in the classroom;
- Identify the basic factors for developing healthy social relations and positive Socio-emotional Climate in the classroom;
- Suggest Teacher's characteristics in Influencing socio-emotional climate in the Classroom;

5.2.1 : CONCEPT OF GROUP

Mere assemblage of more than one individual may form a group; but it is not always true. For example, assemblage of people in a street corner may or may not be a group. We generally believe when individuals come together and make interactions, they form a group. But this connotation is very loose.

According to social scientists three essential factors for group formation are :

- (i) There should be interactions and communications among the individuals,
- (ii) There should be a sense of belongingness and feeling of self awareness resulting from sharing of common ideas, beliefs, attitudes and acceptance of common norms.
- (iii) There should be a common goal among the individuals.

In a group, there must be some identifiable set of individuals, who socially interact with one another, maintains some rules, regulations and norms, and have some psychological relationships.

Thus, persons meeting in a railway station or waiting at a bus stop for the bus do not form a group. They are called an aggregate.

It is not always necessary that the group will form only when the individuals will sit together for group formation. In the days of highly developed tools of communications, groups may also be formed without having close proximity for a long time. *Thus, reciprocity and communication between individuals, a sense of belongingness and share of feeling when added to commonality of purpose usually result in the formation of group.*

If we observe a child, while playing with his toys, from close proximity we would find that he is very possessive. He possesses even his mother exclusively. If the mother loves any other child then the child would stop play, cry and make uproar. Even for a newborn second baby the same thing may happen. But mother is always tolerant and this is not seen in other creatures.

Group formation of the child starts from childhood. At the earlier stage he forms his inner group with his family members, through he like solitary play. Gradually he realizes that play with others is more joyful and fun than solitary play. At this point 'I' or 'Me' is replaced by 'We', 'Ours'. This expansion of self is known as '*rudimentary socialisation*'. At any moment this might break but this is only temporary.

Essential factors for group formation :

- (i) interactions and communications among the individuals,***
- (ii) sense of belongingness and feeling of self awareness,***
- (iii) common goal among the individuals.***

Hypothetically if we take an aerial view of our society from above, we will see clusters of people moving here and there. For example, we shall see groups of students are going to school, groups of people are going to their work place, groups of people through the market place etc. We express these groupings in different ways, eg., unity in diversity, cohesiveness, affiliation, membership, companionship, fellowship, etc.

We have understood the formation of group. Now we try to define group.

What is a Group?

After considering the preliminaries about the formation of groups we shall now discuss some standard definitions of Group. In psychological sense a group consists of members who think alike, feel alike and act towards a common goal or purpose. The members of the group are controlled by a common culture, rules and common code of conduct.

According to Maclver and Page (1937) “By a group we mean any collection of social beings who enter in to distinctive social relationships with one another. A group then, as we understand it, involves reciprocity between its members.”

A group consists of two or more interacting persons who share common goals, have a stable relationship, are somehow independent, and perceive that they are in fact part of a group.

In this definition the key factor is the reciprocity. When a group is formed, there must be mutual understanding and inter change of views and ideas. In other words there will be a nexplicit psychological relationship to one another.

Sherif and Sherif (1969) defines group as “a social unit consisting of a number of individuals who stand in role and status relationship to one another, stabilised in some degree at the time and who possesses a set of values or norms of their own regulating their behaviour, at least in matters of consequence to the group”.

Paulus (1989) a social psychologist, observed that *a group consists of two or more interacting persons who share goals, have a stable relationship, are somehow independent, and perceive that they are in fact part of a group.*

Types of groups

Before going to elaborate about types of groups, let us discuss the difference between crowd and group.

Crowd

In psychology mere collection or aggregate of people does not form a psychological group. For example, in a bezaar or in cinema halls we find a number of people moving here and there according to their own wish. It is called a crowd and not a group. They have no psychological relationships with one another. Supposing some accident took place, immediately most of the people will suspend their work and thronged at the accident site. The police will come and immediately the crowd will disperse. Even people do not try to give testimony to the police. The behaviour of the crowd is primitive, impulsive, uncontrollable, non interacting, transitory and impersonal. It is the lowest form of group.

Association

An association or club is more refined than the crowd. Membership and entry in an association is limited or restricted to a special group like doctors, engineers, lawyers, teachers, etc. There may

be other associations like clubs like Rotary Club, Lions Club, East Bengal Club etc. These are all regulated by some rules and regulations. One has to be a member of the association or club. An association is more dynamic and disciplined than a crowd.

Community

A community forms by a body of persons living in a locality, leading a common life and possessing common rights. A community may be formed through religion, language or economy.

There are many classifications of social groups : formal and informal groups, primary and secondary groups, face to face groups, distant groups, in-groups and out groups, social class, associations, and so on.

We shall now discuss some distinctive groups :

(a) Primary Groups

- (i) Family : Generally, the primary groups are relatively small and warmth and love exist among the members of the group. Family is the most primitive, basic and a universal primary group. To a considerable extent personality of the family members is molded and shaped by the family. According to Erikson the trust between parents and children transfer in to the society and fellow-human being.
- (ii) Play Group : It is another important primary group. It involves intimate and face to face interaction between the group members. There is no sex difference during infancy and childhood. Some times loyalty towards the play group supersedes loyalty towards one's family. But differences do crop up time and again but it is a temporary matter. At teenage sometimes the groups display gang-spirit to enjoy adventure. This is important in the classroom. Guidance of the teacher can motivate such gangs for worthy causes.
- (iii) Rural community: It is also a primary group. Unlike city folks, rural community has a strong bond among its members.

Thus primary groups have strong potential influence over the children, because they develop their behaviour and basic personalities from the primary groups in their formative periods of their lives.

(b) Secondary Groups

The Secondary Groups are also important because, these are useful for social development. It is called a secondary group because here face to face interactions are less. These groups survive in different ways e.g. letters, circulars, posters, advertisement, telephonic conversation etc. These groups are also called 'special interest groups'.

(c) **Tertiary Groups**

The meaning of the term 'tertiary' is 'third degree order or formation'. Though bond among the tertiary group members are very less, yet it has some impact on the members of the group. In long distance train, persons forms bond with other persons. But as soon as the journey ends, the group breaks and bond is seldom renewed. Such types of groups are called tertiary groups.

Again there are In-Groups and Out-Groups, Formal and Informal Group etc.

Herbert A. Thelen has classified the groups into the following categories :

- (A) **Face-to-face group** : In this group members meet at a given time and given place. Direct interaction exists in the face-to-face groups. The students in the class form a face-to-face group.
- (B) **The hang over group** : This type of group refers to an intimacy which was previously shared by a member of the group. The family comes under this group. The child learns social norms and rules from the family, but when he grows up he may deviate himself from the family influence.
- (C) **Abstract Group** : It refers to certain abstract group characteristics, e.g., a vague idea of belongingness develops in the mind of the individual member such as nation, public opinion, religion etc.

Question :

Let Us Check Our Progress

1. List three essential factors for group formation.
2. What are the difference between a 'group' and a 'crowd'?
3. What is a 'primary group'? Give three examples of 'primary group'.

5.2.2 : THE GROUP PROCESS

The group formation process has certain features. When a child is born in a family, he automatically becomes the members of the family by birth. However, when a person becomes a member of a club, he/she becomes the member of the clubby choice.

Reasons for group formation are :

- ***To satisfy the need of belongingness or affiliation***
- ***To get required information***
- ***To achieve the goal***

There are several reasons for which a person joins a group. Need satisfaction of all the human beings is a basic character. They form group to satisfy the need for 'belongingness' or 'affiliation'. Therefore, they form a group or join a group. Sometimes persons join a group/groups to get required information for future living, to satisfy their needs, or to increase their future status. For example, an employee joins an institution for development of knowledge in a particular field to get promotion in future. We often also found that by joining a group as a member, a person becomes safe from external threats or enjoys some of the basic needs. Some times, it may fulfill his/her recognition or prestige.

Another reason for group formation is to fulfill the goals, which is not possible if the person stays alone. Thus, it is not possible to play football. In the days of crisis also the people is bound to form groups. For example, if there is fire or flood people form group for disaster management because it is not possible for an individual person to do all there lief activities.

5.2.3 : CHARACTERISTICS OF THE GROUP

Different groups have different purposes and characteristics, which differentiate the groups from other groups. Group members have to interact with themselves to transect business. This requires effective communication. The groups should have cohesiveness and effective bond to reach the target goal because all the groups have some common goals, duties and responsibilities to fulfill their aims and objectives.

1. HUMAN GROUPS

Human groups have certain characteristics, which differentiate from animal groups. In psychological sense, the following characteristics are essential for a human group :

- (1) *Motivational base* : Motivational base of the group helps the group to set the go a land reach it through the common objectives. The motivational base of the group differs from group to group. It depends on the type of the group and its ultimate aims.
- (2) *Organization* : The group must have a well-organized structure. The roles of each individual member are well defined. The group must have specified rules, regulations and norms so that the group may function as a strong bond and individual members have their own role.

<i>Essential characteristics of a human group :</i>

- | |
|--|
| <p>(1) <i>Motivational base</i></p> <p>(2) <i>Organization</i></p> <p>(3) <i>Interdependency</i></p> <p>(4) <i>Structure</i></p> |
|--|

- (3) *Interdependency* : The group members have their separate identities and at the same time they are well organized., They will act and react with other group members and interdependent with one another. Thus during this process they change their personalities and influences the group as a whole.
- (4) *Structure* : It is an essential character of human group. The structure of the group is in hierarchical in nature and mostly a top down process. The structure of the human group may be various types. In a democratic set up, power vests on different members of the group. However, in other forms of groups the division of authoritative powers is different.

5.2.3.1 : CLASSROOM GROUPS

In psychological sense, the following characteristics are essential for classroom group.

- (a) *Common Goal* : The class has a common goal defined by the institution and the society. All the students are bound themselves by this common goal. All the members try to reach the goal. Thus, the goal of a class is well defined.
- (b) *Organized Structure*: The class has an organized structure. There is homogeneity in the class as regards to age, subject background etc. The class is a perfect group in this respect.
- (c) *Motivation*: It is an important character of the group. The class has a common goal and all members of the class are motivated to reach the goal set by the institution and the society.
- (d) *Leadership* : The group has a leader and he motivates the group members. The class, as a group, has also a leader. Here the teacher is the leader of the group. A leader may be of different types according to their styles of activities.

Essential characteristics of a class as a group :

- (1) Common goal***
- (2) Organised structure***
- (3) Motivation***
- (4) Leadership***

5.2.4 : GROUP DYNAMICS AND CLASSROOM INTERACTION

We have discussed group formation and its different forms. Now we shall discuss Group Dynamics, Classroom Interaction and their interrelationship.

To understand the dynamics of a group, we have to understand the structural characteristics of the group. We shall first try to understand about Group Dynamics, its characters and functions.

5.2.4.1 : GROUP DYNAMICS

The term Group dynamics is the fusion of two terms - group and dynamics. You have already learnt - what is group? Dynamics is the branch of mechanics that is concerned with the effects of forces on the motion of a body or system of bodies, especially of forces that do not originate within the system itself. Then, “group dynamics” refers to the structures and processes by which group form and function.

Group dynamics is a derivative of Kurt Lewin’s field theory. He has focused on the nature of group task in an attempt to understand the uniformity of groups’ behaviour. He argues that individuals may come to a group with very different dispositions, but if they share a common objective, they are likely to act together to achieve it. Moreover, an intrinsic state of tension within group members stimulates or motivates movement toward the achievement of desired common goals. This implies a state of interdependence which results in the group being a ‘dynamic whole’. Members tended to participate and communicate more in group desired tasks to reduce group tension and maintaining a dynamic equilibrium having no trace of unresolved conflicts of tension in the social-psychological topography of the group.

Therefore, ‘Group dynamics’ is the change of behaviour through the interaction within the group. Behaviour of human beings are not static, it also changes with the interaction with the environment in which the individual lives. Lewin considered this changing behavioural pattern of all human beings for his research work and did his pioneering work on ‘Group Dynamics’ of small group behaviour. According to him when a person constantly interacts with its members, their personality and behaviour changes, because these are not static in character.

Group Dynamics is important in educational institutions also, because the schools are like communities and the classrooms are groups. Students come from different segments of the society. They have different behaviour and personality patterns, economic conditions, etc. For this reason, knowledge of group dynamics is important to the teachers, so that they can motivate their students, guide them for better adjustment and improve the emotional and social condition of the class.

‘Group Dynamics’ is the change of behaviour through the interaction within the group. It is important in educational institutions for different reasons.

Group Dynamics is again of great importance in modern classroom situations, because after industrial revolution, the joint families of our country are breaking down rapidly and the family is unable to provide sense of safety, security, love, affection and cooperation like previous days. Adolescent boys and girls deserves love, affection, safety and security. Hence, the knowledge of interaction process among students might help the teachers to guide their students.

In schools, learning happens in social situations and hence all the ingredients of the society, e.g. conflicts, fear, anger, love, hatred, rivalry etc. are there. The teacher with his knowledge of *Group Dynamics* can help the students to improve the group relationship among them and they can be directed in constructive work with the help of the group.

Now a days audio-visual media has a strong impact on the mind of the learners. There are many instances, which prove that these have negative impact on the minds of the young learners and turn them in to antisocial activities. Mental health of the learners is important for the proper learning process. This may be developed by the development of proper group activities among the students. The teachers with his knowledge of Group Dynamics may improve the social and emotional climate in the class and diagnose students to find out the causes and can use remedial measures. Thus, inter and intra group relations among the students may be improved and it will help to improve the mental health of the students.

2. CLASSROOM INTERACTIONS

Group formation improves classroom interaction. Classroom interaction may happen among peer group or between students and teachers. It requires communication of different types : Verbal, nonverbal, gestures and pauses etc. This is important for the teachers for developing proper classroom interactions, it is also important for the learners for the development of proper communication with the peer group and the teachers. The traditional classroom interaction was a one-way process and the students were only passive listeners. But one way interaction is not helpful at all for the development of group interaction.

We shall now try to give a very brief description of classroom interaction analysis made by Ned, A. Flander. It is also important for the teachers to know the impact of the amount of interaction required in the class for proper group formation.

Ned, A. Flander made classroom interaction analysis.

Interaction Analysis : Ned Flanders, an American educator, made intensive study on the classroom interaction and tried to find out the way to relate them in actual classroom process.

Flander used the term 'Direct Influence' to refer to the dominating, authoritarian and prescriptive method of teaching where the students are passive.

But 'Indirect Influence' refers to permissive, democratic, interactive and pupil-centered classroom activity where the teachers remain in the background.

Flander considered ten categories for effective classroom interactions :

1-4 categories :	Indirect influence
5-7 categories :	Direct influence

- 8-9 categories : Student talk
 10 categories : Silence or confusion

These categories are briefly explained below :

Indirect influence

- (1) Accepts Feelings : accepts and clarifies the feeling-tone of the students in a non-threatening manner. Feeling may be positive or negative. Predicting and recalling of feeling are included here.
- (2) Praises or Encourages : Teacher praises, encourages students' action, uses jokes to release tension etc.
- (3) Accepts or uses ideas of students : Clarifying, building or developing ideas or suggestions by the students.
- (4) Asks Questions : Asking questions about the content or the procedure so that the students may answer.

Teacher Talk (Direct influence)

- (5) Lectures : Giving facts and opinions about the content or procedure; express own ideas, asking questions etc.
- (6) Gives Directions : The teacher directs, orders or commands and he expects that the students will follow.
- (7) Criticizes and justify authority : Statement to change the behaviour of the students from non-acceptable to acceptable pattern etc.

Student Talk

- (8) StudentTalk– : Talk by students in response to the Response teacher. The teacher initiates the interaction.
- (9) Student Talk–Initiation : Talks initiated by students.
- (10) Silence or Confusion : Pauses, short period of silence and periods of confusion where the observer does not understand communication.

Thus the teacher can observe the group activity of the students and can modify or develop group activities by giving proper freedom to the students.

Question :

Let Us Check Our Progress

1. Give a suitable definition of 'Dynamics'.
2. List ten categories of classroom interactions as suggested by Flenders.

5.2.4.2 : GROUP RELATIONSHIP AND GROUP STRUCTURES IN THE CLASS

A group must have a structure; otherwise, it will be a disorganised mob. Each member of the group may have at least one role or expected behaviour in the group. Members may differ in their capacities and skills. This develops the expertise of the group system and one's status is related to one's own expertise. Again, the role and the status of each individual are interrelated. Group members according to their role and status. Conflict arises in the group due to the multiple relationships with his/her colleagues. For example, a teacher may have good interactions with the students, he has good name in teaching activities, yet he feels ill at ease with the Headmaster, because the Headmaster, as a leader of the institution, desires some other roles from the teacher. Thus, it may develop conflict, demotivation and disorganisation in the school. Cohesiveness is important in '*Group Dynamics*'. Cohesiveness means to stick together and to live in harmony. When cooperation of the group increases, cohesiveness of the group increases and competition reduces cohesiveness. When group members put the interest of the group above self-interest, the group really flourishes and '*Group Dynamics*' increases. Every member of a family or a school has some needs : identifications, recognition, acceptance, security, affiliation etc. If these needs are satisfied, then cohesiveness increases in the school or at home. On the other hand, competition reduces cohesiveness and increases hostility.

Moreno has conducted studies on group formation in the class with the help of '*Sociometric Techniques*'. He asked questions to the students, e.g., (i) Name two students of your class with whom you like to join in the picnic ? (ii) Name one student of your class with whom you would like to reside in your hostel etc. Based on the collected data, they were grouped in to different categories.

The following patterns of relationships were found among the groups :

- (1) Stars : Some students are liked by the majority of the students. They are called stars.
- (2) Isolates : Some students are indifferent towards others and others are also indifferent towards them. They are isolates.
- (3) Rejected : Pupils whom no members of the class likes and rejected by all the group members of the class are called rejected pupils.
- (4) Mutual pairs : There are students who like each other. There have reciprocal relationships' between them. They are termed as mutual pairs.
- (5) Chains and cliques : There are chains in the group, e.g., A likes B, B likes C etc. However, there may be small circles also, e.g., A likes B, B likes C, C likes D, D likes A etc.

So teachers must aware about the groups in the classroom because each group needs special attention. The teacher and the classroom group should help isolates or rejected students so that they may be an active member of the group.

5.2.4.3 : LEADERSHIP IN THE CLASSROOM

Now we shall turn our attention to another important aspect of the group process in the classroom situations. It is the leadership role of teachers in the class and it is one of the most important roles of the teachers in the classroom. The teachers always play the emotional role like parents for the learners in the classroom. They serve as a focus for positive feelings of the learners. Thus by virtue of the special status in the group, the teacher serves as a primary agent for determining the group structure, group goals and group activities.

Different psychologists have studied the leadership concept extensively and differently. According to Carter (1953) there are five different types of leadership.

- (a) According to first view, the leader is a person who is the focus of group behaviour. Here the leader remains in the middle of the population of the group. He communicates more than the other and is the centre of attention.
- (b) Second approach defines leadership in terms of group goals, ie. the group leader has the ability to pursue the group goal.
- (c) The third approach defines a leader as the person so named by the members of the group. This definition gives importance to the members of the group.
- (d) A fourth approach defines a leader as syntality.
- (e) The fifth approach defines leader in terms of leadership behaviour. This approach defines the leader as a person who always engages himself/herself in the group activities.

In the classroom situations, a teacher is practically a group leader, because he/she has to lead the total class according to the goal ascertained previously. For this reason, the teacher should know his/her roles as a leader in the classroom.

In actual situation, we generally find three types of teachers' leadership where the above ideas are combined in the in one or other ways in three types of leadership. These three types are : Autocratic leader, Democratic leader and Laissez-faire leader.

Lewin, Lippitt and White (1939) did their pioneering work in this field. It was found that the majority of the students like democratic leadership. Prestone and Haintz (1949), Sha (1955), Morse (1956) and many other researchers reached the same conclusion.

From time immemorial, it has been said that the leader emerges because he/she has certain qualities or traits for gaining and maintaining popularity among the group members. We often mention the personal qualities, intelligence, dominance, initiatives and some other personal qualities are important for the leader. Researches have confirmed this view but researchers are different in their conclusion about the importance of any particular quality or trait of the leader.

5.2.5 : SOCIO METRIC GROUPINGS

The class is a social group because it has structural features, inter-personal relationships and socio-emotional environment like any other social groups. Like any other groups class as a group have different types and forms of subgroups. Teachers can properly guided and persuade these sub-groups to accept worthy social goals outside the classroom boundaries.

Again, there are different types of learners forming groups and sub-groups in the class. However, there are also some learners in and out side the group and sub-group boundaries. We identify these learners as stars, isolates, rejects, etc.

An author has given a nice picture of a classroom :

'It is the recess time. The teacher is still in the staff room. Students have already assembled in the class. There is a lot of noise, minor fighting, giggling and commotion. Unmindful of the uproar, a few are reading or writing something. One or two in the rear row remain non-participants. Neither they seek company of others nor do others seek their company. The bell rings. The noise subsides a little. ... By the time the teacher enters, deadly silence prevails in class... But a real would not like to see them as dummies. He would on the other hand, encourage a certain amount of informality, mobility in the classroom. A classroom has to remain 'Dynamic' and not dead!' (Dandapani, S. 2001). This 'Dynamics' of the classroom can be studied by 'Sociometry'.

5.2.5.1 : SOCIOMETRY

Now let us try to understand what 'Sociometry' is. We can define 'Sociometry' in the following way :

"Sociometry is the study of those aspects of the socio-emotional climate in the classroom having to do with feelings of attraction, rejection and indifference which pupils express towards each other when faced with situations calling for interaction within the classroom."

J. L. Moreno, an Australian psychologist invented the technique of Sociometry. During the World War 1, Moreno has the responsibility of a camp at Tyrolese. Displaced persons were in the camp. Moreno observed that adjustment of people was better when they are permitted to form their own groups. Later he made more experiments in schools and reformatories and found similar results. Experiment of Moreno was stated earlier (p-10). It is not a test like attitude or interest test. The teacher can observe and understands the reaction of students among themselves and later they can take appropriate approaches for proper group formation in the classroom. These groups were prepared according to the responses given by the students and prepared a 'Sociomatrix'. After few

weeks of starting the classes, the students will know one another and then the teacher will give them some open-ended simple questions. Of course, freedom of choice will be there. Some sample questions are given here :

- (i) With whom would you like share yours it next to you in your class?
- (ii) With whom would you share your books?
- (iii) With whom would you like to share your room in the hostel? etc.

These are all positive items but negative or neutral items can be formed and responses may be in positive and negative forms. Positive responses mean positive relative relationship, negative responses mean negative relationship, and blank spaces indicate no relationships. From the Sociomatrix teachers can ascertain Stars, Isolates, Rejected, Mutual pairs, Chains and Cliques etc. and take respective measures.

ChOSEh → Chooser ↓	1	2	3	4	5	6	7		n
1		+1		+1	-1				
2	+1					+1			
3				-1		-1	+1		
4		+1	-1						
5	+1					+1			
6		+1	+1	-1	-1				
.....									
n									
Total	+2	+3 -1	+1 -2	+1	-2 -1	+2	+1		

Fig.1. Sociomatrix

[+ showing popularity and – showing unpopularity]

5.2.5.1 : SOCIOGRAM

A ‘Sociogram’ is a diagrammatic representation of a mutual choice, rejection and indifference of the pupils in a classroom toward one another. The above ‘Sociomatrix’ may be represented in a diagram called ‘Sociogram’ where relationship is represented by arrows ($\rightarrow$, $\leftarrow$, $\leftrightarrow$, $\nleftrightarrow$, $\nleftrightarrow$, $\leftrightarrow$).

For example 1 likes 2 is represented by $(1 \leftrightarrow 2)$; 2 likes 1 as $(1 \leftrightarrow 2)$; Both 1 and 2 likes each other as $(1 \leftrightarrow 2)$; 1 dislikes 2 as $(1 - \rightarrow 2)$ and vice-versa as $(1 \leftarrow - \rightarrow 2)$; 1 likes 2 but 2 likes 1 then $1 \leftarrow 2$ etc. Here the numbers 1,2,3 ... etc. represent Roll numbers or indicators of the students. After drawing, the Sociogram different indications are counted. Thus five pattern can be found as depicted by Monero. The highest scores obtained is the most popular one and are 'Stars'. '0' score indicates isolates and the scores with dotted lines are un-popular. Highest numbers of dotted lines indicate highest un-popularity. It is shown in Fig. 2.

5.2.5.2 : LEARNING GROUPS

The 'Sociometric' techniques may be used in the classroom to determine different groups in the class and identify the isolates and remedial measures may be taken by the respective teachers to diagnose them properly. Besides Sociometric groups '*Learning Groups*' are also found in the classroom. These groups help to develop group discussion, group work, and other learning activities outside the class boundaries. Three types of learning groups may develop : (i) *The guidance groups* with a personal development orientation. (ii) *The instructional groups* to develop cognitive abilities. This group will help development of content and process of learning. (iii) *The application group* will help to undertake action-oriented and problem solving activities.

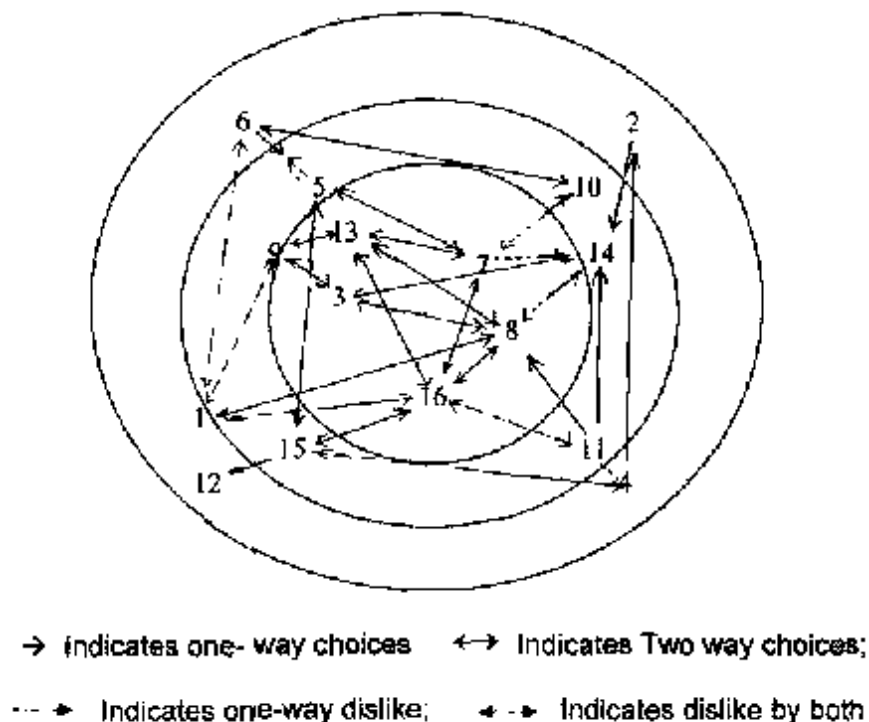


Fig. 2. Sociogram in a Class.

The function of the learning groups has some distinctive characteristics (a) the group strive for affiliation and affection from others; (b) striving for influence and powers in relation to others; (c) striving for competence in terms of capabilities, efficiency, achievement and mastery.

Researches have shown that cooperative classroom structure has favorable effects on students' sense of responsibilities, attitudes, interpersonal relations etc. The prime function of the teachers as well as the schools is to socialize the students for fitting them in to the future society so that they can take the leadership of the future society.

5.2.6 : SOCIO-EMOTIONAL CLIMATE OF CLASSROOM

Group dynamics deals with the change of social behaviour through groups. Each and every educational institution is a powerful social system and deals with the socialization of the students. For this reason, Group Dynamics is important for students, teachers, school authorities and society members. The process of socialization in the classroom is not so simple. It depends on several factors : Classroom environment, emotional bonding with the peers, teachers and other members of the institution etc. The social relations in the classroom should be pleasant, informal, cordial, warm, supportive, integrative, cooperative, flexible and permissive. Students should be alert and enthusiastic, but feel relaxed and free from all tensions.

Development of emotional bonding helps learning process, increase motivation of the students and mental health of the students. Therefore, it is also important in learning process. If there are conflicts, rivalry, distrust, fear, anxiety among group members, socialization process will be at stake and learning process will slow down. Some students may fall prey or this situation. Repetition of failure may pose withdrawal effect from the activities of the school. Socio-emotional climate of the classroom is also very important for proper and healthy development of the students, because in the conflicting classroom situation, some pupil may become isolated or rejected.

5.2.7 : TEACHER'S CHARACTERISTICS INFLUENCING IT

In classroom teacher is the leader. Therefore, leadership quality of the teacher is one of the most important qualities of the teacher. The teacher should act as a leader in planning, initiating, implementing, setting up and maintaining a productive and socio-emotional climate in the classroom. School activities mainly centered round two circles : teacher and student. In a modern classroom democratic attitude of teachers are preferred more than any other styles of leadership. Students often face emotional problems during the transition from one school to another by natural process. For example, a student moves from primary school to secondary school. In the secondary schools generally adolescent periods of students start. But in the mean time, the pupil has to leave his/her previous peer group

with whom she/he had developed a strong emotional bond in the early childhood years. The students would have to leave their previous teachers with whom they have developed a close emotional bond. At this point of time, the duties and responsibilities of the teachers are very important. This is also important in teaching learning situation in the classroom and the teachers should give special attention to the following areas :

- (a) Teacher pupil interaction;
- (b) Classroom management;
- (c) Quality and styles of instruction;
- (d) Level of expectation from the child;
- (e) Attention to special children;
- (f) Develop group bonding;
- (g) Identifying Isolates, Rejected etc. and help them to involve in group activities.
- (h) Identifying stars and engage them group development process.

5.2.8 : TEACHERS CHARACTERISTICS INFLUENCING IT

The teachers should also give special attention to the following areas to improve classroom climate :

- (1) *Teachers' Behaviour* : Teacher is a role model to students. So he should handle the problems of the students impartially and psychologically. He will develop the whole class with emotional bondage.
- (2) *Discussion* : To improve emotional climate, the teacher should organize discussion for the group, invites suggestions from the group and try to implement it in practice. It is desirable that the teacher will not allow any discussion regarding social prejudices, religious beliefs etc. discussed in the class.

Improvement of classroom climate may be made by improved teachers behaviour, discussion, effective com-munication, cohesiveness, counseling, tours and visitsetc.

- (3) *Effective communication* : Classroom communication is a two-way process. Teacher should use proper communication process, so that good interaction may take place, invite suggestions from students to improve communication process.

- (4) *Cohesiveness* : The teachers should encourage to develop the feeling of cohesiveness among the students through developed communication system though it is not an easy task to develop cohesiveness in a class where students come from different religious, economic and social groups.
- (5) *Counseling* : Knowledge of counseling is important for teachers. Recent studies have shown that counseling can reduce mental disturbance among students. Teachers may arrange group counseling for the whole class.
- (6) *Tours and visits* : It helps bonding among the peers and develops interaction between teacher and student. This also gives an opportunity to understand each other and help to develop group dynamics in the classroom climate.

5.2.8.1 : Isolates and function of the teacher

From Sociometric studies it is found that there are some small numbers of isolate students. If not properly guided, they may be dropouts in future or pose problems in the class. Therefore, teacher should have some knowledge to guide them. The teachers can handle them in the following way :

- (1) *Maximise early success* : This helps students to be motivated in the classroom. Repeated failure may be a frustrating effect on the students and ultimately they may withdraw from all the activities.
- (2) *Select students from least aversion* : The teacher should select some students from the class who have least aversion towards the isolates. They will form an occasional group and interact with the isolates. This group will work together. The isolates may find hope and try to overcome the causes of isolation.
- (3) *Praise moderately* : The teacher should praise moderately to the isolates in the time of success in the school work.
- (4) *Find out interest areas of the isolates* : The teacher should find out the skills, hobbies and other areas of interest of the isolates and help them to develop these areas.
- (5) *Discuss problems* : The teacher should individually discuss with the isolates and identify their problems, so that these can be removed.

The teacher, as a leader in the classroom, should develop the class as a reality-centered class. Thus, students' participation will be high, students will set their own standard and teacher will justifiably identify their limits. In this way a cohesive, at the same time a cooperative group will be formed, instead of a self-destructive and disintegrating group of students.

Question :

Let Us Check Our Progress

1. How the knowledge of 'Group Dynamics' can be applied to develop classroom climate?

5.2.9 : SUMMING UP

Three essential factors for group formation are interactions and communications among the individuals, a sense of belongingness and a common goal among the individuals. The group must have some identifiable set of interacting individuals, maintains some rules, regulations and norms, and have some psychological relationships. Reciprocity and communication between individuals, a sense of belongingness and share of feeling when added to commonality of purpose usually result in the formation of group.

Group formation of the child starts from childhood. At this point 'I' or 'Me' is replaced by 'We' or 'Ours'. This expansion of self is 'rudimentary socialisation'.

Groups are generally divided in to three distinctive parts : (a) Primary Groups, (b) Secondary Groups and (c) Tertiary Groups. The family, play-groups, rural communities etc. are all primary groups. Groups may be divided in to In-Groups and Out-Groups, Formal and Informal Group, Face to face group, Hang over group, Abstract 'Group' etc.

Groups form mainly to satisfy the need of belongingness or affiliation, getting required information or achieving the goal.

Essential characteristics of a classroom group are : a common goal, organized structure, motivation and leadership. Group Dynamics is important in educational institutions, because the schools are like communities and the classroom groups are like community groups. In the classroom, there are communications between teachers and students among peer groups. Ned, A. Flander attempts to study classroom climate and its relation to pupils' performance.

Knowledge of Group Relationship and Group Structure in the class is important for the teacher to understand the students and group formation process.

Moreno has conducted studies on group formation in the class with the help of 'Sociometric Techniques'. He found five patterns of relationships among the group: Stars, Isolates, Rejected, Mutual pairs, Chains and cliques.

Besides Sociometric groups, 'Learning Groups' are also found in the classroom. Three types of learning groups found in the classroom are : (i) The guidance groups (ii) The instructional groups and (iii) The application groups.

It is also important to develop socio-emotional climate in the classroom. It depends on several factors : classroom environment, emotional bonding with the peers, teachers and other members of the institution etc. In classroom teacher is the leader and the teachers' characteristics and behaviour pattern with the students is responsible for the development of socio-emotional bonding in the class.

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ASSIGNMENTS

9. State three essential factors for group formation.
10. Give a suitable example to distinguish between a group and an aggregate and give reasons for your answer.
11. What are the reasons for group formation?
12. State the essential characteristics of a human group.—Why are these called essential factors?
13. Explain how the results of Sociometry can be used in the Sociogram?
14. Do you consider that a teacher should be an Autocratic leader—justify your answer.
15. What should be the function of the teacher to improve the Isolated students in the class?
16. State how teachers' behaviour can improve the group formation process in the classroom.

Two-Year
POST GRADUATE DEGREE PROGRAMME
in
E D U C A T I O N

SEMESTER-II

EDC-08

Research Methodology-2

Self-Learning Material



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Director's Message

Satisfying the varied needs of distance learners, overcoming the obstacle of distance and reaching the unreached students are the threefold functions catered by Open and Distance Learning (ODL) systems. The onus lies on writers, editors, production professionals and other personnel involved in the process to overcome the challenges inherent to curriculum design and production of relevant Self Learning Materials (SLMs). At the University of Kalyani a dedicated team under the able guidance of the Hon'ble Vice-Chancellor has invested its best efforts, professionally and in keeping with the demands of Post Graduate CBCS Programmes in Distance Mode to devise a self-sufficient curriculum for each course offered by the Directorate of Open and Distance Learning (DODL), University of Kalyani.

Development of printed SLMs for students admitted to the DODL within a limited time to cater to the academic requirements of the Course as per standards set by Distance Education Bureau of the University Grants Commission, New Delhi, India under Open and Distance Mode UGC Regulations, 2017 had been our endeavour. We are happy to have achieved our goal.

Utmost care and precision have been ensured in the development of the SLMs, making them useful to the learners, besides avoiding errors as far as practicable. Further suggestions from the stakeholders in this would be welcome.

During the production-process of the SLMs, the team continuously received positive stimulations and feedback from Professor (Dr.) Sankar Kumar Ghosh, Hon'ble Vice- Chancellor, University of Kalyani, who kindly accorded directions, encouragements and suggestions, offered constructive criticism to develop it within proper requirements. We gracefully, acknowledge his inspiration and guidance.

Sincere gratitude is due to the respective chairpersons as well as each and every member of PGBOS (DODL), University of Kalyani. Heartfelt thanks is also due to the Course Writers-faculty members at the DODL, subject-experts serving at University Post Graduate departments and also to the authors and academicians whose academic contributions have enriched the SLMs. We humbly acknowledge their valuable academic contributions. I would especially like to convey gratitude to all other University dignitaries and personnel involved either at the conceptual or operational level of the DODL of University of Kalyani.

Their persistent and co-ordinated efforts have resulted in the compilation of comprehensive, learner-friendly, flexible texts that meet the curriculum requirements of the Post Graduate Programme through Distance Mode.

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Director
Directorate of Open and Distance Learning
University of Kalyani

SECOND SEMESTER
EDC-08 : RESEARCH METHODOLOGY-2

Block	Contents	Study hours
Block-1 Normal probability curve	Unit-1 : Normal Probability Curve and some other 1.1.1: Normal probability curve 1.1.2: Derived scores 1.1.3: Sampling distribution of mean and other Statistics	01 Hour
Block-2 Measures of relationships	Unit-1: Measures of relationships -concept and use only (A) 2.1.1: Correlation 2.1.2: Co-efficient of correlation 2.1.3: Types of Correlation 2.1.4: Product moment Correlation 2.1.5: Rank difference Correlation	01 Hour
	Unit-2: Measures of relationships-concept and use only (B) 2.2.1: Bi-serial Correlation 2.2.2: Point bi-serial Correlation 2.2.3: Partial Correlation 2.2.4 Multiple correlation	01 Hour
Block-3 Inferential Statistics	Unit -1: Inferential Statistics and related concepts (A) 3.1.1: Inferential Statistics. 3.1.2: Null Hypothesis. 3.1.3: Level of Significance.	01 Hour
	Unit -2: Inferential Statistics and related concepts (B) 3.2.1: Degrees of Freedom. 3.2.2: Two tailed and one tailed test of Significance. 3.2.3: Decision making : Type-I and Type-II Errors.	01 Hour
	Unit -3: Parametric and Non parametric Techniques 3.3.1: Concepts of Parametric and non-parametric Techniques. 3.3.2: Parametric Tests 3.3.3: Non parametric Tests	01 Hour
	Unit -4: Non-parametric Tests 3.4.1: Chi-square test 3.4.2: Median test.	01 Hour
	Unit -5: Parametric Tests 3.5.1: Z test and t test 3.5.2: F-test or Analysis of Variance 3.5.3: Analysis of Co-variance	01 Hour

Block	Contents	Study hours
Block-4 Reliability and Validity	Unit -1: Reliability and Validity- Concept 4.1.1: Population and Sample 4.1.2: Quality of sample 4.1.3: Quality of tools	01 Hour
	Unit -2: Reliability 4.2.1: Concept of Reliability 4.2.2: Definitions of Reliability 4.2.3: Factors affecting Reliability. 4.2.4: Methods of Estimating Reliability.	01 Hour
	Unit -3: Validity 4.3.1: Concept of Validity. 4.3.2: Determination of Validity. 4.3.3: Factors affecting Validity.	01 Hour
Block-5 Regression and Prediction	Unit -1: Introduction to Regression and Prediction 5.1.1: Basics of Regression and Prediction. 5.1.2: Further Conceptualization about Regression 5.1.3: Origin of the concept Regression in solution of Real life problems.	01 Hour
	Unit -2: Regression and Prediction: Illustration 5.2.1: Concept of Regression and Prediction: Illustration 5.2.2: Regression Equations.	01 Hour
	Unit -3: Multiple Regression 5.3.1: Multiple (Linear) Regression and Prediction 5.3.2: Multiple Regression and Multiple R 5.3.3: Uses of Regression and prediction in Educational Research	01 Hour
Block-6 Research Report	Unit - 1: Research Report 6.1.1: Importance of Research Report. 6.1.2: Style Format of Research Report. 6.1.3: Guidelines for Writing Research Report.	01 Hour
	Unit - 2: Research Report - Writing 6.2.1: Writing qualitative Research report 6.2.2: Evaluation of Research Report.	01 Hour

SECOND SEMESTER
EDC-08
RESEARCH METHODOLOGY-2

EDC-08	Author	Unit : Title	Page
Block-1 Normal probability curve	Dr. Shyam Sundar Bairagya	Unit - 1: Normal Probability Curve and some other related concepts	1-28
Block-2 Measures of relationships	Dr. Shyam Sundar Bairagya	Unit-1: Measures of relationships -concept and use only (A)	29-67
		Unit - 2: Measures of relationships-concept and use only (B)	
Block-3 Inferential Statistics	Dr. Nimai Chand Maity	Unit - 1: Inferential Statistics and related concepts (A)	68-116
		Unit - 2: Inferential Statistics and related concepts (B)	
		Unit - 3: Parametric and Non parametric Techniques	
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Block-4 Reliability and Validity	Prof. D. Mukhopadhyaya	Unit - 1: Reliability and Validity- Concept	117-151
		Unit -2: Reliability	
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Block-6 Research Report	Dr. Bijan Sarkar	Unit -1: Research Report	186-204
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EDC - 8

RESEARCH METHODOLOGY - 2

BLOCK - 1

NORMAL PROBABILITY CURVE

Unit - 1

**NORMAL PROBABILITY CURVE AND
SOME OTHER RELATED CONCEPTS**

CONTENT STRUCTURE :

Introduction

Objectives

1.1.1 : Normal Probability Curve

1.1.2 : Derived Scores

1.1.3 : Sampling Distribution of Mean and other Statistics.

1.1.4 : Let Us Sum Up

Suggested Readings

Assignments

Appendix

INTRODUCTION

The present Unit presents the concept, characteristics and use of normal distribution in relation to the educational evaluation and research. Moreover, this Unit likes to give you some basics of inferential statistics as well as the ways how we can transform scores for wide comparison and application in educational research.

OBJECTIVES

You will be able to:-

- * Explain the concept of normal probability curve
- * Discuss the characteristics of normal probability curve and their applications.
- * Calculate the z-score and T-Score
- * Compute Significance of Mean in case of Large and Small Samples, etc.

1.1.1 : NORMAL PROBABILITY CURVE

Probability is a part of our everyday life. In every sphere of our daily life, we face uncertainty and use probability theory whether or not we admit the use of something so sophisticated. When we hear a weather forecast of a 70 percent chance of rain, we change our plans from a picnic to a pool game.

In general, probability refers to the chance that something will happen. Probabilities are expressed as fractions $\left(\frac{1}{6}, \frac{1}{2}, \frac{8}{9} \text{ etc.}\right)$ or as decimals (0.16, 0.50, 0.889, etc.) and range between zero and 1. Assigning a probability of zero means that something can never happen; a probability of 1 indicates that something will always happen.

In probability theory, an event is one or more of the possible outcomes of doing something. If we toss a coin, getting a tail would be an event, and getting a head would be another event. An example of an event closer to your life, perhaps, is being picked from a class of 100 students to answer a question.

The activity that produces such an event is referred to in probability theory as an experiment.

Using this formal language, we could ask the question, “In a coin-toss experiment, what is the probability of the event head ?” And, of course, it is a fair coin with an equal chance of coming down on either side, we would answer “ $\frac{1}{2}$ ” or “0.5”. The set of all possible outcomes of an experiment is called the sample space for the experiment. In the coin-toss experiment, the sample space is

$$S = \{ \text{head, tail} \}$$

Events are said to be mutually exclusive if one and only one of them can take place at a time. Consider again the example of the coin. We have two possible outcomes, heads and tails. On any toss, either heads or tails may turn up, but not both. As a result, the events heads and tails on a single toss are said to be mutually exclusive.

When a list of the possible events that can result from an experiment includes every possible outcome, the list is said to be collectively exhaustive. In our coin example, the list “head and tail” is collectively exhaustive. A collectively exhaustive list sets out all possible outcomes.

The probability of an event may be stated mathematically as a ratio. Probability of an event A, denoted by $P(A)$ is defined as $P(A) = \frac{F(A)}{T(A)}$, where $F(A)$ = Favourable no. of cases and $T(A)$ = Total no. of cases. The range of $P(A)$ is $0 \leq P(A) \leq 1$.

If a fair coin is tossed, either a head (H) or a tail (T) will turn up. The probability that a head will appear is one chance in two. Expressed as a ratio, therefore, the probability of H is $\frac{1}{2}$; of T is $\frac{1}{2}$; and we have :

$$(H + T) = H + T$$

$$= \frac{1}{2} + \frac{1}{2}$$

If we toss two coins, C_1 and C_2 , at the same time, there are four possible arrangements which the coins may take:

(1)		(2)		(3)		(4)	
C_1	C_2	C_1	C_2	C_1	C_2	C_1	C_2
H	H	H	T	T	H	T	T

Both coins (C_1 and C_2) may fall H; C_1 may fall H and C_2 T; C_1 may fall T and C_2 H; or both coins may fall T. Expressed as ratios, the probability of two heads is $\frac{1}{4}$ and the probability of two

tails is $\frac{1}{4}$. Also, the probability of two heads is $\frac{1}{4}$ and the probability of TH combination is $\frac{1}{4}$; and

since it ordinarily makes no difference which coin falls H or which falls T, we may add these two

raios to obtain $\frac{1}{2}$ as the probability of an HT combition. The sum of these probability raitios is =

$$\frac{1}{4} + \frac{1}{2} + \frac{1}{4} = \frac{4}{4} = 1$$

The expected appearance of heads and tails can be expressed as:

$$(H + T)^2 = H^2 + 2HT + T^2$$

in which

$$1H^2 = \text{both heads : 1 out of 4; probability ratio} = \frac{1}{4}$$

$$2HT = 1 \text{ head 1 tail : 2 out of 4; probability ratio} = \frac{1}{2}$$

$$1T^2 = \text{both tails : 1 out of 4; probability ratio} = \frac{1}{4}$$

$$\text{Total} = 1$$

If we toss three coins (C_1), (C_2) and (C_3) simultaneously, there are eight possible outcomes:

(1)			(2)			(3)			(4)		
C_1	C_2	C_3	C_1	C_2	C_3	C_1	C_2	C_3	C_1	C_2	C_3
H	H	H	H	H	T	H	T	H	T	H	H
(5)			(6)			(7)			(8)		

C_1	C_2	C_3	C_1	C_2	C_3	C_1	C_2	C_3	C_1	C_2	C_3
H	T	T	T	H	T	T	T	H	T	T	T

Expressed as ratios, the probability of three heads is $\frac{1}{8}$; of two heads and one tail $\frac{3}{8}$; of one

head and two tails $\frac{3}{8}$; of three tails $\frac{1}{8}$. The sum of these probability ratios is

$$\frac{1}{8} + \frac{3}{8} + \frac{3}{8} + \frac{1}{8} = 1.00$$

The expected appearance of heads and tails can be expressed as :

$$(H + T)^3 = H^3 + 3H^2T + 3HT^2 + T^3$$

in which

$$1H^3 = \text{three heads : 1 out of 8; probability ratio} = \frac{1}{8}$$

$$2H^2T^1 = \text{two head 1 tail ; 3 out of 8; probability ratio} = \frac{3}{8}$$

$$2H^1T^2 = \text{one head and two tail ; 3 out of 8; probability ratio} = \frac{3}{8}$$

$$1T^3 = \text{three tails ; 1 out of 8; probability ratio} = \frac{1}{8}$$

Total = 8

Total = 1

When the number of factors become very large, suppose n, the expression, $(p + q)^n$ become infinite, the frequency polygon would exhibit an ideal perfect smooth surface like that of the curve in Fig. 1

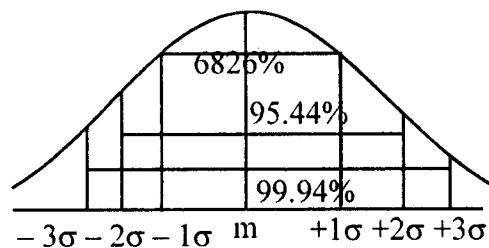


Fig. The ideal normal curve

We may then define a normal probability curve as :

A normal curve is a graphical plot of the mathematical function represented by the equation

$$y = f(x) = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

where.

$$-\infty < x < +\infty$$

μ = mean and σ = standard deviation;

π and e are two mathematical constant having the approximate values 3.1416 and 2.718 respectively.

μ and σ are known as parameters of this distribution.

Let Us Check Our Progress

1. What do you mean by probability ?
2. Relate normal probability curve and probability ?

Characteristics of Normal Probability Curve (NPC) :

The NPC has the following characteristics :

- The Normal Curve is bell shaped.
- The normal distribution has two parameters μ and Standard Deviation = σ .
- Mean = Mode = Median in NPC
- The normal curve is unimodal. (has a single Mode)
- It is perfectly bilateral symmetrical about the mean,

- The maximum ordinate is at $x = \mu$ and the maximum height is $y = \frac{1}{\sigma\sqrt{2\pi}}$.
- The normal probability has two points of inflexion, that is, $\mu \pm 1\sigma$.
- In a normal distribution the skewness is zero and the kurtosis is 0.263.
- Theoretically the curve never touches the base line, that is, X-axis, This implies that normal probability curve is asymptotic to the X-axis.
- The total percentage of area of the normal curve within the two points of inflexions, is, $\mu \pm 1\sigma = 68.26\%$
- The total area under the normal curve may be considered to approach 100 percent probability. The area between Mean and any point deviation given in terms of σ - distance is always the same as shown in Fig-2.

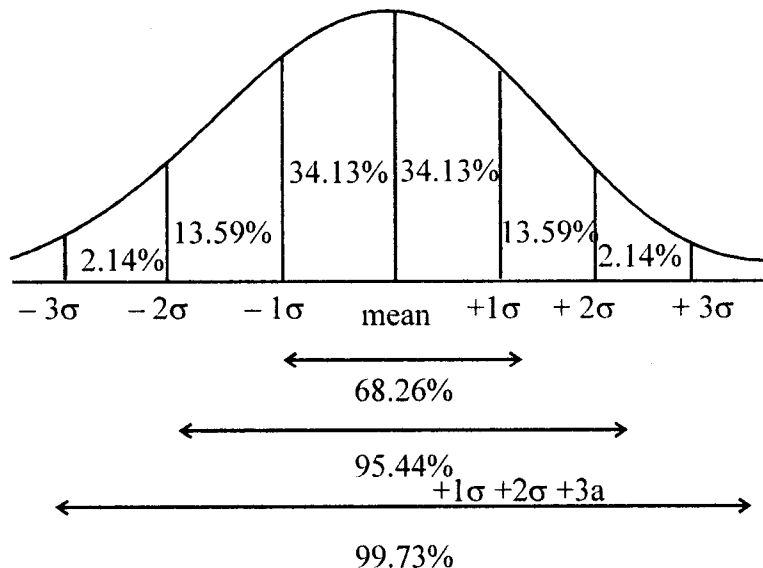


Fig. 2 : The percentage of the cases falling between successive Standard Deviations in Normal Distribution.

Let Us Check Our Progress

1. Define Normal probability curve.
2. Discuss the characteristics of NPC.

Factors causing divergence in the Normal Curve / Normal Distribution :

A careful analysis of the data can often throw some light on the asymmetry. Some of the common causes of non-normality in distribution of obtained data are being expressed below.

Selection of the sample :

Selection of the subjects (individuals) can produce skewness and kurtosis in the distribution. If the sample size is small or sample is biased one, skewness (other than zero) is possible in the distribution of scores obtained on the basis of selected sample or group of individuals. Similarly, its kurtosis may deviate from 0.265.

The scores made by small and homogenous group likely to yield narrow and leptokurtic distribution. Scores from small and highly heterogeneous group yield platykurtic distribution. In actual research for this purpose the principle of randomization is to be followed in the selection of the sample.

Unsuitable or Poorly Made Tests :

If the measuring tool of test is inappropriate for the group on which it has been administered, or poorly made, the asymmetry is likely to occur in the distribution of scores. If a test is too easy, scores will pile up at the high end of the scale, whereas when the test is too difficult, scores will pile up at the low end of the scale. The easiness and difficulty refer to the level of ability of the subjects who are taking the test.

The Trait Being Measured is Non-Normal :

Skewness or Kurtosis will appear when there is a real lack of normality in the trait being measured, eg. interests or aptitudes or IQ of a group who is intellectually gifted. Similarly many variables are not normally distributed.

Errors in the Construction and Administration of Tests :

A poorly constructed test may cause asymmetry in the distribution of the scores. Similarly, while administering the test, unclear instructions, error in timings, errors in the scoring procedure used and lack of motivation to complete the test may cause skewness in the distribution.

We may be kept in mind that the normal curve is a mathematical or theoretical model for real variables. This is obtained when the cases / elements are very large or infinite; hence we may not expect the real NPC with finite cases, if not relatively large one. Experts assume that psychological or educational, data are ideally normally distributed, hence they use it as a good fit of those data.

Divergence in Normality : Skewness and Kurtosis

Generally, two types of divergence occur in the form of the normal curve, which are :

- (i) Skewness, and
- (ii) Kurtosis.

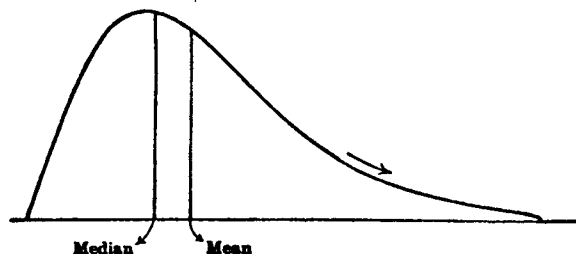
Skewness : A distribution is said to be ‘Skewed’ when the mean and median fall at different points in the distribution and the balance i. e. the point of center of gravity is shifted to one side or the other to the left or right.

There are two types of skewness which appears in the score distribution.

- (a) Positive Skewness, and
- (b) Negative Skewness

(a) Positive Skewness

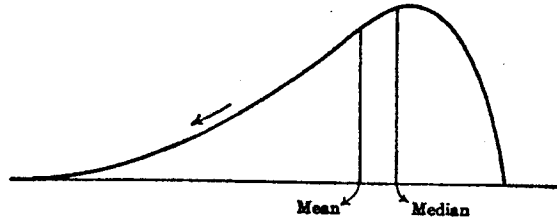
Distributions are skewed positively or to the right, when scores are massed at low i.e. the left end of the scale, and spread out gradually toward the high or right end as shown in the Figure below:



Positive skewness : to the right

(b) Negative Skewness :

Distribution is said to be skewed negatively or to the left when scores are massed at the high end of the scale, i. e. the right side of the curve, and are spread out more gradually towards the low end i. e. the left side of the curve.



Negative skewness : to the left

Index of Skewness (SK) :

A useful measure of skewness is given by the formula

$$Sk = \frac{3(\text{mean} - \text{median})}{\sigma}$$

The formula points out that—

- (i) The Skewness is zero; when mean = median.
- (ii) The skewness is + ve; when mean > median
- (iii) The skewness is –ve; when mean < median

We may also use an alternate formula for determination of the magnitude of skewness.

$$Sk = \frac{(P_{90} + P_{10})}{2} - P_{50}$$

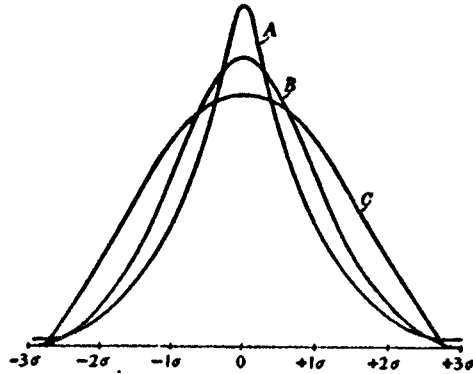
When the symbols have usual meanings.

Kurtosis :

The term Kurtosis refers to the divergence in the height of the curve, specially in the peaked-ness or flatness of a frequency distribution. A frequency distribution more peaked than the normal is

said to be Leptokurtic. A frequency distribution which is flatter than the normal is said to be platykurtic. A normal curve is also called mesokurtic.

Leptokurtic, Mesokurtic, Platykurtic



Leptokurtic (A), normal or mesokurtic (B),
and platykurtic (C) curves

Index of Kurtosis :

$$Ku = \frac{Q}{P_{10} - P_{10}}; \text{ where } = \frac{Q_3 - Q_1}{2}$$

Then we have for

- (i) normal distribution, $Ku = .263$; (ii) If $Ku > .263$ then platykurtic
(iii) If $Ku < .263$ then Mesokurtic.

Uses of Normal Probability Curve :

There are number of applications of normal curve in the field of educational measurement, evaluation and resaerch. These are :

1. to determine the percentage of cases (in a normal distribution) within given limits or scores.
2. to determine the percentage of cases that are above or below a given score or reference point.

3. to determine the limits of scores which include a given percentage of cases.
4. to determine the percentile rank of a student in his own group.
5. to find out the percentile value of a student's percentile rank.
6. to compare the two distributions in terms of overlapping.
7. to determine the relative difficulty of test items, and
8. dividing a group into sub-groups according to certain ability and assigning the grades.

Application of NPC : Some Examples :

We understand some important applications of properties of NPC in numerical data processing required in testing and research in education

Case I : Comparing Scores obtained in two different Tests

Problem : A student obtained 80 in Mathematics and 50 in English. If the mean and standard deviation in Mathematics scores are respectively 70 and 20 and those for English are respectively 30 and 20 find out in which subject the student has fared better.

Solution :

Here from the given data a direct comparison of the status of the student in Mathematics and English can not reasonably be made because the scores achieved do not belong to the same scale. The clue to the solution is that the two scores obtained in subjects would be made comparable. This can be possible if we convert these two scores into a new score, called z scores (standard scores).

Here, score (raw score, i.e. obtained mark) in Mathematics (X_1)=80, Mean (M_1)=70 and SD_1 =20

Similarly, score (raw score, i.e. obtained mark) in English (X_2)=50, Mean (M_2)=30 and SD_2 =20

We are now transforming the obtained scores in the following way -

z-score in Mathematics = $(X_1 - M_1) / SD_1 = (80 - 70) / 20 = 0.5$; and

z-score in English = $(X_2 - M_2) / SD_2 = (50 - 30) / 20 = 1.0$

We can now conclude that the particular student has obtained better marks in English.

Note : We are using a new score, called z-score which is a derived or transformed score.

Case II : To Determine percentage of the distributions whose values lie between two given scores.

Problem : In a sample of 1000 cases, the mean of a test score is 14.50 and standard deviation is 2.50. Assuming normality of distribution, how many individuals scores between 12 and 16 ?

Solution : Both the raw scores are 12 and 16. These are to be converted into z scores (sigma score)

z-score of raw score of 12 is —

$$z = \frac{12 - 14.5}{2.5} = -1.00\sigma$$

z-Score of raw score of 16 is —

$$z = \frac{16 - 14.5}{2.5} = 0.69(+ve)$$

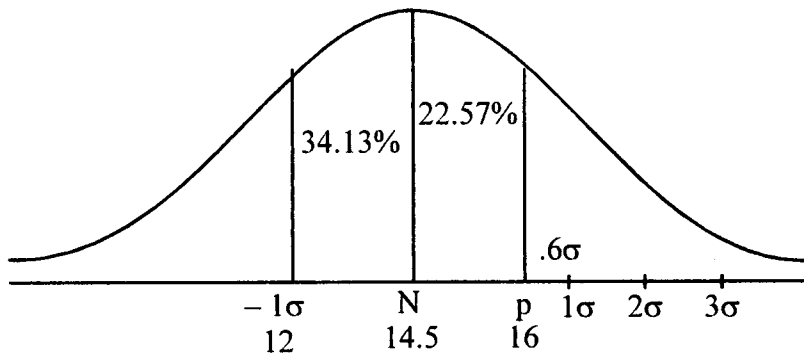


Fig. Showing the Cases lying between Scores 12 and 16

From the Table-B (Appendix) we see that 22.5% cases lie between mean and 0.69 (right side of mean). Similarly, 34.13% cases lie between mean and -1.00 (left side of mean). It may easily be concluded that $22.57 + 34.13 = 56.7\%$. If we convert this percentage value in number,

$$\text{We get } 56.7\% = \frac{56.7}{100} \times 1000 = 567$$

Then we conclude that under the given conditions 567 individuals lie between scores of 12 and 16.

Case III : To determine percentage of the individuals scoring above a given score point.

Problem 3 : In a sample of 500 cases, the mean of the distribution is 40 and S.D is 4. Assuming normality of distribution, find how many individuals score above 47 score point.

Soultion : Here, z-score equivalent to raw score 47 is :

$$z = \frac{47 - 40}{4} = \frac{7}{4} = 1.759$$

From the Normal Curve Tables B it may (see in Appendix) found that 45.99% cases lie between mean and 1.759. It is also Know that a total of 50% cases lie on both sides of the mean. Therefore, it may be easily concluded that is all $50 - 45.99 = 4.01$ or 4% individuals lie above the raw score of 47. Here, the total number of cases in the sample is only 500 (given). Then 4% of 500 cases, that is 20 cases lie above the raw score of 47.

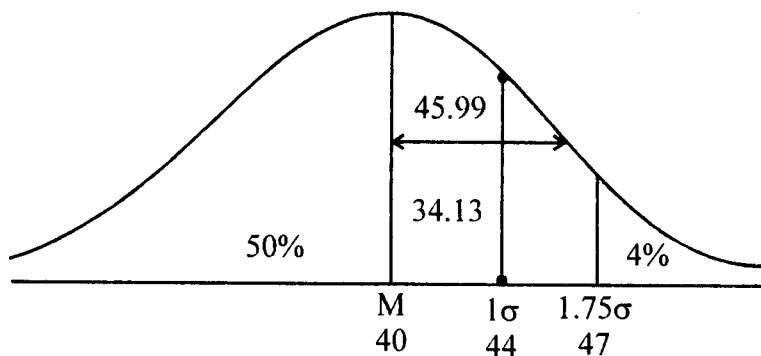


Fig. Showing the Cases above 47 Scores point

Case -IV : To determine percentile rank i. e. percentages of cases lying below a given score point.

Problem 4 : Given a normal distutibution $N = 1000$, mean = 80, SD = 16; find (i) the percentile rank of the individual scoring 90 and (ii) the total number. of individuals whose score lie below score point of 40.

Solution : (i) The percentile rank is essentially a rank or the position of an individual divided on the basis of the individuals score.

Now z-score equivalent to new score 90 is

$$z = \frac{90 - 80}{16} = .62\sigma$$

The area lying between mean and .6259 is 23.41% (Table B). But 50% of cases lie up to the mean. Therefore it may be concluded that there is $(50+23.41)\% = 73.41\%$ of the individuals whose score lie below the score point 90. We may say that percentile rank of the individual score of 90 is 73.

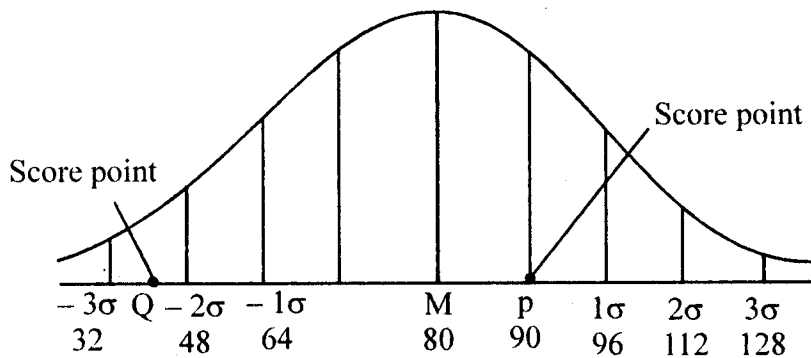


Fig 7. Shwoing the Perectile Rank 90 and cases lying below 40

Solution (ii) : Here, the given raw score point is 80. Let us convert it into z score.

$$z = \frac{40 - 80}{16} = -2.5\sigma$$

Form the Normal Curve Tables B, we may find out that 49.38% cases lie between M and -2.5σ . Therefore, it may be easily concluded that, in all, $50 - 49.38 = 0.62\%$ of the cases lie below the given score point 40.

Here, the total number of cases is 1000. Then,

$$\frac{0.62}{100} \times 1000 = 6.2 \text{ i. e. } 6 \text{ individuals achieve below the score point } 40.$$

Case - V : To determine the limit of the scores between which a certain percentage of case lie.

Problem-5 : If a distribution is normal with $M = 100$ and $SD = 20$, find out the two points between which middle 60% of the cases lie.

Solution : It may be seen from the given data that the middle 60% of cases are distributed in such a way that 30% of the cases lie to the left and 30% to the right of the mean.

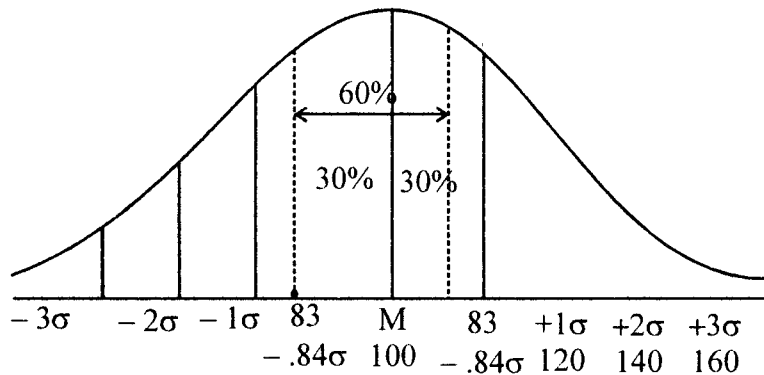


Fig 8. Showing the area covered by middle 60 percent

From the Normal Curve Table B we find that 30% of cases lie between mean and $.84\sigma$. It means that 30% of the cases lie on the right side of the curve between mean and 0.89σ and similarly 30% of the cases lie on the left hand side of the curve between mean and $-.84\sigma$. Then the middle 60% of the cases lie between mean and $\pm .84\sigma$ since standard deviation is equal to 20 (given). This value become $\pm .84 \times 20$ score units which is ± 16.80 score units. Now adding ± 16.80 to the mean (100), we get that the middle 60% of the scores is given distribution lie between 83.20 and 116.80 [$100 - 16.80 = 83.20$; and $100 + 16.80 = 116.80$]. After due approximation the two score points become equal to 83 and 117.

Let Us Check Our Progress

1. Mention the causes of non-normality in score distribution.
2. Why there are two tails in NPC. — Explain with example.

1.1.2 : DERIVED SCORES

STANDARD SCORES

Raw scores are not comparable due to difference of units in different tests. There should be a common point of reference on the basis of which the raw scores can be compared. In order to interpret the scores properly or to make them comparable we need to convert the raw scores into Derived Scores. The derived scores or called standard scores are of different kinds, for examples,

Sigma Scores (σ scores)

Standard Scores (z or T scores)

Sigma Scores (σ Scores) :

Let us suppose that the mean of a test is 120 and the standard deviation is 15. Then if Ram earns a score of 140 on this test, his deviation from the mean is $140 - 120$ or 20. Dividing this deviation of 20 by the standard deviation. (σ) 15, we give him a score of $\frac{20}{15}$ or 1.33. If Anjali's score is 115 on this test her deviation from the mean is $115 - 120$ or -5 ; and her score in σ unit is -0.33 . Deviations from mean expressed in σ terms are called sigma (σ) scores.

The mean of a set of a σ scores is always 0 (the reference point) and the standard deviation is always unity or 1.00. As approximately half of the score in a distribution will lie below and above the mean, about half of the sigma scores will be negative and half positive. A sigma score makes possible a realistic comparison of scores and provides a basis for equal weighting of the scores as the score on different tests are expressed on a scale with a mean of zero and a standard deviation of 1. The sigma scores are also useful in hypothesis testing, determination of percentile ranks, and probability judgements. However, sigma scores are often small decimal fractions and hence somewhat awkward to deal with in computation.

Characteristics of σ scores :

σ scores are the units of normal probability curve which range from -3σ to $+3\sigma$,

The Mean of a set of a scores is always 0 (zero) and the σ (SD) is always unity or 1.00.

Approximately half of the σ scores will be negative and half positive.

σ scores are often small decimal fractions and hence somewhat awkward to deal with in computation, even though it express a standard for comparison between or among scores obtained from different tests.

Advantages of σ scores :

It is an improved norms over the percentile norms and eliminates the limitation exists in percentile norms.

It is based on the nature of normal probability curve. Generally the raw scores of large sample are approximately normally distributed.

The linear transformation porcedure of σ score is simple and easy.

The σ scores are widely used in the intelligence test and aptitude test, which are supposed to be normally distributed in the population and they represent interval scale of measurement.

Limitations of σ scores :

The σ scores are in minus and plus, therefore it is difficult to understand. The minus values are confusing and not justifiable in educational measurements.

The interpretation of σ score is done with reference to mean of average performance.

The scores are obtained in decimal points which are complicated to handle.

Let Us Check Our Progress

1. Define sigma score.
2. Mention uses of sigma score is educational research and measurement.

Standard Scores :

Sigma Scores are often small decimal fractions and half of them are negative; and hence somewhat inconvenient to deal with in computation. For these reasons, σ scores are usually converted into a new distribution with mean (M) and standard deviation (σ) so selected as to make all scores positive and relatively easy to handle in computation. Such scores are called standard scores.

The conversion of raw scores into standard scores is done with the help of a linear transformation which does not change the shape of the distribution in any way. The formula for the conversion of a raw score to standard score is as follows :

Let X = a score in the original distribution.

X' = a standard score in the new distribution.

M and M' = mean of the raw and standard scores respectively

σ and σ' = SD's of raw and standard scores respectively

Then we may express as —

$$\frac{X' - M'}{\sigma'} = \frac{X - M}{\sigma}$$

$$\text{or, } X' = \frac{\sigma'}{\sigma}(X - M) + M'$$

An example will help us to understand the use of the above expression.

Example : Given a distribution with mean = 86 and $\sigma = 15$. Tarun's score is 91 and Mira's 83. Express these raw scores as standard scores in a distribution with a mean of 500 and σ of 100.

Solution :

The formula for conversion of a raw score into z scores is

$$X' = \frac{\sigma'}{\sigma}(X - M) + M'$$

Here, $\sigma' = 100$

$$\sigma = 15$$

$X = 91$ (Tarun's score)

$X' = 83$ (Mira's score)

$M = 86$, and

$$M' = 500$$

Then we may write as below

$$X' = \frac{100}{15}(90 - 86) + 500$$

$$= 6.67 \times 4 + 500$$

$$= 533 \text{ [Tarun's new score]}$$

For Mira, we may write as.

$$X^I = \frac{100}{15}(83 - 86) + 500$$

$$= 6.67 \times (-3) + 500$$

$$= 400 \text{ (approx) [Mira's new score]}$$

Therefore, in standard score (with Mean=500 and SD=100) Tarun's and Mira's scores are respectively 533 and 480.

T-scores :

There are some limitations related with the use of standard score norms. The standard scores are obtained in plus and minus. The minus standard score are cumbersome to handle. Secondly the standard scores are expressed in decimal points of sigma (σ) which are also complicated to handle them.

T-Score is an improvement over these difficulties of standard score norms. T-scores are also the standard scores but the mean value is 50 and standard deviation is 10. It is also a linear transformation on new mean and SD.

Therefore, it can be said that when the mean (M) and standard deviation (σ) are taken to be 50 and 10 respectively, the standard score is called a T score.

Thus the formula of T-score is as follows :

$$T = \frac{10}{\sigma}(X - M) + 50$$

Where, T= T-scores or standard score.

X=Raw score.

M=Mean of the raw scores.

σ =Standard deviation of raw scores.

Example : Given a distribution with mean = 86 and $\sigma = 15$. Anil's score is 90 and Jamal's 80. Express these raw scores as T score.

Solution :

As we know.

$$T = \frac{10}{\sigma}(X - M) + 50$$

Here, $\sigma = 15$

$$M = 86$$

∴ Substituting Anil's score of 90, we have

$$T = \frac{10}{15}(90 - 86) + 50$$

$$= 0.66 \times 4 + 50$$

$$= 53$$

substituting Jamal's score of 80, we have

$$T = \frac{10}{15}(80 - 86) + 50$$

$$= 0.66 \times (-6) + 50$$

$$= 46.$$

Advantages of standard scores (T-scores)

Standard scores (T scores) are improved norm over the σ (Sigma Score). All the transformed scores are obtained in plus sign.

These are also the linear transformation of scores.

It is also easy to interpret.

This is highly applicable in achievement tests and aptitude tests.

Limitation of Standard scores (T-scores) :

In standard scores norm, the value of T-score norms is computed for each raw score, therefore, it is very time consuming in developing the norms.

This standard score does not locate the position in group performance like percentile norms.

1.1.3 : SAMPLING DISTRIBUTION OF MEAN AND OTHER STATISTICS

Standard Errors of Means and other statistics refer to a special class of statistics which are needed for taking in statistical decisions in context of educational and other researches. These reside in the inferential statistics. The concept of standard errors is conceptually abstract and mathematically complex. But we need to understand the concept in various places and also to apply them in educational research.

Let first recall meaning of two important terms – statistics and parameters; of both of these terms has already been learned in context sampling. A statistic is any kind of measure (say, mean, median, standard deviation, quartile deviation etc) derived from a sample which represents a population and is commonly called “obtained” measure (e.g., mean, median, etc). Other examples of statistics in educational research may be difference(s) between / among two means, medians, r ’s etc. On the other hand, a parameter is any measure (say mean, median etc. of the population). A parameter is seldom determinable, since the entire population is not accessible. The best we can do is to estimate the parameter by drawing sample and by calculating the corresponding statistic. But this is not easy task. We may draw more than one sample from a given population and then calculate statistic of each sample thus drawn. In reality we are very likely to observe all these ‘obtained’ statistic of each sample thus drawn. In reality we are very likely to observe all these ‘obtained’ statistics are not equal although each one has been drawn randomly from the same population. That is, the ‘obtained “measures(statistics) will vary. Then how can we estimate the parameter ? This is a big question. Statisticians have given us solutions.

For this solution to get a concept — sampling distribution of statistic — may be helpful to us. A sampling distribution (for an infinite population) is a theoretical distribution of statistic for an infinite number of similar samples drawn independently from that population. For example, the distribution of means of IQ for an unlimited number of similar samples (say $N=100$ for each case) selected from a large given population (say of seventh grade students in a wide geographical region) would be the sampling distribution of the mean IQs of those seventh grade students.

Naturally, such distribution of statistics will be characterized by its form and standard deviation. Let us put our attention to the later. The standard deviation of the obtained sampling distribution of any statistic (say mean) is referred to as *standard error*. Secondly, in most of the occasion we assume that the form of the sampling distribution is normal or near normal within certain given conditions to be stated later on.

But we can never, of course actually construct a sampling distribution for an infinite population. In most occasion we assume that the form of the sampling distribution (say of mean) of a large random sample is normally distributed and we can estimate the standard the probability that an obtained statistic (say mean) will differ from the true mean by more than any given amount. In Statistics this refers to the Central Limit Theorem. This theorem states : the random sampling distribution of means (and other statistics) tend towards a normal distribution irrespective of the shape of the population of observation sampled and that the approximation to the normal distribution becomes increasingly close with increase in sample size. The meaning of 'large' depends upon the problem but in most educational observation we may say size close to 30 or so.

However, sampling distribution for any statistic (say mean) will be markedly skewed, not normal, for small sample but we can think of any other form of distribution.

Thus, we see that the standard error, standard deviation of sampling distribution of any statistic can be useful to estimate the "true" measure of the concerned population parameter and with the obtained value of the estimated "true" measure is reliable, not out of any chance. This is the base line of inferential statistics for taking up reasonable decisions in our research outcomes. The primary objective of statistical inference is to enable us to generalize from a sample to population of which a sample is a representative part. It is also instructive to note that the value of standard error of any statistic depends partly upon the size of the random sample.

Standard Error of Mean

Standard error mean is the standard deviation of sampling distribution of means of a large number of similar random sample drawn from a defined population. Most common formula is :

$$SE_m = \sigma_m = \sigma / \sqrt{N}$$

Where N is the number of cases (sample size) and σ is the standard deviation of the population. But we can substitute it by our obtained standard deviation (s) of an available random sample if the sample is large (greater than 30)

The above relation points out that the value of SE_m should functionally smaller and this is possible if (i) N is larger and (ii) standard deviation is smaller (which is possible if the sample is homogenous)

Confidence Intervals

The standard error of the mean SE_m or σ_m represents a measure by which the sample means deviate from population mean so that it may be taken as a trustworthy estimate of the population mean. The answer lies in the limit of confidence intervals fixed on the basis of degree of confidence or trustworthiness required in a particular situation. Usually we make use of 0.95 (or 0.55) and 0.99 (or 0.01) percentage of probability as two known degrees of confidence for specifying the interval within which we may assert the existence of the population mean.

In the case of normal distribution we know from the Table B for normal curve that 95% cases lie within the limits $\mu \pm 1.96$ and 99% cases lie within the limits $\mu \pm 2.58\sigma$. Hence, from the normal distribution of the sample means, it may be safely concluded that there are 95 chances out of 100 for a sample mean to deviate from the population mean by $\pm 1.96\sigma$ (± 1.96) times the standard error of the mean and only 5 chances out of 100 that the population mean will lie beyond the limits $\mu \pm 1.96\sigma_m$. Similarly, it may be generalised that there are 99 chances out of 100 for a sample mean to deviate from the population mean by $\pm 2.58\sigma_m$. The values in terms of scores of the limits $\mu \pm 1.96\sigma_m$ and $\pm 2.58\sigma_m$ are called confidence limits and the interval they contain is called the confidence interval for a known and a fixed degree or a level of confidence. Basically we will use the term 5% and 1% level confidence in depending the limits ($\mu \pm 1.96\sigma_m$ and $\mu \pm 2.58\sigma_m$) beyond which population mean may be estimated to lie. At 5% level of confidence we will say that our population mean may lie within the range of $\mu \pm 1.96\sigma_m$.

Computation of significance of mean in case of Large Samples :

Problem : In an educational test, a sample of 500 undergraduate students of University of Kalyani is found to possess the mean score of 95.00 and SD of 25. Test the significance of this mean. In other words how far can this mean be trusted to estimate the mean of the entire population of the undergraduate students studying in the colleges of Kalyani University.

Solution : We have seen that large samples drawn randomly from the same population produce a normal distribution. In the present case a sample of 500 students is quite a large sample. Therefore, the standard error of the mean may be computed by the formula :

$$SE_m \text{ or } \sigma_m = \frac{\sigma}{\sqrt{N}} = \frac{25}{\sqrt{500}} = \frac{25}{\sqrt{5 \times 10 \times 10}} = \frac{25}{10\sqrt{5}} = 1.12$$

Significance of the given mean at 5% and 1% levels of confidence may be given through the following confidence limits.

The limit of confidence level may be calculated as :

$$M \pm 1.96 \times 1.12$$

$$= 95 \pm 2.2$$

Or between 92.8 and 97.2.

It means that only 5 chances at of the 100 that the population mean or true mean will be beyond the limit 92.8–97.2. or 93-97 (approx)

At 1% level of confidence, we get

$$M \pm 2.58\sigma_m = 95 + 2.58 \times 1.12$$

$$= 95 \pm 2.89$$

or from 92.11 to 97.89

It means that there is only 1 chance out of 100 that the true mean will be beyond the 92.11–97.89 or 92-98 (approx)

Significance of mean for small sample

In small samples (N less than 30), the standard error of the mean is computed by the formula.

$$SE_m \text{ or } s_m = \frac{s}{\sqrt{N-1}}$$

Where N is the size of the sample and s is the standard deviation.

$$s = \sqrt{\frac{\sum x^2}{N-1}}; \text{ instead of } a = \sqrt{\frac{\sum x^2}{N}} \text{ in large sample}$$

Where x = deviation scores from the mean.

Other Statistic : For large samples $N > 30$ standard error of median, $\sigma_{md} = \frac{1.253 \sigma}{\sqrt{N}}$

Standard error of Quartile deviation SE_σ or $\sigma_\theta = \frac{0.786 \sigma}{\sqrt{N}}$

Standard error of a standard deviation SE_σ or $\sigma_\sigma = \frac{.71 \sigma}{\sqrt{N}}$

Standard error of the co-efficient of correlation

$$SE_r = \sigma_r = \frac{1-r^2}{\sqrt{N}} ; \text{ when } N \text{ is large}$$

1.1.4 : LET US SUM UP

The normal distribution is a very important concept in the behavioral sciences because many variables used in behavioral research are assumed to be normally distributed. Normal curve is very helpful in educational evaluation and measurements. It provides relative position of the individual in a group. The normal distribution is a significant tool in the hands of teacher, through which he can decide the nature of distribution of the scores obtained on the measured variable.

1.1.5 : SUGGESTED READINGS

Mangal, S.K. (2008) : Statistics in Psychology and Education; Prentice-Hall of India Pvt. Ltd. New Delhi.

Garrett, H. E (2005) : Statistics in Psychology and Education; Paragon International Publishers, New Delhi.

Koul, L (1998) : Methodology of Education Research; Vikas Publishing House Pvt. Ltd. New Delhi.

Das, N. G. (2001) : Statistical Methods; (V-II) M. Das and Company, Kolkata.

1.1.6 : ASSIGNMENTS

1. What is a normal curve ? Discuss the properties of normal probability curve.
2. Define and explain the term Skewness, Kurtosis and Standard error of Mean.
3. Given the following data regarding two distributions

	Mathematics	Physics
M	60	33
SD	8	9
Achievement scores of a student	70	67

Find out whether the student did better in Maths or Physics

4. Given a normal distribution with a mean of 50 and standard deviation of 15.

(a) What percent of the cases will lie between the scores of 47 and 60.

(b) What percent of the cases will be between 40 and 47, and

(c) What percent of the group is expected to have scores greater than 68.

5. Explain the concept of standard error, confidence interval and confidence limit as used to determine significance of the mean and other statistics.

APPENDIX : TABLE B

Table B Areas of the Normal Curve (proportions out of 10,000) and Critical Values of z (i.e. x/σ)

x/σ	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0000	0040	0080	0120	0160	0199	0239	0279	0319	0359
0.1	0398	0438	0478	0517	0557	0596	0636	0675	0714	0753
0.2	0793	0832	0871	0910	0948	0987	1026	1064	1103	1141
0.3	1179	1217	1255	1293	1331	1368	1406	1443	1480	1547
0.4	1554	1591	1628	1664	1700	1736	1772	1808	1844	1879
0.5	1915	1950	1985	2019	2054	2088	2123	2157	2190	2224
0.6	2257	2291	2324	2357	2389	2422	2454	2486	2517	2549
0.7	2580	2611	2643	2673	2704	2734	2764	2794	2823	2852
0.8	2881	2910	2939	2967	2995	3023	3051	3078	3106	3133
0.9	3159	3186	3212	3238	3264	3290	3315	3340	3365	3389
1.0	3413	3438	3461	3485	3508	3531	3554	3577	3599	3621
1.1	3643	3665	3686	3708	3729	3749	3770	3790	3810	3830
1.2	3849	3869	3888	3907	3925	3944	3962	3980	3997	4015
1.3	4032%	4049	4066	4082	4099	4115	4131	4147	4162	4177
1.4	4192	4207	4222	4236	4251	4265	4279	4292	4306	4319
1.5	4332	4345	4357	4370	4383	4394	4406	4418	4429	4441

1.6	4452	4463	4474	4484	4495	4505	4515	4525	4535	4545
1.7	4554	4564	4573	4582	4591	5499	4608	4616	4625	4633
1.8	4641	4649	4656	4664	4671	4678	4686	4693	4699	4706
1.9	4713	4719	4726	4732	4738	4744	4750	4756	4761	4767
2.0	4772	4778	4783	4788	4793	4798	4803	4808	4812	4817
2.1	4821	4826	4838	4834	4838	4842	4846	4850	4854	4857
2.2	4861	4864	4868	4871	4875	4878	4881	4884	4887	4890
2.3	4893	4896	4898	4901	4904	4906	4909	4911	4913	4916
2.4	4918	4920	4922	4925	4927	4929	4931	4932	4934	4936
2.5	4938	4940	4941	4943	4945	4946	4948	4949	4951	5952
2.6	4953	4955	4956	4957	4959	4960	4961	4962	4963	4964
2.7	4965	4966	4967	4968	4969	4970	4971	4972	4973	4974
2.8	4974	4975	4976	4977	4977	4978	4979	4979	4980	4981
2.9	4981	4982	4982	4983	4984	4984	4985	4985	4986	4986
3.0	4986.5	4986.9	4987.4	4987.8	4988.2	4988.6	4988.9	4989.3	4939.7	4990.0
3.1	4990.3	4990.0	4991.0	4991.3	4991.6	4991.8	4992.1	4992.0	4992.6	4992.9
3.2	49923.129									
3.3	4995.166									
3.4	4996.631									
3.5	4997.674									
3.6	4998.409									
3.7	4998.922									
3.8	4999.277									
3.9	4999.519									
4.0	4999.683									
4.5	4999.966									
5.0	4999.997133									

BLOCK - 2

MEASURES OF RELATIONSHIPS

CONTENT STRUCTURE

Introduction

Objectives

2.1.1 Correlation

2.1.2 Co-efficient of Correlation

2.1.3 Types of Correlation

2.1.4 Product Moment Correlation

2.1.5 Rank Difference Correlation

2.2.1 Biserial Correlation

2.2.2 Point Biserial Correlation

2.2.3 Partial Correlation

2.2.4 Multiple Correlation

Let Us Sum Up

Suggested Readings

Assignments

Appendix

INTRODUCTION

In the foregoing Units we have discussed those statistical measures that we use for a single variable i.e. the distributions relating to one quantitative variable. Now we shall study the problem of describing the degree of simultaneous relationship of two variables. If we pair measures on two variables of each individual the joint presentation of the two sets of scores in mathematics and physics as under.

Students	1	2	3	4	5
Scores in math	40	17	29	36	25
Scores in phy	38	16	30	32	24

Here each student has value on two variable X and Y i.e. the scores in Mathematics and Physics respectively; hence the distribution is called bivariate distribution. Similarly, the distribution involving more than two variables are called multivariate distributions. In the present Unit we will deal with co-efficient of correlation, product moment and rank difference, biserial, point biserial, partial and multiple.

At the beginning we must note that this type of relationship does not indicate causation, merely shows degree of association between variables under study. Further, the coefficient of correlation is purely relative to the circumstances under which it was obtained and should be interpreted in the light of those circumstance, very rarely, certainly in any absolute sense.

OBJECTIVES

You will be able to :

- * Define correlation
- * Understand the various types of correlation
- * Calculate the co-efficient of correlations of various type.
- * Interpret the obtained co-efficient correlations
- * Be acquainted with the uses of correlation

Unit-1 : Measures of relationships---concept and use only (A)

2.1.1 : CORRELATION

We have so far considered the statistical description of a single variable with the help of mean, standard deviation, etc. for meeting some purposes of educational research. But it is more important to examine the relationship of one variable (say, academic achievement) with another variable (say, IQ) than to measure performance on a single variable.

Now we shall study the problem of describing the degree of simultaneous variation of two variables eg. age and weight. The data in which we secure measures of two variables for each individual is called a bivariate data. Let us suppose that the two variables are denoted by X and Y which indicate height and weight or age and fluency of thinking. These may be shown as :

$$(X, Y) : (X_1, Y_1), (X_2, Y_2), \dots, (X_n, Y_n)$$

The essential feature of the bivariate data is that one measure can be paired with another measure for each member of the group. When we study bivariate data we can find out the degree of relationship between the two variables of such data. By correlatin between two variables X and Y, we mean that, the degree of interdependence / association between X and Y. The degree of relationship within the bivariate data is known as correlation.

If change in the one variable appears to be accompanied by a change in the other variable, the two variables are said to be co-related and this interdependence is called correlation.

The degree of correlation between two variables is termed as coefficient of correlation. Mathematically, it is a ratio. It expresses the extent to which changes in one variable (say X) are accompanied by — or are dependent upon — changes in a second variable (say Y). The expressed relationship may be either linear or non-linear.

2.1.2 : CO-EFFECIENT OF CORRELATION

Co-efficient of correlation is a ratio that tells us to what extent the two variables are related and to what extent the variations in one variable changes with the second variable. It is an index / ratio.

There are various type of coefficient correlation. We are now going to discuss a very common one, formulated by Prof. Karl Pearson, which is popularly called product moment correlation method. It expresses a linear relationship only. Moreover, the measurement must be atleast in interval scale.

The product moment co-efficient of correlation is symboleged by (r).

The measurement of correlation between two variables results in a maximum value that ranges from 1 to -1 ; it may also be 0.

Let Us Check Our Progress

1. What do you mean by co-efficient of correlation ?

2.1.3 : Types of Correlation

Then the value of the correlation in such occasions may be :

(a) Positive (b) Negative or, (c) Zero correlation

(a) Positive Correlation :

When the increases in one variable (X) is followed by a corresponding increases in the other variable (Y); the correlation is said to be positive, its value may range from 0 to $+1.00$.

Thus, the maximum value is $+1.00$ (perfect correlation).

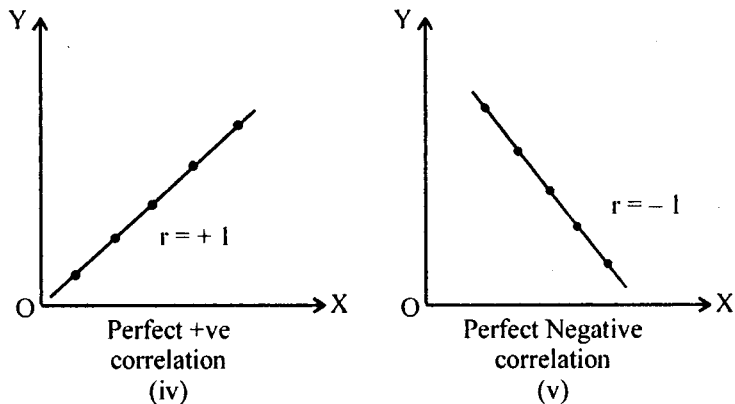
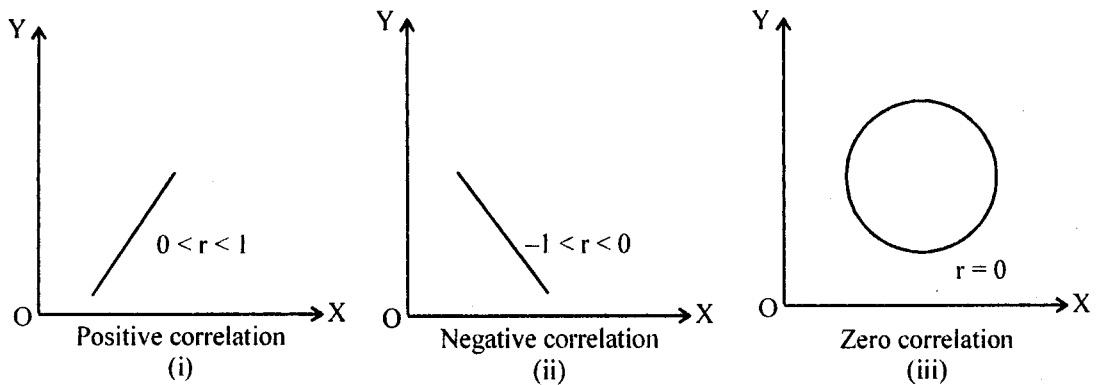
(b) Negative Correlation :

If the increases in one variable (X) results in a corresponding decrease in the other variable (Y), correlation is said to be negative correlation. The negative correlation ranges from 0 to -1.00 . The minimum value is -1.00 (perfect but negative).

(c) Zero correlation :

Zero correlation means no relationship between the two variable X and Y i.e the changes in one variable (X) is not associated with the change in the other variable (Y). The zero correlation is the mid -point of the range -1 to $+1$.

These three kinds are being shown in the three following figures.



Let Us Check Our Progress

1. Differentiate between Positive and Negative correlations with suitable examples.

Interpnelation of the co-efficient of correlation

Let us now see the meaning of Co-efficient of correlation :

Size of correlation	Interpretation
± 1	Perfect positive/negative correlation
$\pm .90 \pm .99$	Very high +ve/-ve correlation ;
$\pm .70 \pm .89$	High +ve/-ve correlation;
$\pm .50$ to $\pm .69$	Moderate +ve/-ve correlation;
$\pm .30$ to $\pm .49$	Low +ve/-ve correlation;
$\pm .10$ to $\pm .29$	Very low +ve/-ve correaltion;
$\pm .00$ to $\pm .09$	Markedly +ve/-ve correlation.

The above enterpretations are only loose. The actual statistical strength of correlation co-effi-
cient depends upon several factors of which the number of pairs used and the nature of variables are
being correlated. While co-efficient of correlation is used in inferential statistics its strength is also
estimated with the help of probability theory.

Co-Variance :

We are now going to get acquainted with a new term covariance which has an essential role in
the calculation of correlation coefficient by product moment method of Karl Pearson.

Given a set of n pairs of observations (X,Y) : $(X_1 Y_1)$, $(X_2 Y_2)$, ..., $(X_n Y_n)$ nelation to the two
variable X and Y, the co-variance of X and Y usually represented by cov (X,Y), is difined as :

$$\text{Cov}(X, Y) = \frac{1}{n} \sum (X - \bar{X})(Y - \bar{Y})$$
$$= \frac{1}{n} \frac{\sum xy}{\sigma_x \cdot \sigma_y}$$

Where $x = X - \bar{X}$

$$\text{and } y = Y - \bar{Y}$$

Then we may say that correlation is a method of summarizing the relationship between two
variables or two sets of data.

The two most useful methods for determining the correlation coefficient are :

- * Karl Pearson's Product moment coefficient of correlation (r) and
- * Charles Spearman's Rank difference coefficient of correlation (ρ).

2.1.4 : Product Moment Co-efficient of Correlation

Karl Pearson derived a formula for the calculation of product moment correlation. The formula is

$$r_{xy} = \frac{\text{Cov}(x, y)}{N \cdot \sigma_x \cdot \sigma_y} = \frac{\sum (X - \bar{X})(Y - \bar{Y})}{N \cdot \sigma_x \cdot \sigma_y}$$

$$= \frac{\sum xy}{N \cdot \sigma_x \cdot \sigma_y}; \quad \text{Where } X = X - \bar{X} \text{ and } Y = Y - \bar{Y}$$

r_{xy} = correlation between X and Y.

x = Deviation of X-score from the mean of X score

y = Deviation of Y-score from the mean of Y score

$\sum xy$ = Sum of all the products of deviation

σ_x = Standard deviation of the distribution of X

σ_y = Standard deviation of the distribution of Y

N = Total No of scores (Paired)

There is also another formula for computing the Pearson product moment coefficient of correlation is

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{\{N \sum X^2 - (\sum X)^2\} \{N \sum Y^2 - (\sum Y)^2\}}}$$

We are now understanding the above formula with the help of solution of the following problems :

Problem 1 : Find the product moment coefficient of correlation between the two sets of scores given below.

Scores in : X 88, 87, 85, 84, 81, 79, 76, 75, 73, 72

Scores in : Y 65, 69, 71, 59, 55, 40, 61, 60, 57, 63

Soulutin :

Let us work out the Solution as shown in Table-1.

Table : 1

Scores in X	Scores in Y	$X = X - \bar{X}$	$Y = Y - \bar{Y}$	x^2	y^2	xy
88	65	8	5	64	25	40
87	69	7	9	49	81	63
85	71	5	11	25	121	55
84	59	4	-1	16	1	-4
81	55	1	-5	1	25	-5
79	40	-1	-20	1	400	20
76	61	-4	-1	16	1	-4
75	60	-5	0	25	0	0
73	57	-7	-3	49	9	21
72	63	-8	3	64	9	-24
$\Sigma X = 800$	$\Sigma Y = 600$			$\Sigma x^2 = 310$	$\Sigma y^2 = 672$	$\Sigma xy = 162$

$$\text{Mean of } X = \bar{X} = \frac{810}{10} = 80$$

$$\text{Mean of } Y = \bar{Y} = \frac{600}{10} = 60$$

$$\sigma_x = \sqrt{\frac{\Sigma x^2}{n}} = \sqrt{\frac{310}{10}} = \sqrt{31}$$

Please note for the first pair

$$x = 88 - 80 = 8 ; x^2 = 64$$

$$y = 65 - 60 = 5 ; y^2 = 25$$

$$xy = 8 \times 5 = 40$$

$$\sigma_y = \sqrt{\frac{\Sigma Y^2}{n}} = \sqrt{\frac{672}{10}} = \sqrt{67.2}$$

$$\therefore r = \frac{\Sigma xy}{n \sigma_x \cdot \sigma_y}$$

$$= \frac{162}{10 \times \sqrt{31} \times \sqrt{6.72}} \text{ [Putting the respective numerical values]}$$

$$= 0.355$$

Therefore, co-efficient of correlation between X and Y variables is equal to 0.35. It can be said that there are a definite but slight +ve relationship between the Scores X and Scores of Y in the given problem.

Problem 2 : Calculate the product moment co-efficient of correlation between the scores in English and scores in Bengali. The scores in English and scores in Bengali have been obtained by 10 students of Class VII.

Students Sl. No.	1	2	3	4	5	6	7	8	9	10
Score in English	49	73	54	50	37	43	84	74	55	61
Score in Bengali	77	81	87	52	51	77	93	91	89	72

Soulutin :

Table : 2

Students sl. No.	Scores in English (X)	Scores in Bengali (Y)	$x = X - \bar{X}$	$y = Y - \bar{Y}$	x^2	y^2	xy
1	49	77	- 9	0	81	0	0
2	73	81	15	4	225	16	60
3	54	87	- 4	10	16	100	- 40
4	50	52	- 8	- 25	64	625	200
5	37	51	- 21	- 26	441	676	- 546
6	43	77	- 15	0	225	0	0
7	84	93	26	16	676	256	416
8	74	91	16	14	256	196	224
9	55	89	- 3	12	9	144	- 36
10	61	72	3	- 5	9	25	- 15

$$\Sigma X = 580 \quad \Sigma Y = 770$$

$$\Sigma x^2 = 2002 \quad \Sigma y^2 = 2038 \quad \Sigma xy = 1355$$

$$M_x = \bar{X} = \frac{580}{10} = 58.00$$

$$M_y = \bar{Y} = \frac{770}{10} = 77.00$$

$$\sigma_x = \sqrt{\frac{\Sigma x^2}{N}} = \sqrt{\frac{2002}{10}} = 14.11$$

$$\sigma_y = \sqrt{\frac{\Sigma y^2}{N}} = \sqrt{\frac{2038}{10}} = 14.27$$

Then,

$$r = \frac{\Sigma xy}{N \cdot \sigma_x \cdot \sigma_y} = \frac{1355}{10 \times 14.11 \times 14.27} = \frac{1355}{201.35} = 0.67$$

The obtained value of r is 0.67 which is a ratio and expresses degree of correlation between two variables (X and Y), namely measures of achievement in English and Bengali of ten VII grade students.

Hence, it can be interpreted that the two set of scores of English and Bengali are substantial and markedly related and the relation is positive that is if a student score right in English, his score in Bengali is likely to be correspondingly high too.

Problem : 3

The Scores given below were obtained on an Intelligence Test and Algebra Test by 10 students of class VIII. Compute Pearsons co-efecient of correlation.

Student	1	2	3	4	5	6	7	8	9	10
Score in Int.	24	20	18	17	15	12	10	8	6	4
Score in Alzebra	13	9	12	20	11	16	5	2	7	1

Solution :

For computing r we may use here another formula

$$r = \frac{\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{\{N\Sigma X^2 - (\Sigma X)^2\} \{N\Sigma Y^2 - (\Sigma Y)^2\}}}$$

Where

r = Pearson's co-efecient of correlation

ΣX = Sum of scores of X variable;

ΣY = Sum of scores of Y variable;

ΣX^2 = Sum of the sqyared X scores;

ΣY^2 = Sum of the squared Y scores;

ΣXY = Sum of the product of period X and Y scores.

N = Number of paired scores.

The steps in computing 'r' from ungrouped scores may be outlined thus:

Step - 1 : Find the sum of the scores of X and Y variable;

Step - 2 : Square each scores of X variable ad find their sum, ΣX^2

Step - 3 : Square each scores of Y variable ad find their sum, ΣY^2

Step - 4 : Multiply the X scores of Y scores in the same rows, and enter these products in the colum XY and get the sum of XY, is ΣXY

Step - 5 : Put the vlaues of N, ΣX , ΣY , ΣX^2 , ΣY^2 and ΣXY in the formula, and simplify.

Table : 3

Students	Scores on Intelligence	Sores on Algebra	X^2	Y^2	XY
1	24	13	576	169	312
2	20	9	400	81	180
3	18	12	324	144	216
4	17	20	289	400	340
5	15	11	225	121	165
6	12	16	144	256	192
7	10	5	100	25	50
8	8	2	64	4	16
9	6	7	36	49	42
10	4	1	16	1	4

$$N=10 \quad \Sigma X = 134 \quad \Sigma Y = 96 \quad \Sigma X^2 = 2174 \quad \Sigma Y^2 = 1250 \quad \Sigma XY = 1517$$

$$r = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{\{N\Sigma X^2 - (\Sigma X)^2\}\{N\Sigma Y^2 - (\Sigma Y)^2\}}}$$

$$= \frac{10(1517) - 134 \times 96}{\sqrt{\{10 \times 2174 - (134)^2\}\{10 \times 1250 - (96)^2\}}} = \frac{2306}{3525 - 5} = +.65$$

Hence it can be interpreted that the two sets of scores i.e. intelligence test and Algebra test scores are moderately and positively correlated.

2.1.5 Rank difference Method :

Charles Spearman's Rank difference method is used widely in computing the correlation between two sets of data. This method is applied particularly where the number of cases is less than 30. This method can be used only when the measure is in ordinal scale or if the measure is in nominal/ratio scale that should be converted into ordinal scale before actual computation. The formula for calculating rank difference co-efficient of correlation is

$$\rho = 1 - \frac{6\Sigma D^2}{N(N^2 - 1)}$$

Where ρ = The Spearman's Rank difference co-efficient correlation

D = Difference between paired Ranks

N = Number of subjects or items ranked.

Problem 4 :

Find the correlation between the following sets of scores by using the rank difference method.

X = 80, 68, 73, 48, 65, 77

Y = 66, 44, 55, 82, 90, 66, 66

Solution :

Table : 4

X	Y	R_x	R_y	$D=R_x - R_y$	D^2
80	66	1	4	-3	9
68	44	5	7	-2	4
73	55	3	6	-3	9
72	82	4	2	2	4
48	19	7	1	6	36
65	66	6	4	2	4
77	66	2	4	-2	4
					$\Sigma D^2 = 70$

Note :

R_x = rank of X.

R_y = rank of Y.

In X set of scores the first number is 80, this is the highest in value and its assigned rank is 1. Similarly, the score 48 is the lowest, hence its assigned rank is 7.

$$\begin{aligned}\therefore \rho &= 1 - \frac{6\Sigma D^2}{N(N^2 - 1)} \\ &= 1 - \frac{6 \times 70}{7(7^2 - 1)} = 1 - \frac{420}{7 \times 48} = 1 - \frac{420}{336} = 1 - 1.25 = -0.25\end{aligned}$$

The co-efficient of correlation between two variables of X and Y is negative. It is -0.25. This means that as the values of X increases the values of Y decreases and vice versa. The correlation between the variable of X and Y is negative.

Problem - 5 :

Find the rank difference correlation coefficient between two sets of scores given below.

x = 27 81 45 66 63 22 25

y = 35 42 55 60 42 55 25

Solution :**Table : 5**

X	Y	R _x	R _y	D=R _x -R _y	D ²
27	35	5	6	-1	1.00
81	42	1	4.5	-3.5	12.25
45	55	4	2.5	1.5	2.25
66	60	2	1	1.0	1.00
63	42	3	4.5	1.5	2.25
22	55	7	2.5	4.5	20.25
25	25	6	7	1.	1.00
					$\Sigma D^2 = 40.00$

$$\therefore \rho = 1 - \frac{6\Sigma D^2}{N(N^2 - 1)}$$

$$= 1 - \frac{6 \times 40}{7(7^2 - 1)}$$

$$= 1 - \frac{240}{7 \times 48}$$

$$= 1 - \frac{240}{336}$$

$$= 1 - 0.714$$

$$= +0.29$$

$$= + 0.29$$

The coefficient of correlation between variable of X and Y is positive but low which means that an increase in values of X will lead to simultaneous increase in values of Y but only to a slight degree and vice versa.

Problem 6 :

The following data give the scores of 10 students on two trials of test with a gap of 2 weeks in Trial-I and Trial-II. Compute the correlation between the scores of two trials by rank difference method.

Student	A	B	C	D	E	F	G	H	I	J
Trial-I	10	15	11	14	16	20	10	8	7	9
Trial-II	16	16	24	18	22	24	14	10	12	14

Solution :

Table : 6

Student	Trial-I X	Trial-II Y	Rank of Trial-I	Rank of Trial-II	D= R(x)~R(y)	D ²
A	10	16	6.5	5.5	1.0	1.00
B	15	16	3	5.5	-2.5	6.25
C	11	24	5	1.5	3.5	12.25
D	14	18	4	4	0	0
E	16	22	2	3	-1.0	1
F	20	24	1	1.5	-0.5	2.5
G	10	14	6.5	7.5	-1.0	1
H	8	10	9	10	-1.0	1
I	7	12	10	9	1.0	1
J	9	14	8	7.5	0.5	2.5
N=10					$\Sigma D = 00.00$	24.00

$$\rho = 1 - \frac{6\sum D^2}{N(N^2 - 1)} = 1 - \frac{6 \times 24}{10(10^2 - 1)} = .85$$

The correlation between Trial-I and Trial-II positive and very high.

Steps : —

Step-I : List the students in column-I

Step-II : In column 2 & 3 write scores of each student on individual in test-I and test-II

Step-III : Take one set of scores of column-2 and assign a rank of 1 to the highest scores which is 20, assign a rank of 2 to the next highest scores which is 16 and so on, till the lowest scores get a rank equal to N which is = 10

[Look at the column 4. Students A and G have similar scores to 10 each and they possess 6th and 7th rank in the group. In stead of assigning the 6th and 7th rank, the average of the two rank i.e. $6.5 = \frac{6+7}{2}$ has been assigned to each of them]

Step-IV : Take the 2nd set of scores and calculate the same

Step-V : Calculate the difference of ranks of each student

Step-VI : Each difference of ranks of column 6 is squared and recorded in column 7. Get the $\sum D^2$.

Step-VII : Put the value of $\sum D^2$ and N in the formula of spearman's co-efficient of correlation.

Uses of Co-efficient of Correlation (r) :

Co-efficient of Correlation (r) may be useful in the following cases :

- * Predicting one variable from another.
- * It indicates the nature of relationship between two variables.
- * It is useful in validating a test. (eg. a group intelligence test)
- * It is used in determining the reliability of a test.
- * It is useful for factor analysis.
- * It is useful for item analysis, to determine the difficulty value and discriminating power of a test.

- * It is useful in educational and vocational guidance, prognosis in the selection of workers in office or factory, and in educational decision making.
- * It is useful for regression analysis.

Let us check your progress

- (i) State three uses of co-efficient correlation
- (ii) Distinguish between r and ρ .

Unit-2 : Measures of relationships---concept and use only (B)

2.2.1 : Biserial Correlation :

It is a further method of computing product moment (Karl Pearson's) correlation (r). The Biserial Correlation (r_{bis}) is used when two sets of scores are obtained on the same test for two groups respectively. Two groups are formed initially on the basis of some criterion, and instead of scores, observed frequencies on the matched score groups are taken into consideration.

In educational and psychological studies, we often come across situations where both the variables are correlated and continuous, while one of them is artificially reduced to dichotomy. The term dichotomous means “cut in to two parts”. In such a situation, when we try to compute correlation between a continuous variable and a variable reduced to artificial dichotomy, we compute the co-efficient of biserial correlation.

Suppose, we like to find correlation between marks obtained in an achievement test and classroom adjustment in a group of primary school children ; we have continuous score on the first but for the second we can group students as “adjusted” or “mal adjusted” on the basis of some criterion measure. This is an appropriate case for Biserial Correlation.

Characteristics of Biserial Correlation :

The biserial correlation co-efficient, r_{bis} , is computed when one variable is artificially reduced to two categories (dichotomy).

The conditions of the Biserial Method are —

- * Continuity in the dichotomised traits.
- * Normality of distribution, underlying the dichotomy,
- * A large N, and
- * A split near the median.

Computation of r_{bis} :

Formula : The general formula for biserial co-efficient of correlation (r_{bis}) is —

$$r_{bis} = \frac{Mp - Mq}{\sigma_t} \times \frac{pq}{y}$$

here, p = Proportion of cases in one of the categories (group) of dichotomous variable.

q = Proportion of cases in the lower group = 1 – p

Mp = Mean (M) of the values of higher group.

Mq = Mean (M) of the values of lower group.

σ_t = Standard deviation (SD) of the entire group.

y = Height of the ordinate of the normal curve separating the portion p and q.

Problem 7 :

The following table shows the distribution of scores on an achievement test earned by two groups of students those who passed and those who failed in a test of Arithmetic. Compute the co-efficient of biserial correlation.

[Here score in arithmetic is a continuous and normally distributed measure while pass / fail has been determined by a criterion that has differentiated between pass or fail]

Table-7

Scores on a test of achievement	Result in Arithmetic test	
	Passed	Failed
185-194	7	0
175-184	16	0
165-174	10	6
155-164	35	15
145-154	24	40
135-144	15	26
125-134	10	13
115-124	3	5
105-114	0	5
	120	110

Solution : The formula for calculating r_{bis} is

$$r_{bis} = \frac{Mp - Mq}{\sigma_t} \times \frac{pq}{y}$$

Based on this, we can assign values to the above variable by using the following steps :

Step 1 :

p, Computes proportion of cases in the passed group (Group - 1)

$$= \frac{n_1}{N} = \frac{\text{Those who passed}}{\text{Total No. of students}} = \frac{120}{120 + 110}$$

$$= \frac{120}{230} = 0.52$$

Step 2 : Calculate proportion of cases in the failed group (Group - 2)

$$q = 1 - p = 1 - 0.52 = 0.48$$

Step 3 : Determine y, Height of the normal curve ordinate separating the portions p and q
 = 0.3984 (as read from the Table A given in the **Appendix**)

Step 4 : For the calculation of Mp (Mean of the scores of the passed group). Mq (Mean of the scores of the failed group), and σ_t (Standard Deviation of scores of total group), we shall now compute as in Table 8.

Table : 8

Achievement	Arithmetic Test			Passed group		failed group		Entire group		
test scores	Passed	Failed	Total	x'	fx'	y'	fy'	z'	fz'	fz' ²
185-194	7	0	7	4	28	4	0	4	28	112
175-184	16	0	16	3	48	3	0	3	48	144
165-174	10	6	16	2	20	2	12	2	32	64
155-164	35	15	50	1	35	1	15	1	50	50
145-154	24	40	64	0	0	0	0	0	0	0
135-144	15	26	41	-1	-15	-1	-26	-1	-41	41
125-134	10	13	23	-2	-20	-2	-26	-2	-46	92
115-124	3	5	8	-3	-9	-3	-15	-3	-24	72
105-114	0	5	5	-4	0	-4	-20	-4	-20	80
	n ₁ =120	n ₂ =110	N=230		$\Sigma fx' = 87$		$\Sigma fy' = -60$		$\Sigma fz' = 27$	$\Sigma fz'^2 = 655$

$$M_p = A + \frac{\Sigma fx'}{N} \times i$$

$$\text{Where, } A = \text{Assumed Mean} = \frac{145 + 154}{2} = 149.5$$

$$x' = \frac{X - A}{i} = \frac{\text{Mid - Value of X scores} - \text{Assumed Mean}}{\text{Class interval}}$$

Here, N = Total No. of passed students (n₁) = 120

i = Class interval = 10

Hence,

$$M_p = 149.5 + \frac{87}{120} \times 10$$

$$= 149.5 + \frac{87}{12} = 149.5 + 7.25 = 156.75$$

$$M_q = A + \frac{\Sigma fy'}{N} \times i$$

$$= 149.5 + \frac{(-60)}{110} \times 10 = 149.5 - \frac{60}{11}$$

$$= 149.5 - 5.45 = 144.05$$

$$M_p - M_q = 156.75 - 144.05 = 12.70$$

$$\sigma = i \sqrt{\frac{\Sigma f_z'^2}{N} - \left(\frac{\Sigma f_z'^2}{N} \right)}$$

$$= 10 \sqrt{\frac{655}{230} - \left(\frac{27}{230} \right)^2}$$

$$= 10 \sqrt{\frac{655}{230} - \left(\frac{27}{230} \right)^2}$$

$$= \frac{1}{23} \sqrt{655 \times 230 - 27 \times 27}$$

$$= \frac{1}{23} \sqrt{149921}$$

$$= \frac{387.2}{23}$$

$$= 16.83$$

Step 5 : Substitute the value of p, q, y, Mp, Mq and σ_t in the following formula :

$$r_{bis} = \frac{M_p - M_q}{\sigma_t} \times \frac{pq}{y}$$

$$= \frac{12.67 \times 0.52 \times 0.48}{16.83 \times 0.3984}$$

$$= \frac{127 \times 52 \times 480}{1683 \times 3984}$$

$$= 0.47$$

Then the co-efficient of biserial correlation, $r_{bis} = 0.47$

Thus, biserial correlation gives an estimate of the product moment correlation coefficient (r) to be expected from the given data when certain assumptions have been met. The assumptions are (a) Continuity in the dichotomized trait (Variable) ; (b) normality of distribution, underlying the dichotomy, (c) a large N, and (d) a split that is not too extreme (i.e. the proportions p and q should not maintain a large difference closer to 50).

However, r_{bis} cannot be used in regression equation.

Biserial Correlation Coefficient (r_{bis}) is less reliable than product moment r. However, there are many situations, if N is large, and p and q values are closer to 0.50, it may be profitable to use biserial correlation.

2.2.2 : Point Biserial Correlation

When items are scored simply as 1, if correct, and 0, if incorrect, that is, as right or wrong, the assumption of normality in the distribution is unwarranted. But the other variable is expressed as test scores, continuous and normally distributed. In such cases the point biserial method is appropriate to use. It assumes that the variable which has been classified into two categories can be thought of as concentrated at two distinct points along a graduated scale or continuum. Examples of true dichotomies are pass-fail male-female, etc.

The formula for Point Biserial Correlation is :

$$r_{pbis} = \frac{M_p - M_q}{\sigma} \times \sqrt{pq}$$

Where, M_p = Mean of the first category (continuous)

Mq = Mean of the second category (diachotomous)

σ = SD of the entire sample.

p = Proportion of the sample in the first group.

q = Proportion of the sample in the second group.

The alternative formula for this is :

$$r_{p.bis} = \frac{Mp - Mt}{\sigma t} \times \sqrt{p/q}$$

Here, Mt = Mean of the entire group

σt = Standard deviation (SD) of the entire group.

Problem 8 : The data given in the following table shows the distribution of scores of 100 students on a certain test (X) and another test (Y) which was simply scored as right or wrong, 1 and 0. Compute the necessary coefficient of correlation.

Table-9

Scores on Test X	Those who responded rightly	Those who responded wrongly
70-74	3	0
65-69	6	1
60-64	6	2
55-59	5	4
50-54	6	2
45-49	7	6
40-44	6	8
35-39	3	6
30-34	3	9
25-29	1	4
20-24	0	12
	46	54

Solution : Here we have to compute the correlation between two sets of variable, one of which is in a continuous measure and the other in a genuine dichotomy. Hence it needs the computation of co-efficient of point biserial correlation ($r_{p\text{ bis}}$).

Therefore, the formula for $r_{p\text{ bis}}$ is

$$r_{p\text{ bis}} = \frac{M_p - M_t}{\sigma_t} \times \sqrt{p/q}$$

For finding the related values of the formula, let us proceed as follows :

Step 1 : p = Proportion of cases in the first group. (those who responding rightly)

$$= \frac{46}{100} = 0.46$$

Step 2 : $q = 1 - P = 1 - 0.46 = 0.54$ [those who responded wrongly]

Step 3 : Calculation of M_p , M_t and σ_t

The computation process is illustrated in

Table -10

Scores on X	Those who responded rightly (X)	Those who responded wrongly	Total (z)	x'	fx'	z'	fz'	fz'^2
70-74	3	0	3	5	15	5	15	75
65-69	6	1	7	4	24	4	28	112
60-64	6	2	8	3	18	3	24	72
55-59	5	4	9	2	10	2	18	36
50-54	6	2	8	1	6	1	8	8
45-49	7	6	13	0	0	0	0	0
40-44	6	8	14	-1	-6	-1	-14	14
35-39	3	6	9	-2	-6	-2	-18	36
30-34	3	9	12	-3	-9	-3	-36	108
24-29	1	4	5	-4	-4	-4	-20	80
20-24	0	12	12	-5	0	-5	-60	300
$n_1=46$	$N_2=54$	$N=100$			$\Sigma fx' = 48$		$\Sigma fz' = -55$	$\Sigma fz'^2 = 841$

$$M_p = A + \frac{\sum fx'}{n_1} \times i = 47 + \frac{48}{46} \times 5 = 47 + 5.2 = 52.2$$

$$(\text{Here, } A = \text{Assumed Mean} = \frac{45 + 49}{2} = 47, i = 5 \text{ and } n_1 = 46)$$

$$M_t = A + \frac{\sum fz'}{N} \times i = 47 + \frac{-55}{100} \times 5 = 47 - 2.75 = 44.2$$

$$\sigma_t = i \sqrt{\frac{\sum fz'^2}{N} - \frac{(\sum fz')^2}{N^2}} = 5 \sqrt{\frac{841}{100} - \frac{(-55)^2}{100^2}} = 5 \sqrt{\frac{841}{100} - \frac{55 \times 55}{100 \times 100}}$$

$$= \frac{5}{100} \sqrt{84100 - 3025} = \frac{1}{20} \sqrt{81075} = \frac{284.73}{20} = 14.236$$

$$\therefore r_{p.bis} = \frac{M_p - M_t}{\sigma_t} \times \sqrt{p/q} = \frac{52.2 - 44.2}{14.236} \sqrt{0.46/0.54}$$

$$= \frac{8}{14.236} \sqrt{0.8518518} = 0.562 \times 0.923 = 0.52$$

Therefore, point biserial correlation coefficient $r_{p.bis} = 0.52$

Some points : Point biserial correlation is especially useful in the analysis of a test, i.e., in item-test correlations.

Further, point biserial correlation is a product moment correlation (r).

Since point biserial correlation is not restricted to normal distributions in the dichotomous variable, it is much more generally applicable than biserial correlation.

Relation of r_{bis} and r_{pbis} :

On most counts r_{pbis} is a better-more dependable — statistic than r_{bis} . Remember that point biserial correlation makes no assumptions regarding the form of distribution in the dichotomized variable; its range is ± 1.00 ; it may be used in regression equation and its standard error can be determined exactly. In comparison, point biserial correlation coefficient is always lower than r_{bis} for the same two variables.

2.2.3 : Concepts of Partial Correlation

Partial and Multiple correlations represent an important extension of the theories and techniques of two-variable linear correlation to problems which involve three or more variables. The correlation between two variables is sometimes misleading and may be erroneous if there is little or no correlation between the variables other than that brought about by their common dependence upon a third variable (or several variables).

Partial correlation Method :

While conducting studies in the field of education and psychology, we often find that the relationship between two variables is greatly influenced by a third variable or an additional variable. In such a situation, it becomes quite difficult to have a reliable and an independent estimate of correlation between these two variables unless there is some possibility of nullifying the effects of a third variable on the variables in question. It is the partial correlation which helps in such a situation for nullifying the undesired influence of a third or any additional variable on the relationship of the two variables.

Partial correlation can thus be described as a special correlation technique, which is helpful in estimating independent and reliable relationship between any two variables by eliminating and ruling out any undesirable influence or interference of a third or an additional variable on the variable being correlated.

Let us take a concrete example. If we were to take a large sample of primary school children of all ages from 6 to 10, we would find a significant correlation (r) between measures of height and spelling ability for this sample. This of course would not mean that the taller students are better spellers because they are taller, not that they are taller because they are better spellers. Rather, the observed correlation may be readily explained by the fact that both height and spelling ability increase with age, and hence the older students are both taller than the younger students and better spellers than the younger students. The fact that there is little or no intrinsic relationship between height and spelling ability may be readily demonstrated by computing the correlation between measures of these traits for a group of students all of whom are of the same age, in which case no significant correlation would be found.

Thus, when the relationship between two variables for a given group is influenced by the

presence of a third variable, a measure of the relationship with this influence removed may (if the relationships are linear) be computed by the technique of partial correlation. The partial correlation between variables 1 and 2, with variable 3 “taken out” or “partially out” is given by the formula.

$$r_{1.23} = \frac{r_{12} - r_{11}r_{23}}{\sqrt{(1 - r_{13}^2)(1 - r_{23}^2)}}$$

The coefficient $r_{1.23}$ is a partial correlation coefficient of first order (only one variable has been taken out).

Uses of Partial correlation :

Partial correlation is used to examine the influence of one variable upon another, after eliminating the effects of all other variables.

Partial correlation thus one technique of control of variables that may appear in the degree of relationship to which the researcher is interested to examine.

Its major advantage lies in the fact that it enables us to set up a multiple regression equation of two or more variable, by means of which we can predict another variable or criterion.

Partial Correlation : Example

Problem : From a certain number of schools in Kolkata, a sample of 500 students studying in classes IX and X was taken. These students were evaluated in terms of their academic (variable 1) achievement and participation in co-curricular activities (variable 2). Their IQ's (variable 3) were also tested. The correlation among these three variables was obtained and recorded as follows :

$$r_{12} = 0.18, r_{23} = 0.70, r_{13} = 0.60$$

Find out the independent correlation between the main (first two) variable - academic achievement and participation - in co-curricular activities.

Solution : The independent correlation between academic achievement and participation in co-curricular activities - the main two variables - can be found by computing partial correlation between these two variable, i.e. by computing $r_{1.23}$ (keeping constant the third variable)

$$r_{12.3} = \frac{r_{12} - r_{13}r_{23}}{\sqrt{1-r_{13}^2}\sqrt{1-r_{23}^2}} \text{ [Using above formula in a somewhat modified form]}$$

Substituting the given value of correlation in the foregoing formula, we obtain

$$r_{12.3} = \frac{0.80 - 0.60 \times 0.70}{\sqrt{1 - 0.60 \times 0.60} \sqrt{1 - 0.70 \times 0.70}}$$

$$= \frac{0.80 - 0.42}{\sqrt{1 - 0.36} \sqrt{1 - 0.49}}$$

$$= \frac{0.38}{\sqrt{0.64} \sqrt{0.51}}$$

$$= \frac{0.38}{0.8 \times 0.714}$$

$$= \frac{0.38}{0.5712}$$

$$= \frac{3800}{5712}$$

$$= 0.67$$

Thus, the partial correlation = 0.67

This partial correlation $r_{12.3} = 0.67$ establishes correlation between academic achievement and participation in cocurricular activities when IQ of the students has been partial-out. (i.e. if all students had same IQ).

2.2.4 : Multiple Correlation

In many studies related to education and psychology, we find that a variable is dependent on a number of other variables called independent variables. For examples, if we take the case of one's academic achievement, it may be found associated with or dependent on variables like intelligence, socio-economic status, education of the parents, the methods of teaching, the quality of teachers,

aptitude, interest, environmental set up, number of hours spent on studies and so on. All these independent variables affect the achievement scores obtained by the students. If we want to study the combined effect or influence of these variables on a single dependent variable, then we have to compute a special statistic called co-efficient of multiple correlation.

The co-efficient of multiple correlation signifies a statistic used for denoting the strength of relationship between one variable, called dependent variable, and two or more variable, called independent variables.

In simple terms, therefore, by multiple correlation, we mean the relationship between one variable and a combination of two or more variables. In other words, the correlation between a set of obtained scores and the same scores predicted from the multiple regression equation is called a co-efficient of multiple correlation. It is designated by R (called multiple R).

The multiple correlation is not merely the sum of the correlations of the dependent variable and the various independent variables taken together. The coefficient of multiple correlation (R) indicates the strength of relationship between one variable and two or more others taken together. The multiple R is related to intercorrelation of independent variables as well as to their correlation with the dependent variable. However, this relationship is linear.

Multiple correlation embraces within its theoretical structure two other statistical techniques — partial correlation and linear regression. Therefore, the interpretive value of multiple correlation becomes more explicit in terms of multiple regression and the equation it establishes. More technically we can say that “The correlation between a set of obtained scores and the same scores predicted from the multiple regression equation is called a coefficient of multiple correlation.” Its estimation is complicated but modern statistical packages help calculation of R with the aid of computers.

Characteristics of Multiple Correlation :

Multiple correlation helps one to measures the strength of association of a dependent variable with two or more independent variables.

It is related to the correlations of independent variables as well as to the correlations of these variable with the dependent variable.

It helps estimate the combined effect or influence of the independent variables on the dependent variable.

It helps in the selection and rejection of the sub-tests for a particular test or tests.

For proper computation of multiple correlation it is desirable that the number of cases and, especially, the number of variables, be large.

The multiple correlation co-efficient R is always positive, less than 1.00 and is greater than the zero.

Uses of Multiple Correlation :

Multiple R is used mainly for two purpose —

- * Analysis and
- * Prediction, with the extent of combined influence of a group of variables upon another variable.

Multiple Correlation : Example

Problem : A researcher was interested in studying the relationship between success in a job and the training received. He collected data regarding these and treated them as the two main variables and added a third variable, “interest” (measured by interest inventory). The correlations among these three variables were

$$r_{12} = 0.41, r_{13} = 0.50, r_{23} = 0.16$$

This data enabled him to compute the multiple correlation coefficient and thus to find out the relationship between success in the job and the combined effect of the two independent variables — “training” and “interest”. Find the value of the multiple correlation co-efficient in his study :

Solution : The multiple correlation co-efficient is given by

$$\begin{aligned} R_{1.23} &= \sqrt{\frac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23}}{1 - r_{23}^2}} \\ &= \sqrt{\frac{0.41^2 + 0.50^2 - 2 \times 0.41 \times 0.50 \times 0.16}{1 - 0.16^2}} \\ &= \sqrt{\frac{0.4181 - 0.0656}{0.9744}} \\ &= \sqrt{0.3628} \\ &= 0.601 \end{aligned}$$

Thus, the Multiple correlation coefficient = 0.601

However, the importance multiple correlation, as such, is limited in the light of its interpretation in research. Its squared value expresses the percentage of total variance (100%) what has been accounted for by the joint influence of the independent variables used. In the present problem obtained $R_{1,23} = 0.601$; i. e. $R^2_{1,23} = 0.36$ (approx). Then we may conclude that 36% of the total variance of the dependent variable (success in job) has been accounted for by the combined effects of two independent variables (training and interest).

Let Us Check Our Progress

- (a) What is multiple correlation ?
- (b) What are its uses ?

LET US SUM UP

In computing co-efficient of correlation between two sets of scores achieved by the individual with the help of Rank difference method and product method in case of ungrouped data. Biserial correlation is computed between two variables when one of them is in continuous measure and the other is reduced to artificial dichotomy, e.g. pass fail, adjusted-mal-adjusted. Point biserial correlation is used as a measure of relationship between two variable when one variable falls in a continuous scale and the other is in the situation of natural of genuine dichotomy e.g. right-wrong, living-dead, ad scored for instance, as 1 ad 0. Finally, we have learnt some elementary conceptions of about partial correlation, and multiple correlation both of these have enormous importance in educational research.

Suggested Readings

1. Best & Kahn (2008) : Research in Education; Prentice Hall of India, New Delhi.'
2. Mangal, S. K. (2008) :Statistics in Psychology and Education ; Prentice Hall of India, New Delhi.

3. Das, G (2000) : Psychological Testing and Statistics ; King's Book ; Delhi.
4. Koul, L (1998) : Methodology of Educational Research ; Vikas Publishing House Pvt. Ltd. New Delhi.
5. Garrett, H. E. (2005) : Statistics in Psychology and Education ; Paragan International Publishers, New Delhi.
6. Guilford, J. P (1956). Fundamental Statistics in Psychology and Education. 3rd Edn. New York : Mc Graw-Hill.

Assignment

1. Enumerate the need and importance for computing correlation in the fields of education.
2. What do you mean by co-efficient of correlation ? Discuss in brief the two important methods for computing co-efficient of correlation.
3. What do you understand by the term co-efficient of correlation ? Discuss the ways and means for the interpretation of a computed coefficient of correlation.
4. What are the conditions of Biserial correlation ? When will you use biserial and point biserial correlation ?
5. What is biserial correlation ? How is it computed ?
6. What is point biserial correlation ? How does it differ from biserial correlation ? How is it computed ?
7. What do you mean by the term Partial correlation ? What are its uses ?
8. An investigator, during one of his studies, collected some data and arrived at the following conclusions :
 - (a) The correlation between height and weight = 0.80
 - (b) The correlation between weight and age = 0.50
 - (c) The correlation between height and age = 0.60

Compute the correlation between height and weight by partialling out the third variable, viz. age.

9. Compute product moment correlation from the given two sets of paired scores and interpret the results.

(a)

X :	15	18	22	17	19	20	16	12
Y :	40	42	50	45	43	46	41	41

[Ans. $r : 0.65$]

(b)

Test Score-1	12	10	9	8	7	7	6	5	4	2
Test Scores-2	7	3	8	5	7	12	10	9	13	11

[Ans. $r = - .69$]

10. Perform Rank difference correlation.

Traits	Judge A	Judge B
A	2	1
B	1	2
C	4	5
D	3	6
E	6	4
F	5	3

Note : Numeral under the two judges mean ranks. [Ans. $\rho = 0.48$]

11. The data are distribution of scores on a Poetry Appreciation test achieved by 145 University students belonging to Bengali, Hindi and English departments. The total distribution has been dichotomized into two groups, the first 21 who had training in poetry appreciation and the second 124 who had no such training. Compute biserial correlation to find out if poetry appreciation training had any relation with the students' poetry appreciation ability.

[Assume poetry appreciation scores are normally distributed]

Scores	Training Group (f)	Non-training Group (f)	Total (f)
85-89	5	6	11
80-84	2	16	18
75-79	6	19	25
70-74	6	27	33
65-69	1	19	20
60-64	0	21	21
55-59	1	16	17

$$N_1 = 21$$

$$N_2 = 124$$

$$N = 145$$

$$\text{Ans. } r_{bis} = 0.11$$

12. Perform point biserial correlation.

Assume Criterion score is X and the dichotomy is real (pass or fail) expressed by Y.

Subjects	Test Criterion (X)	Item No. 15 (Y)
1	25	1
2	23	1
3	18	0
4	24	0
5	23	1
6	20	0
7	19	0
8	22	1
9	21	1
10	23	1
11	21	0
12	20	0
13	21	1
14	21	1
15	22	1

$$N_1 = \text{Pass} = 9$$

$$N_2 = \text{Fail} = 6$$

$$\text{Ans. : } r_{bis} = 0.54$$

13. Suppose there are three variables one dependent variable and two independent variables. These have been marked as 1, 2 and 3. The obtained inter correlation among them are — $r_{12} = 0.60$, $r_{13} = 0.32$ and $r_{23} = -0.35$. Find out the values of the following partial correlations.

(a) $r_{12.3}$, (b) $r_{13.2}$ and (c) $r_{23.1}$

[Ans. : (a) 0.80, (b) 0.71 and (c) -0.72]

14. Compute multiple correlation $R_{1(23)}$ of the data given in problem 13

Ans = $R_{1(23)} = 0.88$

Table A : Standard Scores (or Deviates) and Ordinates Corresponding to Divisions of the Area under the Normal curve into a Larger Proportion (p) and a Smaller Proportion (q) alongwith the value $\sqrt{pq}$ (cont.)

The larger area p	Standard scorez	Ordinate y	The smaller area q	$\sqrt{pq}$
.785	.7892	.2922	.215	.4108
.790	.8064	.2882	.210	.4073
.795	.8239	.2841	.205	.4037
.800	.8416	.2800	.200	.4000
.805	.8596	.2757	.195	.3692
.810	.8779	.2714	.190	.3923
.815	.8965	.2669	.185	.3883
.820	.9154	.2624	.180	.3842
.825	.9346	.2578	.175	.3800
.830	.9542	.2531	.170	.3756
.835	.9741	.2482	.165	.3712
.840	.9945	.2433	.160	.3666
.845	1.0152	.2383	.155	.3619
.850	1.0364	.2332	.150	.3571

.855	1.0581	.2279	.145	.3521
.860	1.0803	.2226	.104	.3470
.865	1.1031	.2171	.135	.3417
.870	1.1264	.2115	.130	.3363
.875	1.1503	.2059	.125	.3307
.880	1.1750	.2000	.120	.3250
.885	1.2004	.1941	.115	.3190
.890	1.2265	.1880	.110	.3129
.895	1.2536	.1818	.105	.3066
.900	1.2816	.1755	.100	.3000
.905	1.3106	.1690	.095	.2932
.910	1.340	.1620	.090	.2862
.915	1.3722	.1556	.085	.2789
.920	1.4051	.1487	.080	.2713
.925	1.4395	.1416	.075	.2634
.930	1.4757	.1343	.070	.2551
.935	1.5141	.1268	.065	.2465
.940	1.5548	.1191	.060	.2375
.945	1.5982	.1112	.055	.2280
.950	1.6449	.1031	.050	.2179
.955	1.6954	.0948	.045	.2073
.960	1.7507	.0862	.040	.1960
.965	1.8119	.0773	.035	.1838
.970	1.8808	.0680	.030	.1706
.975	1.9600	.0584	.025	.1561

.980	2.0537	.0484	.020	.1400
.985	2.1701	.0379	.015	.1226
.990	2.3263	.0267	.010	.0995
.995	2.5758	.0145	.005	.0705
.996	2.6521	.0118	.004	.0631
.997	2.7478	.0091	.003	.0547
.998	2.8782	.0063	.002	.0447
.999	3.0902	.0034	.001	.0316
.9995	3.2905	.0018	.0005	.0224

BLOCK - 3

INFERENCEAL STATISTICS

CONTENT STRUCTURE :

Introduction

Objective

3.1.1 : Inferential Statistics

3.1.2 : Null Hypothesis

3.1.3 : Level of Significance

3.2.1 : Degrees of Freedom

3.2.2 : Two-tailed and one-tailed Tests of Significance

3.2.3 : Decision Making : Type I and Type II Errors

3.3.1 : Concepts of Parametric and Non-parametric Techniques

3.3.2 : Parametric Tests

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3.4.0 : Non-parametric Tests

3.4.1 : Chi-square Test

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3.5.0 : Parametric Tests

3.5.1 : Z test and t test (Testing Significance of the
Difference Between Means)

3.5.2 : F-test or Analysis of Variance

Further Testing Significance of the Difference

Two-way Analysis of Variance

3.5.3 : Analysis of Co-variance

Let Us Sum Up

References

Assignments

Some Statistical Tables

INTRODUCTION

Educational research consists of systematically organised variables and its ultimate purpose is the discovery of general principles based on observed relationships between variables. If it were necessary to observe all of the individuals in the population about which one wished to generalise, the process would be highly expensive, never-ending and impracticable. The practical solution is to select samples that are representative of that population; then, through observations and analysis of the sample data, the researcher may infer characteristics of the population. Inferential statistics enable the researcher to make generalization or inferences about the population from his observations of the characteristics of samples. In methodology of education perspective the main task of inferential statistical tests is to draw statistical decision about null hypothesis formulated by a researcher in context of his/her researcher problem.

This Unit will help you systematically to be acquainted with Inferential Statistics for testing null hypotheses using both the non-parametric and parametric technique, and interpretation of results, thus emerged.

OBJECTIVES

After going through this Unit, we will be able to :

- * Define inferential statistics;
- * Define and establish null hypothesis;
- * Give the meaning of the term level of significance/confidence;
- * Define and illustrate the concept of degrees of freedom;
- * State the meaning of two-tailed and one-tailed tests of significance;
- * Explain Type I and Type II errors ;
- * State the assumptions on which the use of parametric tests are based ;
- * Describe the situations for using non-parametric tests ;
- * Discuss the difference between parametric and non-parametric techniques ;
- * Test the null hypothesis and interpret the results ;

- * Describe and illustrate the use of chi-square test ;
- * Describe and illustrate the use of the median test ;
- * Test the significance of the difference between means ;
- * Describe the uses of F-test or analysis of variance ;
- * List the basic assumptions in analysis of variance ;
- * Apply analysis of variance (one-way) ;
- * Describe the basic concept of two-way analysis of variance.
- * Describe the uses and list the basic assumptions of analysis of co-variance.

UNIT-1 : INFERENTIAL STATISTICS AND RELATED CONCEPTS (A)

3.1.1 : Inferential Statistics

Research is generally conducted by means of a sample on the basis of which generalizations concerning the population from which the sample was drawn are reached. The researcher computes certain statistics (sample values) the basis for inferring what the corresponding parameters (population values) might be as it is rarely, if ever possible to measure all of the members of a given population. The values of the parameters for a given population are usually unknown. Ordinarily, the researcher draws a single sample from a given population and his problem becomes one of determining how well he can infer or estimate the parameter from the sample statistics. But he can, under specified conditions, predict the parameters from the sample statistics with a known degree of accuracy. The degree to which a sample statistic represents its parameter is an index of the significance of the computed sample statistics. By applying inferential statistics, the researcher makes decisions or draws inferences from sample data, which have wider generalizability.

3.1.2 : Null Hypothesis (H_0)

A statistical hypothesis is an assumption made about some parameter, i.e., about a statistical measure of population. The commonly used method of stating statistical hypothesis in research is known as *null hypothesis* (H_0). It states that there is no significant difference or relationship between two or more parameters. It concerns a judgement as to whether apparent differences or relationships are true differences or relationships or whether they merely result from sampling error. The

experimenter formulates for statistical purposes a null hypothesis, a no-difference or no-relation hypothesis. It should be mentioned that, although the null hypothesis is needed for statistical purposes, most actual hypotheses are alternatives to the null, that is, hypotheses that propose that differences will exist. The latter type of hypothesis is generally known as alternative hypothesis (H_1). Alternative hypothesis is derived from research hypothesis, though it is stated in operational form

It may seem rather indirect to test a positive hypothesis by testing its alternative, a null hypothesis. But this is precisely what we have to do. The reason is that we can apply a mathematical model in the case of null hypothesis, but there is no easy way for testing alternative hypothesis. When the null hypothesis is not true, there is a multitude of other possible hypotheses, each of which would have to be tested in turn. The null hypothesis is a particular, well-defined, testable case.

Rejecting a null hypothesis provides a stronger test of logic. Evidence that is inconsistent with a particular null or statistical hypothesis provides a strong basis for its rejection. Before a court of law, a defendant is assumed to be not guilty until the not-guilty assumption is discredited or rejected with the support of evidence/data. In a sense the not-guilty assumption is comparable to the null hypothesis.

If it is found, for examples on the basis of statistical test that the difference between the mean achievement of the experimental and the control groups is too great to attribute to the normal fluctuations that result from sampling error, the experimenter may reject the null hypothesis. The researcher may conclude that the experimental variable or treatment probably accounted for the difference in performance, as measured by mean test scores. If, on the other hand, it is found that the difference between means is not great enough to reject the null hypothesis, the researcher fails to reject it and concludes that there is no significant difference and that chance or sampling error may have accounted for any observed difference.

Such statistical decision on rejection of H_0 does not come in any adhoc manner. The decision is made on the basis of some appropriate decision model. This model in inferential statistics is popularly known as sampling distribution of statistics.

3.1.3 : Level of Significance

The rejection or acceptance of a null hypothesis is based on some level of significance (α) as criterion. In behavioural science research work, it is conventional to use the 0.05 and 0.01 levels of significance as a standard for rejection. When a null hypothesis is rejected at the 0.05 or 5% level of significance ($p < 0.05$), it is said that the chances are 95 out of 100 that the hypothesis is not true and

only 5 chances out of 100 that it is true. 0.05 level of significance may also be called 95% level of confidence.

A more stringent test of significance is the 0.01 or level. If a null hypothesis is rejected at this level ($p < 0.01$) the chances are 99 out of 100 that the hypothesis is not true and only 1 chance out of 100 that it is true. So, 0.01 level of significance may also be called 99% level of confidence.

This level of significance on which null hypothesis will be rejected, should be set by the researcher before collecting data.

If the samples are large ($N < 30$ or more than 30), then the distribution of differences between means will be supposed to be a normal one and the critical value approaches the z (sigma) score. In these cases if the z value equals or exceeds 1.96, the researcher may conclude that the difference between means is significant at the 0.05 level and the null hypothesis is rejected at this level. Again, if the z value equals or exceeds 2.58, the researcher may conclude that the difference between means is significant at the 0.01 level and the null hypothesis is rejected at this level. The decision in this case is independent of sample size, however $N > 30$.

If the sample is small ($N < 30$), then the distribution of differences between means is assumed to take the form of t distribution and the shape of the t curve which will vary with the number of freedom. In this case, to test the null hypothesis, we first compute the t ratio in the same manner as Z scores in case of large samples. Then we enter the table of t distribution with $N_1 + N_2 - 2$ degrees of freedom (N_1 and N_2 stand respectively sizes of two samples drawn) and read the values of t given against the row of $N_1 + N_2 - 2$ degrees of freedom and columns headed by 0.05 and 0.01 levels of significance. If the computed t ratio equals or exceeds the values of t read from the Table. We will reject the established null hypothesis at the 0.05 and 0.01 levels of significance respectively. [Pl. see Table-A given is 5.4.9.9]

Unit-2 : Inferential Statistics and related concepts (B)

3.2.1 : Degrees of Freedom

The number of degrees of freedom on a distribution is the number of observations or observations or values that are independent of each other that can not be deduced from each other. It is denoted by the symbol df . By freedom we mean freedom to vary.

The concept of degrees of freedom is highly important in small sample statistics. When a statistic is used to estimate a parameter number of degrees of freedom (df) available depends upon the restrictions placed upon the observations. One df is lost for each restriction imposed. Therefore, the number of degrees of freedom will vary from one statistics to another. In computing population mean from the sample mean, for example, 1 df is used up or lost and so the number of degrees of freedom is $N-1$.

A numerical illustration will make it clearer as to why the df used here is $N-1$. If we have 7 scores, 1, 2, 3, 4, 5, 6 and 7 the mean is 4. we now use this value as estimate of the population mean. The deviations of the scores from the mean 4 are $-3, -2, -1, +1, +2, +2$. The sum of these deviations is zero. Of the 7 deviations, only 6 i.e. $N-1$, can be chosen freely i.e., independently as the condition that the sum equals to zero restricts the value of the 7th deviate. with this condition we can arbitrarily change any six of the deviates and thereby fix the seventh. We could take the first six deviates as $-7, -6, -5, +4, +3$, and $+1$, which would mean that for the sum to be equal zero, the seventh has to be $+10$. Similarly, we can try any other changes, and if the sum is to remain zero, one of the seven deviations is automatically determined. Therefore, only 6 (i.e. $7-1$) are free to vary within the restrictive imposed. There are $N-1$ degrees of freedom.

Whenever a statistic is used to estimate a parameter, the rule is that the df available equals N minus the number of parameters already estimated from the sample. The degrees of freedom will vary with the problem and the restrictions imposed. calculations of the variance and the standard deviation will be based on $N-1$ independent observations or $N-1$ degrees of freedom, As the coefficient of correlation (r) depends on the deviations from two means. so in case of r , the number of degrees of freedom is $N-2$.

3.2.2 : Two-tailed and one-tailed tests of significance

A final point about hypothesis testing must be made regarding the distinction between so called two-tailed and one-tailed tests of significance. The (two and one) tail refers to the tails of probability curves from which the value yielded by the statistical test is interpreted.

Suppose, a null hypothesis was set up that there was no difference other than a sampling error difference, between the mean achievement scores of boys and girls, we would be concerned only with a difference, and not in superiority or inferiority in achievement of either group. To test this hypothesis, we apply two-tailed test or non-directional test as the difference between the obtained means may be as often in one direction (plus) as in the other (minus) from the true difference of zero; and in determining probabilities we take both tails of sampling distribution. We are hypothesizing that the two means will differ only; either of the two may be higher in mean value.

If we change the above null hypothesis as: boys do not have higher achievement than girls; or boys do not have lower achievement than girls; then each of these hypotheses indicates a direction of the difference. When we are hypothesizing a direction of difference in a definite term, rather than the mere existence of a difference, we make use of one-tailed test or directional test.

3.2.3 : Decision Making : Type-I and Type-II Errors

Statistical decisions based on evidence observed in samples always involve the possibility of error. Statisticians do not deal with decisions based on certainty. They merely estimate the probability or improbability of occurrences of events.

The purpose of inferential statistics is to make inferences regarding outcomes, based on a sample. When we use inferential statistics to make decisions to reject or not reject a null hypothesis, there are four possible combinations of outcomes.

1. The researcher decides, based on the statistical findings, to reject the null hypothesis when it is false. — Correct decision.
2. The researcher decides, based on the statistical findings, to not reject the null hypothesis when it is true. — Correct decision.
3. The researcher decides, based on the statistical findings, to reject the null hypothesis when it is true. — Wrong decision. [Type-I Error]
4. The researcher decides based on the statistical findings to accept the null hypothesis when it is false. — Wrong decision. [Type-II Error]

Rejecting a null hypothesis when it is really true is known as a *Type I Error*. The probability of committing a Type I error is associated with the level of significance (α) selected. For example, when the researcher rejects a null hypothesis at the 0.05 level, he or she is taking a 5% risk of rejecting a null hypothesis, due to sampling error, that is actually true.

Not rejecting (i.e. accepting) a null hypothesis when it is really false is known as a *Type II Error*. It is usually represented by β . When H_0 is false and the researcher decides on the basis of a test of significance not to reject H_0 , then he or she is likely to commit Type II error.

Setting a level of significance as high as the 0.01 level minimizes the risk of a Type I error. Setting this high level of significance increases the risk of a Type II error. The researcher sets the level of significance based on the relative seriousness of making a Type I or Type II error. In educational research, we want to be particularly careful about a Type I error when making decisions about a new teaching method i.e., we do not want to take a chance on rejecting the null hypothesis (the new method is no better than the existing methods) when it is true. Thus, perhaps we want to use the 0.01 rather than 0.05 level of confidence. In each case, the researcher must decide which type of error is the greater risk. That is, which decision, if wrong, places people at greater risk for not getting what they should.

UNIT-3 : PARAMETRIC AND NON-PARAMETRIC TECHNIQUES

3.3.1 : Concepts of Parametric and Non-parametric Techniques

In inferential statistics, for making the inferences about various parameters, two types of techniques are used : (1) parametric techniques and (2) Non-parametric techniques.

3.3.2 : *Parametric Tests*

Parametric tests are most powerful tests for testing the significance of the computed sample statistics and should be used if their basic assumptions are assumed met. These assumptions are based on the nature of the distribution of population and on the way the type of scale is used to quantify the data observations. However, according to Glass & Hopkins (1984), some parametric tests (particularly the t test and analysis of variance) are appropriate even when some assumptions are violated as these are robust tests. The basic assumptions for most parametric tests are :

1. The observations are independent of the selection of any other case,
2. The population values are normally distributed. If not, the nature of the distribution is to be known.
3. The samples have equal, or nearly equal, variances. This condition known as equality or homogeneity of variances and is particularly important to determine when samples are small.
4. The variables described are expressed in interval or ratio scales. Nominal measures (frequency counts) and ordinal measures (ranking) do not qualify for parametric treatment.

t test, z test, Pearson Product Moment Correlation (r), Multiple Regression (R), Analysis of variance (ANOVA), Analysis of covariance (ANCOVA) Multivariate Analysis of variance (MANOVA), etc. are some of the examples of parametric tests, generally used in educational research.

3.3.3 : *Non-Parametric Tests*

Some statistical tests have been developed especially to take care of the experimental situation in which samples are small and the form of the population distribution is not normal. These techniques have often been referred to as non-parametric or distribution-free techniques. These techniques do not depend upon, the known distribution and parameters of the a population. Though never requiring population normality, in some instances nonparametric tests do involve limited assumptions about the nature of the population distribution. Non-parametric tests are used when :

1. The sample size is small.

2. The nature of the population, from which samples are drawn, is not known to be normal.
3. The variables are represented by frequency counts. (Nominal scale)
4. The variables are expressed in numerical scores which have the strength of ranks. (Ordinal scale)

Sometimes, it is necessary, or preferable, to use a non-parametric test. Non-parametric tests are usually much easier to compute than parametric tests. Another unique value of certain non-parametric tests is that they can be used to treat data which have been measured on nominal or ordinal scale.

Non-parametric tests, because they are based on counted or ranked data rather than on measured values, are less precise, have less power than parametric tests, and are not as likely to reject a null hypothesis when it is false. parametric tests offer more analysis flexibility to the researches. The possibilities of categorizing variables in such a way as to simultaneously study relationships between a dependent variable and many independent, as well as interaction relationships between such variable is highly advantageous. Many statisticians suggest that parametric tests be used, if possible, and that non-parametric tests be used only when parametric assumptions cannot be met. Others argue that non-parametric tests have greater advantage than is often attributed to them because their validity is not based on assumptions about the nature of the population distribution, assumption that are so frequently ignored or violated by researchers using parametric tests.

Some examples of non-parametric tests are Chi-Square (χ^2) Test, Median Test, Spearman's Rank Order Coefficient of Correlation [ρ , p -Coefficient], ϕ (ϕ)-coefficient, Mann-Whitney U Test, Kolmogorov-Smirnov Test, Sign Test and Wilcoxon Signed Rank Test.

Let Us Check Our Progress on 5.4.9.3

Answer in about **60** words each :

1. Define null hypothesis.
2. What is meant by levels of significance ?
3. State the assumptions on which the use of parametric tests are based.
4. Mention the characteristics of non-parametric tests.

Unit-4 : NON - PARAMETRIC TESTS : APPLICATIONS

3.4.1 : CHI-SQUARE (χ^2) TEST

The chi-square (χ^2) test is used with discrete data in the form of frequencies. It is a test of independence, the idea that one variable is not affected by, or related to, another variable. It is used to estimate the likelihood that some factor other than chance accounts for the observed relationship. Because the null hypothesis states that there is no relationship between the variables under study (i.e. the variables are independent), the chi-square test merely evaluates the probability that the observed relationship results from chance.

If we want to interpret the scores i.e. if we wish to determine whether these outcomes are significant or not, we can find it by using χ^2 test. The test, though simple, is a very powerful or significant non-parametric test.

Let us suppose that 515 boys and 485 girls are reading in class I are equal in numbers, i.e., 50% (500, 500), then that difference (i.e. 15) is whether significant or not, can be found very accurately by using χ^2 test.

In short, we can say that the χ^2 test represents a useful method of comparing experimentally obtained results with those to be expected theoretically on some hypothesis.

The formula for chi-square (χ^2) is :

$$\chi^2 = \sum \left[\frac{(f_o - f_e)^2}{f_e} \right]$$

Where f_o = observed frequencies, and

f_e = expected frequencies based on some hypothesis.

Procedure for calculation of χ^2

Expected frequencies (f_e) in some hypothesis are first determined by the formula

$$f_e = \frac{(\sum f \text{ column}) \cdot (\sum f \text{ row})}{\text{grand total}}. \text{ Then the differences between observed and expected frequencies}$$

$(f_o - f_e)$ are squared and divided by the expected frequency in each case, and the sum of these quotients are determined. This is the value of χ^2 . [Pl. see Table-B in 5.4.9.9]. Whose distribution follows a particular type of curve depending up df associated with it.

Evaluation of χ^2

There exists a Table for the critical value of χ^2 required for significance at a pre-determined significance level (0.05 or 0.01) for the computed degrees of freedom.

To evaluate chi-square, we enter Table for critical values of χ^2 with the computed value of χ^2 and the appropriate number of degrees of freedom (df). The number of $df = (r - 1)(c - 1)$ where r is the number of rows and c is the number of columns in which the data are tabulated.

If the obtained value of χ^2 is greater than the table value of χ^2 , then we reject the null hypothesis and if the obtained value of χ^2 is less than the table value of χ^2 , then we accept the null hypothesis.

In other words, the larger the value of χ^2 , the greater the probability of a real divergence of experimentally observed from expected results and the smaller the value of χ^2 , the closer the agreement between observed results and expected results.

To illustrate the use of χ^2 test, let us consider the following examples :

EXAMPLE-1

A teacher of the pre-primary education wish to know whether 5 colours are equally attractive to the children and she found that 500 two year old infants have chosen toys colourwise as Red 122, Green 86, Blue 105, Yellow 83 and Orange 104.

Test the assumption that 5 colours are equally attractive to the infants.

Solution :

We know,

$$\chi^2 = \sum \left[\frac{(f_o - f_e)^2}{f_e} \right]$$

Where f_o = Observed frequencies, and

f_e = Expected frequencies based on some hypothesis.

Here, $N = 500$

$$\therefore f_e = \frac{N}{5} = \frac{500}{5} = 100$$

Table for Computation of χ^2

Colour	f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$(f_o - f_e)^2 / f_e$
RED	122	100	22	$(22)^2$	$484/100 = 4.84$
GREEN	86	100	-14	$(-14)^2$	$196/100 = 1.96$
BLUE	105	100	5	$(5)^2$	$25/100 = 0.25$
YELLOW	83	100	-17	$(-17)^2$	$289/100 = 2.89$
ORANGE	104	100	4	$(4)^2$	$16/100 = 0.16$
Total	500	500			$\chi^2 = 10.10$

Degrees of freedom (df) = (no. of rows - 1) = 5 - 1 = 4

From the Table B, (P. 49) for $df = 4$, critical value of $\chi^2 = 9.49$ at 0.05 level of significance and critical value of $\chi^2 = 13.28$ at 0.01 level of significance.

We assume that five colours are equally attractive.

The computed χ^2 value must be equal or exceeds the appropriate Table's critical value to justify rejection of the null hypothesis or the assumption of independence at the 0.05 or the 0.01 level of significance.

Since the computed value of χ^2 (i.e. 10.10) is greater than the Table value 9.49 at 0.05 level of significance, the assumption is rejected, i.e., five colours are not equally attractive at the 0.05 level of significance.

But the computed χ^2 value does not equal or exceed the critical χ^2 value (13.28) necessary to reject the null hypothesis or the assumption of independence, at the 0.01 level of significance. So at the 0.01 level of significance, the assumption is accepted, i.e., five colours are equally attractive. However, we should not set both these two levels of significance in actual research while testing hypothesis of independence.

EXAMPLE-2

A sample survey was made on habitates of the 3 types for studying literacy and the following data were obtained :

**Table-1 Showing the Frequency of Occurance across
three levels of habitate**

	LITERATE (L)	ILLITERATE (I)	Total
URBAN (U)	175	225	400
SUBURBAN (S)	150	150	300
RURAL (R)	75	225	300
Total	400	600	1000

Examine whether literacy and habitate are related or not.

Solution :

We assume that literacy and habitate are unrelated [i.e., literacy or illiteracy does not depend on places (Urban, Suburban, Rural)].

Calculation of Expected Frequencies (f_e) : $f_e = \frac{(\sum f \text{ column}) \cdot (\sum f \text{ row})}{\text{Grand Total}}$

$$UL = \frac{400 \times 400}{1000} = 160$$

$$UI = \frac{600 \times 400}{1000} = 240$$

$$SL = \frac{400 \times 300}{1000} = 120$$

$$SI = \frac{600 \times 300}{1000} = 180$$

$$RL = \frac{400 \times 300}{1000} = 120$$

$$RI = \frac{600 \times 300}{1000} = 180$$

Computation of the χ^2 value : $\chi^2 = \sum \left[\frac{(f_o - f_e)^2}{f_e} \right]$

Table for Computation of χ^2

	f_o	f_e	$f_o - f_e$	$(f_o - f_e)^2$	$(f_o - f_e)^2 / f_e$
UL	175	160	15	225	$225/160 = 1.40$
UI	225	240	-15	225	$225/240 = 0.94$
SL	150	120	30	900	$900/120 = 7.50$
SI	150	180	-30	900	$900/180 = 5.00$
RL	75	120	45	2025	$2025/120 = 16.87$
RI	225	180	-45	2025	$2025/180 = 11.25$
					$\chi^2 = 42.96$

The degrees of freedom, df = (rows - 1) (Columns - 1)

= (3 - 1) (2 - 1) = (2) (1) = 2.

For $df=2$, critical value of $\chi^2=5.99$ at 0.05 level of significance and critical value of $\chi^2=9.21$ at 0.01 level of significance. [From Table-B]

The computed value of $\chi^2(42.96)$ is far greater than both the critical values of χ^2 at 0.05 and 0.01 levels. Hence it is taken to be quite significant. Consequently, the assumption is rejected and we conclude that literacy and habitate is related, not statistically and significantly independent.

Testing of null hypothesis of independence in 2×2 contingency Table

The data are arranged in a 2×2 contingency Table in the following manner.

Table : 2×2 Fold Contingency Table

A	B	(A+B)
C	D	(C+D)
(A+C)	(B+D)	N=(A+B+C+D)

In a 2×2 Table which is comprised of 4 cells with (2–1) (2–1) or 1 degree of freedom, there is a simple formula that eliminates the need to calculate the expected frequencies (independent values) for each cell. The formula is —

$$\chi^2 = \frac{N[|AD - BC|]^2}{(A + B)(C + D)(A + C)(B + D)}$$

where A, B, C and D are the frequencies in the first, second, third and fourth cells respectively and the vertical lines $|AD - BC|$ means that the difference is to be taken as positive.

To illustrate the use of the above formula, let us determine whether item 12 of a test differentiates between two groups of boys and girls. The responses to the item are given in the following 2×2 table.

	Passed	Failed	Total
Boys	30 (A)	20 (B)	50 (A+B)
Girls	25 (C)	15 (D)	40 (C+D)
Total	55 (A+C)	35 (B+D)	90 (A+B+C+D) = N

Table : 2×2 Contingency Table

Using the above formula,

$$\chi^2 = \frac{90[(30)(15) - (20)(25)]^2}{(30 + 20)(25 + 15)(30 + 25)(20 + 15)}$$

$$\begin{aligned}
&= \frac{90[450 - 500]^2}{(50)(40)(55)(35)} = \frac{90 \times 2500}{2000 \times 1925} = \frac{9}{154} \\
&= 0.058
\end{aligned}$$

Since the computed value 0.058 of χ^2 is not equal or does not exceed the critical value 3.841 of χ^2 necessary to reject the null hypothesis at the 0.05 level of significance, we conclude that item 12 of the test does not differentiate between two groups of boys and girls.

Yates's Correction for Continuity

In computing a chi-square value for a 2x2 Table with one degree of freedom, the formula is modified when any cell has a frequency count of fewer than 10. The corrected formula is

$$X_c^2 = \sum \left[\frac{(|f_o - f_e| - 0.5)^2}{f_e} \right]$$

$$\text{or } X_c^2 = \frac{N \left(|AD - BC| - \frac{N}{2} \right)^2}{(A + B)(C + D)(A + C)(B + D)}$$

USES OF CHI-SQUARE TEST

χ^2 is an important statistic of non-parametric tests. Most of the statistics used in education are based on normal curve, like M, σ , r, t and F. In practice, most of the education experiments are done with limited samples. Their characteristic is not always distributed normally. In these cases non parametric statistics is used. χ^2 is a powerful non-parametric or distribution free test. Moreover, in educational sample surveys the data are obtained in nominal scale i.e. the data are in categories or classes or classification. In such cases, χ^2 is usually used as a test of significance.

χ^2 test is used for two broad purposes. Firstly, it is used as a test of 'goodness of fit', to determine if the observed results on some experiment or study differ from the theoretically obtained results based on some hypothesis like equal probability or normal distribution and secondly as a test of independence (i.e. testing of hypothesis)

3.4.2 : MEDIAN TEST

The median test is used for testing whether two independent samples differ in central tendencies. This test gives information as to whether it is likely that two independent samples (not necessarily of the same size) have been drawn from populations with the same median. It is particularly useful whenever the measurements for the two samples are expressed in an ordinal scale (i.e. may be expressed in ranks).

The null hypothesis is that the two samples are from populations with the same median.

The median test involves finding the combined median for all scores in both samples being compared, as a first step. Next, the numbers of cases above and below the combined median are counted in each sample, resulting in a 2×2 contingency table.

	Sample I	Sample II	Total
No. of scores above combined Median	A	B	A+B
No. of scores below combined Median	C	D	C+D
Total	$A+C=n_1$	$B+D=n_2$	$N=n_1+n_2$

Table : 2×2 Table for use of Median Test

Now under the null hypothesis, we would expect about half of each sample's scores to be above the combined median and about half to be below, that is, we would expect frequencies A and C to be about equal, and frequencies B and D to be about equal. In order to test this null hypothesis, we

Sample I scores	32, 30, 35, 34, 40, 29, 36, 38, 42, 44	$n_1 = 10$
Sample II scores	31, 33, 38, 41, 36, 39, 40, 43, 37, 42	$n_2 = 10$

calculate χ^2 finally.

The above steps can be explained by the following Example-I.

The data given here belong to two independent samples of $n_1=10$ and $n_2=10$ observations. These are combined as $10 + 10 = 20$ for computing the combined (i.e. common) median. All the scores are arranged in ascending order (i.e. from lower to higher values).

29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 38, 39, 40, 41, 42, 42, 43, 44

As there are 20 scores, so median will be the average of the 10th and 11th values. 10th value = 37 and 11th value = 38

$$\therefore \text{Combined median} = \frac{37 + 38}{2} = 37.5$$

There are 4 scores above 37.5 in sample I and 6 scores in sample II. Similarly, there are 6 scores below 37.5 in sample I and 4 scores in sample II. Therefore, the 2×2 contingency table is as follows.

Table : 2×2 contingency table for computing χ^2

From the contingency table, we can compute the value of χ^2 by using the formula (with Yates' correction).

$$\begin{aligned}\chi^2 &= \frac{N \left(|AD - BC| - \frac{N}{2} \right)^2}{(A + B)(C + D)(A + C)(B + D)} \\ &= \frac{20(|16 - 36| - 10)^2}{(10)(10)(10)(10)} = \frac{20 \times 100}{10 \times 10 \times 10} \\ &= \frac{2}{10} = 0.2\end{aligned}$$

$$\text{Here, } df = (r-1)(c-1) = (2-1)(2-1) = 1$$

The critical value of χ^2 at 0.05 level of significance is 3.841 and at 0.01 level of significance is 6.635. The computed value of $\chi^2 = 0.2$. It is quite small for being significant at both levels of significance. Hence, the null hypothesis can not be rejected. It is safely concluded that the two samples have been drawn from the populations with the same median.

Median test with more than two samples

Suppose that we have three samples, each from its own treatment or set of conditions. We want to test the homogeneity of their central values. For example, let us consider the three samples in the following table.

Table : Median test to more than two samples

Samples		
A	B	C
5	7	9
6	10	16
2	9	15
3	14	14
8	12	12
7	10	
	8	
$N_i =$	6	7
		5

	A	B	C	All
Above Median (10+)	0	4	4	8
Below Median (9-)	6	3	1	10
All	6	7	5	18

We find that the median of all 18 scores is 9.0. Since we have some 9_s in the lists, we cannot make the point of dichotomy at exactly, 9. In such a case, we make it as near the median as we can. Let it be the point 9.5. We then set up a contingency table, such as the one given above. From these data, the value of chi-square is 7.82. Here, number of degrees of freedom is 2. For $df = 2$, critical value of $\chi^2 = 5.991$ at 0.05 level of significance. The computed value of χ^2 is higher than the critical value of χ^2 at 0.05 level. Hence it is taken to be significant. Consequently, null hypothesis is rejected and we conclude that the three medians are not equal.

Let Us Check Our Progress 5.4.9.4

1. Answer in about 60 words each :

(a) Mention the uses of χ^2 test. (b) What is the median test.

2. Work out the problem.

In a survey to determine higher secondary school students' preference for a subject, the results were

	Physics	Chemistry	Mathematics
Boys	25	30	49
Girls	46	22	28

Was there any relationship between the subject preference and the gener of the students.

Unit-5 : PARAMETRIC TESTS

3.5.1 : The z test & the t test (SIGNIFICANCE OF THE DIFFERENCE BETWEEN TWO MEANS)

Many investigations require the use of a statistical technique to determine whether a true difference exists between two sample means (independent or correlated) drawn from the same or different populations.

The process of determining the significance of difference between two given samples as well as the relatedness or unrelatedness (i.e. independence) of the samples. A sample having 30 or more cases is usually treated as a large sample while a sample containing less than 30 cases is considered as a small sample. The samples are called uncorrelated or independent when they are drawn at random from totally different and unrelated groups or when uncorrelated tests are administered to the same sample.

Procedures to be followed :

The process of determining the significance of difference between two means consists of these main points :

1. Establishment of a null hypothesis.
2. Selection of a suitable level of significance, 0.05 or 0.01 level.
3. Computing standard error of the difference between means of two samples.
4. Computing standard score values in terms of z (for large samples) and in terms of t (for small samples). The former assume exactly normal distribution of the sampling distribution of differences between two means while the latter assume t-distribution of the samples distribution of difference between two means.
5. Determining the critical value of z (for large samples) from the normal curve table and critical value of t (for small samples) from the t table for the computed value of degrees of freedom.
6. Interpretation of z or t value.

If the computed value of z or t in the given problem is equal to or greater than the critical Table value of z or t, then it is to be taken as significant and consequently the null hypothesis

is rejected. In case it is less than the critical Table value, the null hypothesis is not rejected. It is to be noted that the critical values of z or t are different in the case of two-tailed and one-tailed test.

The critical values to be taken are given below :

Levels of Significance	Two-tailed test		One-tailed test	
	z-values	t-values	z-values	t-values
0.05 Level	1.96	Read under the column P=0.05	1.96	Read under the column P=0.10
0.01 Level	2.58	Read under the column P=0.01	2.33	Read under the column P=0.02

If a null hypothesis is rejected, we may say that the difference found in the sample means is trustworthy and real, but if the null hypothesis is not rejected, we have to conclude that the difference between means is not real, it may occur by chance or due to sampling fluctuations.

Formulae :

Standard error of the difference between means shows difference on account of the size and nature of the samples. Different formulae are used in the various situations.

Case I : Large but independent (Uncorrelated) samples

$$SE_D \text{ or } \sigma_D = \sqrt{\sigma_{M1}^2 + \sigma_{M2}^2} = \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}$$

Case II : Small but independent (uncorrelated) samples

$$SE_D \text{ or } \sigma_D = \sigma \sqrt{\frac{1}{N_1} + \frac{1}{N_2}}$$

Where σ = pooled SD of the samples, which is given by the formula.

$$\sigma = \sqrt{\frac{\sum x_1^2 + \sum x_2^2}{(N_1 - 1) + (N_2 - 1)}}$$

Here, $x_1 = X_1 - M_1 =$ deviation of scores of first sample from its mean

and

$x_2 = X_2 - M_2 =$ deviation of scores of second sample from its mean

σ = sample standard deviation

N = Sample size.

Case III and IV : Correlated samples — large and small

1. In case of the two groups matched in pairs as well as in case if a single group is tested twice (before and after the experiment), the formula for calculating standard error of the difference between means is

$$SE_D \text{ or } \sigma_D = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r \cdot \sigma_{M_1} \cdot \sigma_{M_2}}$$

2. In case of two groups matched in terms of the group as a whole (i.e. Mean and SD), this formula becomes

$$SE_D \text{ or } \sigma_D = \sqrt{(\sigma_{M_1}^2 + \sigma_{M_2}^2)(1 - r^2)}$$

Here r is the measure of the co-efficient of correlation between two groups. The number of degrees of freedom would be number of pairs minus one.

Now,

$$z \text{ or } t = \frac{D}{\sigma_D} = \frac{M_1 - M_2}{\sigma_D} = \frac{\text{Difference between means}}{\text{Standard error of the difference between means}}$$

An Alternative Method for SMALL SAMPLES

In the case of small samples ($N < 30$), and alternative method known as the “difference method”, recommended by Ferguson, may be employed giving original raw scores to determine t values directly without computing the standard error of the difference between means. The formula is

$$t = \frac{\Sigma D}{\sqrt{\frac{N \Sigma D^2 - (\Sigma D)^2}{N - 1}}}$$

where $D =$ Difference of scores in the two samples or between initial and final testing (in the case of single group) or between pairs of matched subjects (in the case of equivalent groups).

Conditions for using the t test

t test being a parametric test, there are some conditions that must be met to justify the use of t test :

1. The population distribution should be normal. If the population distribution is seriously skewed, t test should not be used and then distribution is seriously skewed, t test should not be used and then distribution-free test or non-parametric test should be used.
2. The two samples should be randomly selected, which means that observations are mutually independent and have equal opportunity to occur.
3. Another condition is known as equality or homogeneity of variance. It does not literally mean that the variances of the samples to be compared must be identical but only that they do not differ by an amount that is statistically significant.

Examples :

Let us illustrate the process of determining the significance of difference between two means through some examples.

Example-1 : (Two - tailed test)

A physics teacher wanted to know the relative effectiveness of lecture-cum-demonstration method over the traditional lecture method. She divides her class into equal random groups A and B and taught group A by the lecture-cum-demonstration method and group B by the lecture method. After teaching for 3 months, she administered an achievement test to both groups and collected data as shown below :

	Group A	Group B
Mean	43	30
Standard deviation	8	7
Number of students	65	65

From this data table, what do you conclude about the effectiveness or supremacy of one method of teaching over the other.

Solution :

Here the teacher has, first, to establish a null hypothesis i.e. there exists on significant difference between the means of two samples. This hypothesis, then will be tested in the following way. The difference between means is equal to, $M_1 - M_2 = 43 - 30 = 13$.

The standard error of the difference between means,

$$SE_D \text{ or } \sigma_D = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2} = \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}} = \sqrt{\frac{8 \times 8}{65} + \frac{7 \times 7}{65}} = \sqrt{\frac{64 + 49}{65}}$$

$$= \sqrt{\frac{113}{65}} = 1.32$$

Now difference between two means $= 43 - 30 = 13$

Then,

$$z = \frac{M_1 - M_2}{\sigma_D} = \frac{13}{1.32} = 9.85 \text{ (approx.)}$$

Our computed z value is much greater than 1.96 as well as 2.58, the critical values required to reach 0.05 and 0.01 levels of significance, respectively. Thus, the null hypothesis is rejected and we may safely conclude that the difference between the means of two samples cannot be attributed to a chance factor. This difference is quite trustworthy and dependable to say that the lecture-cum-demonstration method is more effective as a method of teaching than the traditional lecture method with respect to the population of the students included in this method experiment.

Example-2 : (One-tailed test)

A mathematics teacher divides his class into two random groups. He provides an extra drill in computation skill of the students of this group. The control group is not provided any such drill. At the end of the session, he administers an achievement test and collects data as under :

	Experimental Group	Control Group
Mean	35	30
SD	4	3
N	48	45

Is the gain (difference between means) significant enough to indicate that a drill in mathematics promotes computation skill ? [This is a Null hypothesis, and of course it is one tail].

Solution :

In this test, the teacher is interested to know the significance of difference between means in terms of a particular direction, i.e. gain on account of drill work. Therefore, to determine the significance of difference between means, a one-tailed test (in place of the two-tailed test) will be used.

In this case, the process of testing the null hypothesis will be the same as in the case of two-tailed test, illustrated in Example-1, except that the critical value of z will be taken as 1.65 and 2.33 (in place of 1.96 and 2.58) at the 0.05 and 0.01 levels of significance, respectively.

Here, difference between means = $M_1 - M_2 = 35 - 30 = 5$

Standard error of the difference between means,

$$\begin{aligned}\sigma_D &= \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}} = \sqrt{\frac{4 \times 4}{48} + \frac{3 + 3}{45}} = \sqrt{\frac{1}{3} + \frac{1}{5}} = \sqrt{\frac{8}{15}} \\ &= \sqrt{0.5333} = 0.73\end{aligned}$$

Converting the difference between means into standard sigma (z) score, we get the corresponding z -values.

$$z = \frac{M_1 - M_2}{\sigma_D} = \frac{5}{0.73} = 6.85$$

As this a one-tailed test, the critical value of z will be taken as 1.65 and 2.33 at the 0.05 and 0.01 levels of significance. We may now say that our computed value of z exceeds the critical values of 1.65 and 2.33. Therefore, it may be taken as significant at both 0.05 and 0.01 levels. Hence, the null hypothesis is rejected at the 0.05 and 0.01 levels and we may say that the gain is significant and drill work may be taken as a significant factor for the promotion of computation skill.

Therefore, it may be taken as significant at both 0.05 and 0.01 levels. Hence, the null hypothesis is rejected at the 0.05 and 0.01 levels and we may be taken as a significant factor for the promotion of computation skill.

Example-3 : (Correlated)

A teacher of mathematics gave a test in multiplication to the 30 students of his class. Then he induced a state of anxiety among them and the achievement test was re-administered. The data obtained were as follows :

Initial	Test data	Final Test	Data
Mean	70	Mean	67
SD	6	SD	5.8

r between the initial and final test scores = 0.82. Find out the answer to the following questions on the basis of above data :

1. Is there a significant difference between the two sets of scores?
2. Test the hypothesis that the population mean on the final test is significantly lower than the population mean on the initial test.
3. Did the introduction of the state of anxiety affect the multiplication ability of the students adversely?

Solution : Here, in case of the correlated data of the two samples. We may use the following formula for the computation of the standard error of the difference between means.

$$SE_D \text{ or } \sigma_D = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r \cdot \sigma_{M_1} \cdot \sigma_{M_2}}$$

Where σ_{M_1} = Standard error of the mean of the initial test.

$$= \frac{\sigma_2}{\sqrt{N_2}} = \frac{5.8}{\sqrt{30}} = \frac{5.8}{5.477} = 1.06$$

$$\begin{aligned} \therefore \sigma_D &= \sqrt{(1.09)^2 + (1.06)^2 - 2 \times 0.82 \times 1.09 \times 1.06} \\ &= \sqrt{1.19 \times 1.12 - 1.89} = \sqrt{2.31 - 1.89} = \sqrt{0.42} = 0.648 \end{aligned}$$

$$\therefore z = \frac{M_1 - M_2}{\sigma_D} = \frac{70 - 67}{0.648} = \frac{3}{0.648} = 4.628$$

The computed value of z exceeds both 1.96 and 2.58, the critical values of z at 0.05 and 0.01 levels, respectively. Hence, it is to be taken as significant, resulting in the rejection of the null hypothesis. Consequently, it can be said that there exists a significant difference between the two

sets of scores; population mean on the final test is significantly lower than the population mean on the initial test and introduction of the state of anxiety has affected adversely the multiplication ability of the students.

Example-4 : (Computation of *t* value from original raw scores)

Ten subjects were tested on an attitude scale. Then, they were made to read some literature in order to bring a change in their attitudes. The attitude scale was re-administered. The results of the initial and final testing are as under :

Initial	10, 9, 9, 8, 8, 7, 7, 5, 4, 4
Final	11, 7, 8, 9, 6, 6, 8, 4, 3, 4

Test the null hypothesis at the 5% level of significance.

Solution : As the samples are small, we can compute the value of *t* directly from the original raw scores, without computing the standard error of the difference between means, using the following formula :

$$t = \frac{\sum D^2}{\sqrt{\frac{N\sum D^2 - (\sum D)^2}{N-1}}}$$

Where *D* = difference in scores between initial and final testing :

Initial	Final	D	D ²
10	11	-1	1
9	7	2	4
9	8	1	1
8	9	-1	1
8	6	2	4
7	6	1	1
7	8	-1	1
5	4	1	1
4	3	1	1
4	4	0	0
N=10	N=10	ΣD=5	ΣD ² =15

$$\begin{aligned}
 \therefore t &= \frac{5}{\sqrt{\frac{10 \times 15 - 5^2}{10 - 1}}} \\
 &= \frac{5}{\sqrt{\frac{150 - 25^2}{9}}} = \frac{5}{\sqrt{\frac{125}{9}}} = \frac{5 \times 3}{\sqrt{25 \times 5}} \\
 &= \frac{3}{\sqrt{5}} = \frac{3}{2.236} = 1.34
 \end{aligned}$$

Number of degrees of freedom, $df = N - 1 = 10 - 1 = 9$ [Pl. see Table A]. At the 5% level of significance, the critical value of t with 9 degrees of freedom = 2.26. [Here $df = 10$ (pairs) – 1 = 9].

Our computed value of t , i.e. 1.34 does not reach the critical Table t value 2.26. Hence it is to be taken as not significant and, consequently, the null hypothesis can not to be rejected at the 5% level of significance.

3.5.2 : F-TEST OR ANALYSIS OF VARIANCE (ANOVA)

We use t test to determine whether there is any significant difference between the means of two random samples. Suppose we have five random samples and we want to determine whether there are any significant differences among their means. For this we would have to use 10 t tests to determine the significance of the difference between the 5 means by taking two means at a time. The number of necessary pairs wise comparisons of n things is determined by the formula $\frac{n(n-1)}{2}$. Putting $n=5$ in the formula, we get 10. This procedure of applying t test 10 times is difficult, cumbersome, time consuming and unwise. The technique of analysis of variance would make it possible to determine if any two of the five means differ significantly from each other with a single test, called F test, rather than 10 t tests. Another advantage lies in the fact that computing a number of separate t tests will increase the overall Type-I error rate for the experiment. Analysis of variance takes care of this by comparing all five means simultaneously in a single test. The analysis of variance is an effective way to determine whether the means of more than two samples are too different to attribute to sampling error.

In single classification, or one-way analysis of variance, the relationship between one independent and one dependent variable is examined.

The composite procedure for testing simultaneously the difference between several sample means is known as the F test or analysis of variance (ANOVA).

Variance (σ^2) is the square of the standard deviation (σ). It can be added up or broken down into components. So, ANOVA deals with the task of analysing or breaking up the total variance of a large sample or a population consisting of a number of equal groups or sub-samples into two components, i.e. two kinds of variances :

1. “Within-group” variance — It is the average variance of the members of each group around their respective group means.
2. “Between-groups” variance — It is the variance of group means around the total of grand mean of all groups.

The F test enables us to determine whether the sample means differ from one another (between-groups variance) to a greater extent than the test scores differ from their own sample means (within – groups variance).

$$F = \frac{V_b}{V_w} = \frac{\text{between – groups variance}}{\text{within – groups variance}}$$

According to Lindquist, if the between-groups variance is not substantially greater than the within-groups variance, the samples are not significantly different and probably behave as samples from the same population.

The significance of F ratio is determined from an F table which indicates the F critical values necessary to reject the null hypothesis at selected levels of significance.

It is to be noted that the F ratio was proposed by G.W. Snedecor, who based it upon earlier work by Sir Ronald A. Fisher, in honour of whom the ratio was symbolized by F.

Assumptions in F test or Analysis of Variance

As usual, a statistical decision is sound to the extent that certain assumptions have been satisfied in the data that are used. In analysis of variance, there are usually four stated requirements :

1. The variances from within the various sets must be approximately equal. This homogeneity of variability is to be tested prior to going through the ANOVA.

3. The contributions to variance in the total sample must be additive.
4. The population distribution should be normal. This assumption however, is not essentially important. Eden and Yates showed that even with a population departing considerably from normality the effectiveness of the normal distribution still held. The study of Norton cited by Guilford (1965) also points out that F is rather insensitive to variations in the shape of population distribution.

Procedure for Calculating the Analysis of Variance

The analysis of variance consists of these operations :

1. The variance of the scores for three groups is combined into one composite group known as the *total groups variance* (V_t).
2. The mean value of the variances of each of the three groups, computed separately, is known as *within-groups variance* (V_w)
3. The difference between the total groups variance and the within-groups variance is known as the *between-groups variance* ($V_t - V_w = V_b$).
4. Computation of the F ratio. $F = \frac{V_b}{V_w}$
5. Use of t test (when F is found significant, the need for further testing arises).

The computation of F involves finding the mean of the deviations from the mean, squared. Thus, the between-groups variance (v_b) is more commonly referred to as the mean squared between (MS_b), and the within-groups variance (v_w) is more commonly referred to as the mean squared within (MS_w). The formula then becomes

$$F = \frac{MS_b}{MS_w}$$

To find the mean square between (MS_b) and the mean square within (MS_w), we divide the sum of squares between (SS_b) and the sum of squares within (SS_w) by the respective degrees of freedom (df).

$$\therefore F = \frac{MS_b}{MS_w} = \frac{SS_b/df_b}{SS_w/df_w}$$

Let us explain the whole process of using the analysis of variance technique with the help of an

example.

Example : *Analysis of Variance for a Randomized Group Design (One way Analysis of Variance).*

Example :

A study was conducted to determine the effect of three different methods of teaching a particular topic. Three groups, each consisting of seven students of a particular class, assigned randomly, were taught by the same teacher through these different methods. The scores obtained in an achievement test were recorded as below:

Method I	Method II	Method III
6	5	7
3	5	3
7	9	7
1	4	1
3	3	5
5	5	5
3	4	5

Compute the means for separate groups and test the significance of the difference the groups by applying the analysis of variance technique.

Solution

Step 1 : *Arrangement of the given table and computation of some initial values*

Table : Organization of given data

Method (X_1)	Method (X_2)	Method III (X_3)	Total
6	5	7	18
3	5	3	11
7	9	7	23
1	4	1	6
3	3	5	11
5	5	5	15
3	4	5	12
$\Sigma X_1 = 28$	$\Sigma X_2 = 35$	$\Sigma X_3 = 33$	$\Sigma X = 96$

Here, $n_1 = n_2 = n_3 = 7$ and $N = n_1 + n_2 + n_3 = 7 + 7 + 7 = 21$

$$\text{Group means} = \frac{\Sigma X_1}{n_1} = \frac{28}{7} = 4$$

$$\frac{\Sigma X_2}{n_2} = \frac{35}{7} = 5$$

$$\frac{\Sigma X_3}{n_3} = \frac{33}{7} = 4.71$$

$$\text{Correction term, } C = \frac{(\Sigma X)^2}{N} = \frac{96 \times 96}{21} = \frac{9216}{21} = 438.85$$

Here, X = Raw score, ΣX = Grand sum, $\frac{\Sigma X}{N}$ = Grand mean and N = Total No. of scores or cases

Step 2 : *Arrangement of the given table into squared form table and calculation of some other values*

Table : Organization of given data

X_1^2	X_2^2	X_3^2	Total
36	25	49	110
9	25	9	43
49	81	49	179
1	16	1	18
9	9	25	43
25	25	25	75
9	16	25	50
$\Sigma X_1^2 = 138$	$\Sigma X_2^2 = 197$	$\Sigma X_3^2 = 183$	$\Sigma X^2 = 518$

Step 3 : Calculation of total sum of squares (S_t^2)

$$\begin{aligned} S_t^2 &= \Sigma X^2 - \frac{(\Sigma X)^2}{N} = \Sigma X^2 - C \\ &= 518 - 438.85 = 79.15 \end{aligned}$$

Step 4 : Calculation of total sum of squares (S_b^2)

$$\begin{aligned} S_b^2 &= \frac{(\Sigma X_1)^2}{n_1} + \frac{(\Sigma X_2)^2}{n_2} + \frac{(\Sigma X_3)^2}{n_3} - C \\ &= \frac{28 \times 28}{7} + \frac{35 \times 35}{7} + \frac{33 \times 33}{7} - 438.85 \\ &= (4 \times 28) + (5 \times 35) + \frac{1089}{7} - 438.85 \\ &= 112 + 175 + 155.57 - 438.85 \\ &= 442.57 - 438.85 \\ &= 3.72 \end{aligned}$$

Step 5 : Calculation of within-groups sum of squares (S_w^2)

$$S_w^2 = S_t^2 - S_b^2 = 79.15 - 3.72 = 75.43$$

Step 6 : Calculation of the number of degrees of freedom (df)

df for total sum of squares (S_t^2) = $N-1 = 21-1 = 20$,

df for between-groups sum of squares (S_b^2) = $K-1 = 3-1=2$
(K = No. of sets or samples)

and df for within-groups sum of squares (S_w^2) = $N-K=21-3=18$

Step 7 : Calculation of F ratio

Table : Computation of values of mean square variance

Sources of Variation	Sum of squares	df	Mean square variance
Between-groups	$S_b^2 = 3.72$	2	$3.72/2 = 1.86$
Within-groups	$S_w^2 = 75.43$	18	$75.43/18 = 4.19$

$$F = \frac{MS_b}{MS_w} = \frac{\text{Mean square variance between - groups}}{\text{Mean square variance within - groups}}$$

$$= \frac{1.86}{4.19} = 0.444$$

Step 8 : Interpretation of F ratio

The F ratio table (pl. seen Table C) is referred to for 2 degrees of freedom for smaller mean square variance on the left-hand side and 18 degrees of freedom for greater mean square variance across the top. By interpolation the critical values of F are obtained as

At 0.05 level of significance = 19.43 and

At 0.01 level of significance = 99.44

The computed value of F i.e. 0.444 is much lower than both the critical values of F at 0.05 and 0.01 levels of significance. Hence, it is not significant at both the levels of significance. Consequently, null hypothesis cannot be rejected. We may confidently say that the differences between means are not significant and therefore, there is no need for further testing with the help of t test.

[Generally, as and when we obtain the value of F as less than, we straight away interpret it as non-significant, resulting in the non-rejection of the null hypothesis].

Further testing significance of difference between means with the t test

If the computed value of F is equal to or greater than the critical tabled value of F at a given level of significance 0.05 or 0.01, it is taken to be significant and consequently we reject the null hypothesis of no difference among these means at that level of significance. However a significant F does not tell us which of the group means differ significantly; it merely tells us that at least one mean is relatively different from some other. Consequently, there arises a need for further testing to determine which of the differences between means are significant. We take pairs of the group means one by one for testing the significance of differences. the t test provides an adequate procedure for testing the significance when we have means of only two samples or groups at a time for consideration. Therefore, we make use of the t test to test the significance of differences between pair of means.

The usual formula for computing t value is

$$t = \frac{D}{\sigma_D} = \frac{\text{Difference between two means}}{\text{Standard error of the difference between the means}}$$

$$\text{and } \sigma_D = \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

where σ = the pooled SD of the samples drawn from the same population and n_1 and n_2 are the total number of cases in samples 1 and 2 respectively.

In the analysis of variance technique mean square variance within-groups provides us the value of σ^2 , the square root of which can give us the required pooled SD of the samples or groups included in our study. Degrees of freedom for within-groups sum of squares are given by the formula $N-k$, where k denotes number of the group. With this number of degrees of freedom, we can read the t values from the table, at the 0.05 and 0.01 levels of significance. If the computed value of t is found to be equal to or greater than the critical tabled value of t at 0.05 or 0.01 levels, we can reject the null hypothesis at that level of significance. Proceeding similarly we take other pairs for testing the difference between means and arrive at conclusions.

Analysis of variance in a two-way classification problem or two-way analysis of variance

Until now we have dealt with one-way analysis of variance involving one experimental variable. There was only one principle of classification, one reason for segregating data into sets. However, experiments may be conducted in behavioural sciences for the simultaneous study of two experimental variables. Such experiments involve two-way classification based on the two experimental variables. Two experimental conditions are allowed to vary from trial to trial. There may be several trials or replications under each treatment. Let us make some distinction between the need for applying one-way and two-way analysis of variance through some illustrations.

Suppose we want to study the effect of four methods of teaching. Here method of teaching is the experimental variable i.e. independent variable which is to be applied at four levels. We take four groups of students randomly selected from a class of a school. These four groups are taught by the same teacher in the same school but by different methods. At the end of the session, all the groups are tested through an achievement test by the teacher. The mean scores of these four groups are computed. If we are interested to know the significance of the differences between the means of these groups, the best technique is the analysis of variance. Since, only the effect of the method of teaching i.e. only one experimental variable is to be studied, we have to carry out one-way analysis of variance.

Again, let us suppose that is one more experimental or independent variable in the study, in

addition to the method of teaching. Let it be the teacher. Four methods of teaching a certain topic may be applied by five different teachers (not by the same teacher), each one using every one of the four methods. There would therefore be 4×5 i.e. 20 combinations of teacher and method. Let us suppose that equal numbers of randomly selected pupils obtained learning scores under each combination. When the treatments consist of all possible different combinations of one level from each experimental condition, and we have an equal number of observations for each experimental condition, the experiment is referred to as a complete factorial design with equal replications. The achievement of scores of these groups can then be compared by the analysis of variance technique by establishing a null hypothesis in the form that neither teachers nor methods have to do anything with the achievement of pupils. In this way, we have to study simultaneously the impact of two experimental variables, each having two or more levels, classifications or characteristics and hence we have to carry out the two-way analysis of variance.

In multiple classification or factorial analysis of variance, both the independent and interactive effects of two or more independent variables on one dependent variable may be analysed. Not only may the effect of several independent variables be tested, but their interaction (i.e. how they may combine in a significant way) may be examined. Because human behaviour and the factors influencing it are complex and can rarely be explained by single independent variable influences, this method of analysis is a powerful statistical tool of the researcher of the behavioural sciences.

In factorial designs, the total variance is divided into more than two parts. It is divided into one part for each independent variable (main effect), one part for each interaction of two or more independent variables, and one part for the residual, or within-group, variance. Thus, in a design with two independent variables, the variance is divided into four parts. In the previous example, there is a factorial design with two independent variables, method of teaching and teacher. Because there are four conditions of method of teaching and five conditions of teacher; this is a 4×5 design. Here the variance is divided into four parts: the main effect of method of teaching, the main effect of teacher, and residual. From this, three separate F s are derived one to test the difference among the methods of teaching, one to test the difference among the teachers, and one to test the interaction of teaching methods and teachers. With the help of computers, analysis of variance can be used, with any number of independent variables.

3.5.3 : ANALYSIS OF CO-VARIANCE (ANCOVA)

Analysis of co-variance (ANCOVA) represents an extension of ANOVA. It uses the principle of partial correlation with analysis of variance. It is particularly appropriate when the subjects in two or more groups are found to differ on a pretest or other initial measure. In this case the effects of the pretest and/or other relevant variables are partialled out, and the resulting adjusted means of the post test scores are compared. ANCOVA is a method of analysis that enables the researcher to equate the pre-experimental status of the groups in terms of relevant known variables. The initial status of the groups may be determined by pretest scores in a pretest-post test study or in posttest only studies by such measures as previous knowledge of subject matter, reading scores or intelligence. Differences in the initial status of the groups can be removed statistically so that they can be compared as though their initial status had been equated. The scores that have been corrected by this method are known as residuals, for they are what remain after the inequalities have been removed. ANCOVA, used with one or more independent variables and one dependent variable, is an important method of analysing experiments carried on under conditions that otherwise would be unacceptable.

Analysis of co-variance has some *basic assumptions* underlying it, violation of which may make its use inappropriate. According to Lindquist and Edwards, the assumptions are that :

1. The distribution of the adjusted scores within groups should be normal.
2. The groups should be selected at random from the same population.
3. The groups should be homogeneous in variability.
4. The effect of each treatment should be constant and additive on the responses of the subjects in the group on which the treatment is imposed.
5. There should be a real correlation between the dependent variable and the co-variable or pertinent of regressions from group to group.

Glass and Hopkins (1996) point out that ANCOVA does not transform a quasi-experiment into a true (randomized) experiment. There is no substitute for randomization. However it ensures some form of statistical control.

Let Us Check Our Progress 5.4.9.5

1. Answer in about 60 words each :

- (a) What is meant by the term 'significance of the difference between means'?
- (b) What is analysis of variance?
- (c) Point out the underlying assumptions in the application of analysis of variance.

2. Work out the problem.

The following data represent the scores of six students selected randomly in each of the five sections of class IX of a school on an achievement test :

Section A	Section B	Section C	Section D	Section E
32	19	17	12	12
17	26	26	15	15
28	30	30	10	36
24	17	35	20	17
21	34	20	18	20
38	15	15	30	25

Test the significance of the difference between different sections of class IX by applying the analysis of variance technique.

SUMMING UP

In the present Unit we have seen in detail the Inferential statistics for testing null hypothesis applying both the non-parametric tests (like the chi-square test and the median test) and the parametric tests (like z test, t test and analysis of variance) and interpretation of results has also been discussed. However you may be more benefitted if you study some available referred Book(s) and perform some sums related to each statistical test.

SUGGESTED READINGS

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ASSIGNMENT

1. Write notes on :

- (a) Null Hypothesis.
- (b) Level of significance.
- (c) Degrees of Freedom.
- (d) Type I and Type II Error.

2. Discuss the difference between parametric and Non-parametric tests.
3. What is the median test? Discuss its application as a test of significance with the help of an example.
4. (a) What is a chi-square test? Merntion its uses.
 (b) In a study, an equal number of teacher educators were asked to express their preference for lecture method and discussion method. The data were recorded as below :

Teacher Educators	Lecture Method Prefered	Discussion Method Preferred	Total
Male	10	5	15
Female	12	3	15
Total	400	600	1000

5. Two groups of 1st year students selected randomly from two colleges took a standardized aptitude test. The data collected are given below :

	Group A	Group B
Mean	32	36
SD	6.2	7.4
N	145	82

6. The following data were collected from the students of three groups in terms of correctly recalled non-sense syllables under three methods of memorization :

Method I	Method II	Method III
18	20	7
29	17	15
28	21	9
26	19	13
24	29	5
31	26	11
30	25	
27		

Compute the means for separate groups and apply the analysis of variance technique to test the significance of the difference between groups.

STATISTICAL TABLES

Table A : Critical Values of *t*

Degrees of freedom	Probability P			
	-0.10	0.05	0.02	0.01
1	t=6.34	t=12.71	t=31.82	T=63.66
2	2.92	4.30	6.96	9.92
3	2.35	3.18	4.54	5.84
4	2.13	2.78	3.75	4.60
5	2.02	2.57	3.36	4.03
6	1.94	2.45	3.14	3.71
7	1.90	2.36	3.00	3.50
8	1.86	2.31	2.90	3.36
9	1.83	2.26	2.82	3.25
10	1.81	2.23	2.76	3.17
11	1.80	2.20	2.72	3.11
12	1.78	2.18	2.68	3.06
13	1.77	2.16	2.65	3.01
14	1.76	2.14	2.62	2.98
15	1.75	2.13	2.60	2.95
16	1.75	2.12	2.58	2.92
17	1.74	2.11	2.57	2.90
18	1.73	2.10	2.55	2.88
19	1.73	2.09	2.54	2.86
20	1.72	2.09	2.53	2.84
21	1.72	2.08	2.52	2.83
22	1.72	2.07	2.50	2.81
23	1.71	2.07	2.50	2.81
24	1.71	2.06	2.49	2.80
25	1.71	2.06	2.48	2.79
26	1.71	2.06	2.48	2.78
27	1.70	2.05	2.47	2.77
28	1.70	2.05	2.47	2.76
29	1.70	2.04	2.46	2.76
30	1.70	2.04	2.46	2.75
35	1.69	2.05	2.44	2.72
40	1.68	2.02	2.42	2.71
45	1.68	2.02	2.41	2.69
50	1.68	2.01	2.40	2.68
60	1.67	2.00	2.38	2.66
70	1.67	2.00	2.38	2.65
80	1.66	1.99	2.38	2.64
90	1.66	1.99	2.37	2.63
100	1.66	1.98	2.36	2.63
125	1.66	1.98	2.36	2.62
150	1.66	1.98	2.35	2.61
200	1.65	1.97	2.35	2.60
300	1.65	1.97	2.34	2.59
400	1.65	1.97	2.34	2.59
500	1.65	1.96	2.33	2.59
1000	1.65	1.96	2.33	2.58
∞	1.65	1.96	2.33	2.58

Table B. : Critical Values of χ^2

<i>df</i>	0.10	0.05	0.02	0.01
1	2.706	3.841	5.412	6.635
2	4.605	5.991	7.824	9.210
3	6.251	7.815	9.837	11.345
4	7.779	9.488	11.668	13.277
5	9.236	11.070	13.388	15.086
6	10.645	12.592	15.033	16.812
7	12.017	14.067	16.622	18.475
8	13.362	15.507	18.168	20.090
9	14.684	16.919	19.679	21.666
10	15.987	18.307	21.161	23.209
11	17.275	19.675	22.618	24.725
12	18.549	21.026	24.054	26.217
13	19.812	22.362	25.472	27.688
14	21.064	23.685	26.873	29.141
15	22.307	24.996	28.259	30.578
16	23.542	26.296	29.633	32.000
17	24.569	27.587	30.995	33.409
18	25.989	28.869	32.346	34.805
19	27.204	30.144	33.687	36.191
20	28.412	31.410	35.020	37.566
21	29.615	32.671	36.343	38.932
22	30.813	33.924	37.659	40.289
23	32.007	35.172	38.968	41.638
24	33.196	36.415	40.270	42.980
25	34.382	37.652	41.566	44.314
26	35.563	38.885	42.856	45.642
27	36.741	40.113	44.140	46.963
28	37.916	41.337	45.419	48.278
29	39.087	42.557	46.693	49.588
30	40.256	43.773	47.962	50.892

Table C : Critical Values of F at 5% (Values Written above) and 1% (Lower Values) Levels of Significance											
<i>Degrees of freedom for greater mean square</i>											
	1	2	3	4	5	6	8	12	24	∞	
1	161.45 4052.10	199.50 4999.03	215.72 5403.49	224.57 5625.14	230.17 5764.08	233.97 5859.39	238.89 5981.39	243.91 6105.83	249.04 6234.16	254.32 6366.48	
2	18.51 98.49	19.00 99.01	19.16 99.17	19.25 99.25	19.30 99.30	19.33 99.33	19.37 99.36	19.41 99.42	19.45 99.46	19.50 99.50	
3	10.13 34.12	9.55 30.81	9.28 29.46	9.12 28.71	9.01 28.24	8.94 27.91	8.84 27.49	8.74 27.05	8.64 26.60	8.53 26.12	
4	7.71 21.20	6.94 18.00	6.59 16.69	6.39 15.98	6.26 15.52	6.16 15.21	6.04 14.80	5.91 14.37	5.77 13.93	5.63 13.46	
5	6.61 16.26	5.79 13.27	5.41 12.06	5.19 11.39	5.05 10.97	5.95 10.67	4.82 10.27	4.68 9.89	4.53 9.47	4.36 9.02	
6	5.99 13.74	5.14 10.92	4.76 9.78	4.53 9.15	4.39 8.75	4.28 8.47	4.15 8.10	4.00 7.72	3.84 7.31	3.67 6.88	
7	5.59 12.25	4.74 9.55	4.35 8.45	4.12 7.85	3.97 7.46	3.87 7.19	3.73 6.84	3.57 6.47	3.41 6.07	3.23 5.65	
8	5.32 11.26	4.46 8.65	4.07 7.59	3.84 7.01	3.69 6.63	3.58 6.37	3.44 6.03	3.28 5.67	3.12 5.28	2.93 4.86	
9	5.12 10.56	4.26 8.02	3.86 6.99	3.63 6.42	3.48 6.06	3.37 5.80	3.23 5.47	3.07 5.11	2.90 4.73	2.71 4.31	
10	4.96 10.04	4.10 7.56	3.71 6.45	3.48 5.99	3.33 5.64	3.22 5.39	3.07 5.06	2.91 4.71	2.74 4.33	2.40 3.91	
11	4.84 9.65	3.98 7.20	3.59 6.22	3.36 5.67	3.20 5.32	3.09 5.07	2.95 4.74	2.79 4.40	2.61 4.02	2.40 3.60	

Contd..

Degrees of freedom for smaller mean square

Table C : Critical Values of F at 5% (Values Written above) and 1% (Lower Values) Levels of Significance (contd.)											
<i>Degrees of freedom for greater mean square</i>											
	1	2	3	4	5	6	8	12	24	∞	
12	4.75 9.33	3.88 6.93	3.49 5.95	3.26 5.41	3.11 5.06	3.00 4.82	2.85 4.50	2.69 4.16	2.50 3.78	2.30 3.36	
13	4.67 9.07	3.80 6.70	3.41 5.74	3.18 5.20	3.02 4.86	2.92 4.62	2.77 4.30	2.60 3.96	2.42 3.59	2.21 3.16	
14	4.60 8.86	3.74 6.51	3.34 5.56	3.11 6.03	2.96 4.69	2.85 4.46	2.70 4.14	2.53 3.80	2.35 3.43	2.13 3.00	
15	4.54 8.68	3.68 6.36	3.29 5.42	3.06 4.89	2.90 4.56	2.79 4.32	2.64 4.00	2.48 3.67	2.29 3.29	2.07 2.87	
16	4.49 8.53	3.63 6.23	3.24 5.29	3.01 4.77	2.85 4.44	2.74 4.20	2.59 3.89	2.42 3.55	2.4 3.18	2.01 2.75	
17	4.45 8.40	3.59 6.11	3.20 5.18	2.96 4.67	2.81 4.34	2.70 4.10	2.55 3.79	2.38 3.45	2.19 3.08	1.96 2.65	
18	4.41 8.28	3.55 6.01	3.16 5.09	2.93 4.58	2.77 4.25	2.66 4.01	2.51 3.71	2.34 3.37	2.15 3.01	1.92 2.57	
19	4.38 8.18	3.52 5.93	3.13 5.01	2.90 4.50	2.74 4.17	2.63 3.94	2.48 3.63	2.31 3.30	2.11 2.92	1.88 2.49	
20	4.35 8.10	3.49 5.85	3.10 4.94	2.87 4.43	2.71 4.10	2.60 3.87	2.45 3.56	2.28 3.23	2.08 2.86	1.84 2.42	
21	4.32 8.02	3.47 5.78	3.07 4.87	2.84 4.37	2.68 4.04	2.57 3.81	2.42 3.51	2.25 3.17	2.05 2.80	1.81 2.36	
22	4.30 7.94	3.44 5.72	3.05 4.82	2.82 4.31	2.66 3.99	2.55 3.75	2.40 3.45	2.23 3.12	2.03 2.75	1.78 2.30	
23	4.28 7.8	3.42 5.66	3.03 4.76	2.80 4.26	2.64 3.94	2.53 3.71	2.38 3.41	2.20 3.07	2.00 2.70	1.76 2.26	

Contd..

Degrees of freedom for smaller mean square

Table C : Critical Values of F at 5% (Values Written above) and 1% (Lower Values) Levels of Significance (contd.)										
		Degrees of freedom for greater mean square								
	1	2	3	4	5	6	8	12	24	∞
24	4.26 7.82	3.40 5.61	3.01 4.72	2.78 4.22	2.62 3.90	2.51 3.67	2.36 3.36	2.18 3.03	1.98 2.66	1.73 2.21
25	4.24 7.77	3.38 5.57	2.99 4.68	2.76 4.18	2.60 3.86	2.49 3.63	2.34 3.32	2.16 2.99	1.96 2.62	1.71 2.17
26	4.22 7.72	3.37 5.53	2.98 4.64	2.74 4.14	2.59 3.82	2.47 3.59	2.32 3.29	2.15 2.96	1.95 2.58	1.69 2.13
27	4.21 7.68	3.35 5.49	2.96 4.60	2.73 4.11	2.57 3.78	2.46 3.56	2.30 3.26	2.13 2.93	1.93 2.55	1.67 2.10
28	4.20 7.64	3.34 5.45	2.95 4.57	2.71 4.07	2.56 3.75	2.44 3.53	2.29 3.23	2.12 2.90	1.91 2.52	1.65 2.06
29	4.18 7.60	3.33 5.42	2.93 4.54	2.70 4.04	2.54 3.73	2.43 3.50	2.28 3.20	2.10 2.87	1.90 2.49	1.64 2.03
30	4.17 7.56	3.32 5.39	2.92 4.51	2.69 4.02	2.53 3.70	2.42 3.47	2.27 3.17	2.09 2.84	1.89 2.47	1.62 2.01
35	4.12 7.42	3.26 5.27	2.87 4.40	2.64 3.91	2.48 3.59	2.37 3.37	2.22 3.07	2.04 2.74	1.83 2.37	1.57 1.90
40	4.08 7.31	3.23 5.18	2.84 4.31	2.61 3.83	2.45 3.51	2.34 3.29	2.18 2.99	2.00 2.66	1.79 2.29	1.52 1.82
45	4.06 7.23	3.21 5.11	2.81 4.25	2.58 3.77	2.42 3.45	2.31 3.23	2.15 2.94	1.97 2.61	1.76 2.23	1.48 1.75
50	4.03 7.17	3.18 5.06	2.79 4.20	2.56 3.72	2.40 3.41	2.29 3.19	2.13 2.89	1.95 2.56	1.74 2.18	1.44 1.68
60	4.00 7.08	3.15 4.98	2.76 4.13	2.52 3.65	2.37 3.34	2.25 3.12	2.10 2.82	1.92 2.50	1.70 2.12	1.39 1.60

Degrees of freedom for smaller mean square

Contd..

Table C : Critical Values of F at 5% (Values Written above) and 1% (Lower Values) Levels of Significance (contd.)												
	Degrees of freedom for greater mean square											
	1	2	3	4	5	6	8	12	24	∞		
70	3.98 7.01	3.13 4.92	2.74 4.07	2.50 3.60	2.35 3.29	2.23 3.07	2.07 2.78	1.89 2.45	1.67 2.07	1.35 1.53		
80	3.96 6.96	3.11 4.88	2.72 4.04	2.49 3.56	2.33 3.26	2.21 3.04	2.06 2.74	1.88 2.42	1.65 2.03	1.31 1.47		
90	3.95 6.92	3.10 4.85	2.71 4.01	2.47 3.53	2.32 3.23	2.20 3.01	2.04 2.72	1.86 2.39	1.64 2.00	1.28 1.43		
100	3.94 6.90	3.09 4.82	2.70 3.98	2.46 3.51	2.30 3.21	2.19 2.99	2.03 2.69	1.85 2.37	1.63 1.98	1.26 1.39		
125	3.92 6.84	3.07 4.78	2.68 3.94	2.44 3.47	2.29 3.17	2.17 2.95	2.01 2.66	1.83 2.33	1.60 1.94	1.21 1.32		
150	3.90 6.81	3.06 4.75	2.66 3.91	2.43 3.45	2.27 3.14	2.16 2.92	2.00 2.63	1.82 2.31	1.59 1.92	1.18 1.27		
200	3.89 6.76	3.04 4.71	2.65 3.88	2.42 3.41	2.26 3.11	2.14 2.89	1.98 2.60	1.80 2.28	1.57 1.88	1.14 1.21		
300	3.87 6.72	3.03 4.68	2.64 3.85	2.41 3.38	2.25 3.08	2.13 2.89	1.97 2.57	1.79 2.24	1.55 1.85	1.10 1.14		
400	3.86 6.70	3.02 4.66	2.63 3.83	2.40 3.37	2.24 3.06	2.12 2.85	1.96 2.56	1.78 2.23	1.54 1.84	1.07 1.11		
500	3.86 6.69	3.01 4.65	2.62 3.82	2.39 3.36	2.23 3.05	2.11 2.84	1.96 2.55	1.77 2.22	1.54 1.83	1.06 1.08		
1000	3.85 6.66	3.00 4.63	2.61 3.80	2.38 3.34	2.22 3.04	2.10 2.82	1.95 2.53	1.76 2.20	1.53 1.81	1.03 1.04		
∞	3.84 6.64	2.99 4.60	2.60 3.78	2.37 3.32	2.21 3.02	2.09 2.80	1.94 2.51	1.75 2.18	1.52 1.79			

Contd..

Degrees of freedom for smaller mean square

BLOCK - 4

RELIABILITY AND VALIDITY

CONTENT STRUCTURE :

Introduction

Objectives

4.1.1 : Population and Sample

4.1.2 : Quality of sample

4.1.3 : Quality of tools

4.2.1 : Concept of Reliability

4.2.2 : Definitions of Reliability

4.2.3 : Factors affecting Reliability

4.2.4 : Methods of estimating Reliability

4.3.1 : Concept of Validity

4.3.2 : Determination of Validity

4.3.3 : Factors affecting Validity

Relation between Reliability and Validity
Importance and uses of Reliability and Validity
Let Us Sum Up
Suggested Readings
Assignments

INTRODUCTION

Even in Physical Sciences it has been found that measures do not always do a good job of reflecting the construct for which they are intended. So in planning or assessing research, we must assess all measures. Generally, we judge quality of measures on two dimensions: Reliability and Validity. The use of reliability and validity are common in educational researches. This Unit discusses the use of reliability and validity in the research paradigm. First, the meanings of reliability and validity as used in research are discussed as a way of providing a springboard to examining what these two terms mean and how they can be tested in the research paradigm and then we discuss different ways to determine these two dimensions according to the research tools or research procedures.

OBJECTIVES

After going through the Unit, you will be able to :

- Define population and Sample;
- Understand quality of sample;
- Know the qualities of a good tool;
- Develop the concept of Reliability and Validity;
- Define and explain the term Reliability and Validity;
- Explain different factors affecting Reliability;
- Identify different types of Reliability and Validity;
- Estimate Reliability and Validity by different methods;
- Determine factors that affect Reliability and Validity
- Relation between Reliability and Validity
- Point out the importance and some of the uses of Reliability and Validity;

Unit - 1 : RELIABILITY AND VALIDITY---CONCEPT

4.1.1 : POPULATION AND SAMPLE

To carry out research study, the researcher has to collect relevant information or data as accurately as possible. Data are collected through sample by the application of tool or tools. So the quality of the data depends mostly on the quality of sample, selection procedure of sample and choice of quality and appropriate tools.

Sample is selected from the population. A sample is a miniature or representation of the entire group or aggregate from which it has been selected or collected. In other words, a sample is a representation of the larger whole. The entire group from which the sample has been chosen is known as population or universe. The term population is used in a broad sense in research purposes. A population is a well-defined group of persons, objects, attributes qualities, characters of human beings etc. Sometimes it is not possible to consider the entire population for collecting data or information in order to arrive at a principle of University validity. Again, some population is so big that it is not possible to consider the whole lot for collecting data due to expensive terms of time, money, effort and man power. Hence the importance of selecting sample arises. The sampling is the process of selecting a relatively small group or units representing the total population.

4.1.2 : Quality of Sample

As quality of data depends much on the sample, hence sample should be as good as possible. A good sample should be: (i) representative (ii) adequate and (iii) accurate. Here the term representative means 'miniature' or 'replica' of the population, i.e., ideal in all respect to the population from which it has been drawn. An adequate sample is considered as one that contains enough cases to ensure reliable results. Again accuracy of the results does not come from only representativeness or adequacy. The sampling procedure and data collection techniques should also be employed carefully to get a high degree of accuracy or precision.

4.1.3 : QUALITY OF TOOLS

Quality of data depends not only on the sample, but also on the appropriate tools and suitable measuring procedures.

There are various research tools, varying in their complexity, design, and way of administration and interpretation. In certain cases tools are selected from among the available tools, sometimes they are to be modified according to the purpose of the research. In other cases the researcher himself often develops tools.

Each tool is particularly useful for a particular type of data or information, which lends itself to a particular type of analysis and interpretation for drawing meaningful conclusions and generalizations. So for obtaining quality data good measuring tools should be used.

A good research tool must have some essential qualities. As already stated above, a good tool only can give quality data. So the quality tool should be prepared before placing it for its application. In selecting tools for collecting data in research situations a researcher should evaluate them in terms of these characteristics. The main characteristics of a good research tool are : (i) Validity (ii) Reliability (iii) Objectivity (iv) Usability (v) Economy and (vi) Interest.

The main characteristics of a good research tool are:

- (i) Validity**
- (ii) Reliability**
- (iii) Objectivity**
- (iv) Usability**
- (v) Economy and**
- (vi) Interest.**

Unit-2 : RELIABILITY

4.2.1 THE CONCEPT OF RELIABILITY

The process of scientific inquiry implies that a data-collecting tool must be reliable, that is, it must have ability to measure consistently and yield same results, if repeatedly administered to the same frame under same set of conditions. For example, suppose a tool is subjected to an individual and the individual gives his responses on the various items of the tool and the tool is again applied on the same person in any other time on a same set of conditions and found that he provides the same responses then it is considered that the tool is reliable.

Repeated measures of an attribute or characteristics or trait may yield varied results. This may be due to several factors like change of individual's behaviour or inconsistency of the tool itself. If it is due to the change of individual's behaviour, then reliability of the tool is doubtful and if the change is due to the tool itself, then it may be concluded that the tool is unreliable and not to be used as a data collecting instrument. An unreliable tool is like a stretchable rubber yardstick, which yields different results in different times of measurements. Conclusions arrived from statistical treatment of the data might differ considerably depending upon the reliability of the tool.

4.2.2 : DEFINITIONS OF RELIABILITY

"The reliability of a set of measurements is logically defined as the proportion of the variance that is true variance."

(Guilford, 1985)

A tool may be called reliable, if it provides constantly the same results after repeated applications on the same sample under same conditions. Reliability indicates quality of a tool. According to Best et al., "A test is reliable to the extent that it measures whatever it is measuring consistently." (Best and Kahn, 1992)

According to Guilford, "The reliability of a set of measurements is logically defined as the proportion of the variance that is true variance." (Guilford, 1985).

THE COEFFICIENT OF RELIABILITY

In general term reliability indicates the error rate of a measuring tool. More reliable the tool, is more it would be free from chances of error. In other words, more the error of the tool less will be the reliability. But Guildford considers it more penetratingly. He, on the one hand, gave emphasis on the measurement and on the other hand on the instrument, because in psychological, sociological and educational measurements reliability depends upon population under study, as well as on the tools. Again the term 'true variance' here is important. We know that variance is the mean of the squares of deviations from mean $\left[S_{t^2} = \frac{\sum (\bar{X} - X)^2}{N} \right]$. The total variance (S_{t^2}) composed of true variance (S_{α^2}) and error variance (S_{e^2}).

So the total variance $S_{t^2} = S_{\alpha^2} + S_{e^2}$

Again we can think of each measurement (x_i) having two measurements eg., True measurement (x_{α}) and error measurement (x_i). Then $x_i = X_{\alpha} + x_i$. For example, a measurement of data is found to be 16 (x_i) its true measure (X_{α}) is 20 and error measure of measurement (X_i) is (-4), then $16 (X_i) = 20 (X_{\alpha}) + (-4) (X_i)$. This true value is considered as genuine value, obtained by the application of a perfect tool under certain ideal conditions. But this hardly happens in the time of actual practice. A perfect tool or an ideal condition is a actually beyond our reach.

Now, according to the definition given by Guilford, which we have considered as standard :

$$S_t^2 = S_a^2 + S_e^2$$

$$\text{or } \frac{S_t^2}{S_t^2} = \frac{S_a^2}{S_t^2} + \frac{S_e^2}{S_t^2}$$

$$\text{or } 1 = \frac{S_a^2}{S_t^2} + \frac{S_e^2}{S_t^2}$$

Where Coefficient of Reliability (r_{tt})

$$= \frac{S_a^2}{S_t^2}$$

and Error Variance (e^2)

$$= \frac{S_e^2}{S_t^2}$$

$r_{tt} + e^2 = 1$, or $r_{tt} = 1 - e^2$, where r_{tt} is the coefficient of reliability and e^2 is the proportion of error variance in the total test.

Let us now see how can 'reliability coefficient r_{tt} ' be determined.

An Example

1. Suppose, after a test application the following results are found: The total variance (S_t^2) - 120.2; the true variance $S_a^2 = 105.00$ and the error variance S_e^2 . What is the reliability coefficient r_{tt} ?

Now : $120.2 = 105.0 + 15.2$

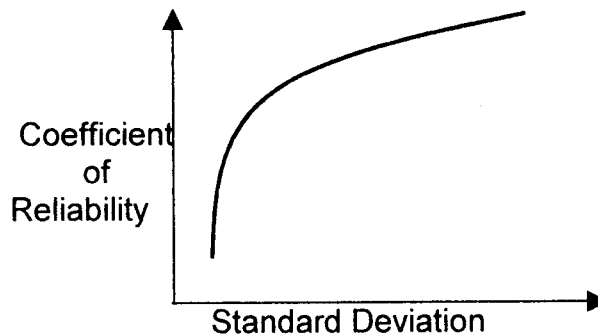
$$\text{or } \frac{120.2}{120.2} = \frac{105.0}{120.2} + \frac{15.2}{120.2}$$

$$\text{or } 1 = \frac{105}{120.2} + \frac{15.2}{120.2}$$

$$\text{Hence } r_{tt} = \frac{105}{120.2} = .87, \quad e^2 = \frac{15.2}{120.2} = .13; \quad \text{and } r_{tt} = 1 - \frac{15.2}{120.2} = .87$$

4.2.3 : FACTORS AFFECTING RELIABILITY

Reliability depends on many factors. Some of the important factors are as follows:



(i) **Variability of age** : Reliability of a test will vary with the variation of the age group of the population. If the age group of the population is wide, reliability will be high and if the age group has small variation, reliability will be low. This is graphically represented below :

Several factors affect Reliability
: 1. **Variability of age** ;
2. **Variability of Scores** ; 3. **Time interval between Testings** ;
4. **Effect of Practice and Learning** ; 5. **Consistency is scores** ; 6. **Effect of Test-length.**

- (ii) **Variability of Scores** : Reliability also depends on the measured scores. Thus when the variability of test scores among the sample is small, reliability between two sets of scores may be lowered by chance and other psychological factors.
- (iii) **Time interval between Testings** : When there is a long time gap between test and retest, then both retest results and reliability may be affected due to the change in environmental and other conditions.
- (iv) **Effect of Practice and Learning** : Practice helps learning and ultimately this may affect reliability. As for example, in case of personality test, counseling may modify an individual's attitude, values and behaviour. This will ultimately produce significant differences in test-retest results.

(v) **Consistency in scores** : When the items are not entirely objective, there may be lack of agreement among the scores. This will drastically affect reliability.

vi) **Effect of Test-length** : If the length of test score be increased or decreased, the reliability will be changed. The reliability of the test will be increased if we increase the number of items. And if the number of items be decreased from 60 to 40, the reliability will be decreased. This may be determined by Spearman-Brown formula in the following way :

$r_n = n \cdot r_1 [1 + (n - 1) \cdot r_1]$, n = Number times the test is increased or decreased and r_1 = Previous Reliability

FACTORS THAT LOWER THE RELIABILITY OF ASSESSMENTS

1. Insufficient number of tasks

Remedy : Accumulate results from several assessments.

2. Poorly structured assessment procedures

Remedy : Define carefully nature of tasks, conditions for obtaining the assessment and the criteria for scoring and judging the results.

3. Dimensions of performance are specific to the tasks.

Remedy : Increase generalizability of performance by selecting tasks that have dimensions like those in similar tasks.

4. Inadequate scoring guides for judgemental scoring.

Remedy : Using scoring rubrics or rating scales that specifically describe the criteria and levels of quality.

5. Scoring judgments that are influenced by personal bias.

Remedy : Check scores with those of an independent judge. Receive training in scoring and rating if possible.

An Example

2. The number of items of a test is increased from 60 to 80 and r_1 is 0.75. Find out the change of reliability coefficient (r_{11})?

Ans. $r_{11} = n \cdot r_1 [1 + (n - 1) \cdot r_1]$; Here $n = \frac{80}{60} = \frac{4}{3}$

$$r_{11} = \frac{4}{3} \times 0.75 [1 + (\frac{4}{3} - 1) \times 0.75]$$

$$\text{or, } r_{11} = \frac{1}{1.25} = 0.80$$

Thus reliability coefficient has increased from 0.75 to 0.80.

Factors that lower Reliability can be tabulated as follows :

4.3.4 : METHODS OF ESTIMATING RELIABILITY

According to Guilford, "There are many procedures, falling in to three general categories: (1) internal-consistency reliability or simply internal consistency; (2) alternate-forms reliability, comparable forms reliability; and (3) retest reliability or test-retest reliability" (Guilford, 1985).

But there are four methods commonly used for measuring reliability. They are :

In Test-retest method the same tool is readministered on the same sample after a definite time period. Generally, the time gap between the two applications should be 10 to 15 days.

1. The test-retest or simply retest reliability
2. Alternate or parallel forms or comparable forms
3. Split half technique
4. Rational equivalence

There is no one best way of estimating r_{11} . The method used will largely depend on the user, purpose of using the test, availability of data and the kind of test.

1. Test-retest method

It must be kept in mind that psychological, environmental and other conditions remain same for both the testing time. The agreement or relationship between the two sets of data obtained by the application gives the reliability of the test or tool. Sometimes this is the only method available for determining reliability. But the method is not free from error if proper cautions are not taken. If the test is used immediately after the first test or after a small lapse of time, some subjects will recall their previous responses. They can thus modify their previous faults and increase the test score.

Again if the time gap between the two tests are too long (eg. six months or more) the real changes in behaviour in terms of growth may alter the true value of reliability. Thus the reliability obtained by this method will not then be a true picture of the tool. Generally, the time gap between the two applications should be 10 to 15 days.

The formula used to find the test-retest reliability is the Pearson Product moment formula as follows:

$$\text{Reliability} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}}$$

where N = Sample;

X = Test scores

and Y = Retest scores

The test-retest method is less accurate for determining reliability when the tool contains some novel features, which may change by practice, induction of confidence etc. Owing to these limits, the test-retest method is generally less useful than other methods. However, this method is commonly used when tools are questionnaires, observations and interviews.

2. The Alternate or Parallel-forms Method

In this method two alternate or parallel forms, if possible, are prepared. The forms must be equivalent, not equal, in all respect. Let these be Form A and B. These two equivalent forms are administered to the same group of subjects. Then, the results in terms of two sets of measures, obtained by the use of the two forms, are correlated to measure the level of reliability. Under these

conditions r_{tt} becomes the index of the equivalence of the two forms of the tool.

According to Freeman, both the forms should meet all of the test specifications as follows:

- (a) The number of items should be same.
- (b) The kinds of items in both should be uniform in respect to content, operations or traits involved, levels and range of difficulty, and adequacy of sampling.
- (c) The items should be uniformly distributed as to difficulty.
- (d) Both test forms should have the same degree of item homogeneity in the operations or traits being measured. The degree of homogeneity may be shown by intercorrelations of items with subtest scores, or with total test scores.
- (e) The means and the standard deviations of both forms should correspond closely.
- (f) The mechanics of administering and scoring should be uniform.

The parallel forms are to be prepared very carefully in terms of the content, the difficulty level and the forms. This method is useful and results are satisfactory when there is a sufficient time gap between the administrations of the two forms, because here memory or practice effect will not influence the test score much due to the different forms of the tools.

When two forms are identical reliability will be high; but when they are not much identical reliability will be low. For standard tests, this is the best way of determining reliability. The best result will be obtained if there is a time gap of two to four weeks between two administrations. This method is useful in psychological tests and attitude scale construction.

3. The Split-half Method

In this method the whole test is divided in to two equivalent halves. After application of the test scoring is done for the two 'halves' separately, correlation between the 'halves' is then measured. This correlation will give the reliability between two 'halves'. From the reliability of the 'halves', reliability of the total tool is determined by the application of the Spearman-Brown prophecy formula, as follow :

$$r_{tt} = \frac{2 \times r_{hh}}{1 + r_{hh}}$$

Where r_{tt} = Coefficient of reliability of the total tool

r_{hh} = Correlation between two 'halves'

The tool may be divided in to two halves in many ways. One-way of dividing the tool by odd - even method. Here the items of the tool is divided in to 1,3,5 ...in one half and 2, 4, 6 ...in the other half. Other methods may be used to split the test items, for example 1, 2 in the first half and 3,4 in the second half and again 5,6 in the first half and 7,8 in the second half etc. Some times to divide the tool in to two halves first fifty percent is taken in one half and other fifty percent is taken in the second half. But when the difficulty level of the two halves are not same, this dividing procedure can not be used.

It must be carefully considered that the two 'halves' must be comparable in content, difficulty level and susceptibility to practice and criteria of the tool.

An Example

3. By using odd-even method, It is found that r_{hh} between the two 'halves' of a tool is 0.542. Find out the reliability coefficient of the tool?

Ans : The r_{tt} of the tool is :

$$r_{tt} = \frac{2 \times r_{hh}}{1 + r_{hh}}$$

Here $r_{hh} = 0.542$

$$\text{So, } r_{tt} = \frac{2 \times 0.542}{1 + 0.542} = 0.70.$$

It may be said that the reliability Coefficient of the tool (r_{tt}) is quite high.

The method is used in estimating reliability of different tests and attitude scales where construction of parallel forms or use of test-retest method is not possible eg. Sometimes Personality tests (the Rorschach Ink Blot Test) cannot be given in alternate forms, nor can be repeated for different reasons.

Many psychologists consider split-half method as the best method of measuring reliability of a test. The main limitation of the method is that the tool can be divided in a number of ways and, therefore, the estimate of reliability may not have a unique value. The method has many advantages,

because here only on testing is needed. Another advantage of this method is that chance errors may affect scores on the two halves so that variation brought about by difference between the two testing situations is eliminated. A reliability Coefficient of this type is also called a Coefficient of internal consistency.

4. Rational Equivalence method

This method was introduced by Richardson, M.W and Kuder, G.F.(1939). This method of measuring reliability is considered as a good method, because it is free from objections raised from other methods stated above. Here two equivalent forms are prepared. Each and every item of the one form is made equivalent to the other, so that the corresponding items are interchangeable and inter item Correlations become the same for both the forms. From four formulas given by Richardson and Kuder, the most accurate one is 'Kuder-Richardson formula 20'. By applying this formula and also by using item difficulty index we can estimate Coefficient of internal consistency. The widely used formula is as follows :

$$r_{tt} = \frac{n}{n-1} \left[1 - \frac{\sum pq}{S_t^2} \right]$$

Where n = the number of items in the tool p = Item difficulty index or proportion of the group answering an item correctly.

Suppose in a item $p = 0.70$, this means 70% has given correct answer to that item.

The proportions failing in each item (q) = $(1 - p)$

Thus, if $p = .70$ then $q = 1 - .70 = .30$

S_t^2 = Variance of the test; n = Number of items of the test

r_{tt} = Reliability Coefficient of the whole test

An Example

4. In an actual situation, there are 8 items in a test. After finding out item difficulty of each item $\sum pq$ and the variance of the test (S_t^2) was found to be 2.0767 and 6.4 respectively. Find out the Coefficient of internal Consistency (r_{tt}) of the test?

Ans : We know that $r_{tt} = \frac{n}{n-1} \left[1 - \frac{\sum pq}{S_t^2} \right]$

Here, $n = 8$; $S_t^2 = 6.4$; $\sum pq = 2.0767$

Then $r_{tt} = \frac{8}{8-1} \left[1 - \frac{2.0767}{6.4} \right] = 0.751$

So the Coefficient of internal Consistency (r_{tt}) of the test is 0.751.

This method is most commonly used in estimating the reliability of psychological tests. The method and its formulas are not strictly comparable to results obtained in other methods of determining reliability as stated above. Again Coefficient of reliability obtained by 'split-half' method and 'rational equivalence method' is very much alike and sometimes the actual difference is so negligible that they fall within the acceptable range.

Let us check our progress I

Write your answers in the space given below:

1. Define Reliability with one example

.....
.....

2. What are the different methods of Reliability estimation?

.....
.....

3. Write two advantages of Test-retest method of Reliability estimation

.....

Unit - 3 : Validity

4.3.1 : CONCEPT OF VALIDITY

A tool used for collecting data must produce relevant information and will also be free from systematic errors. In other words the tool must produce valid information. Determining validity of a physical tool is not too hard. But in psychological tools, independent standards are hard to be found. So validity of in psychological measurement will not be as accurate as a physical tool. Validity is a relative term. A tool may be a valid one for a particular research situation; it may not be valid for another situation.

The traditional criteria for validity find their roots in a positivist tradition. Within the positivist terminology, validity resided amongst and was the result and culmination of other empirical conceptions: universal laws, evidence, objectivity, truth, actuality, deduction, reason, fact and mathematical data to name just a few (Winter, 2000).

Validity has the following characteristics :

Validity -

1. is never assumed. It is inferred from available evidence (not measured);
2. requires multiple sources of evidence to support or refute meaningful score interpretation;
3. is expressed by degree. Assessment is never valid or invalid; rather scores have more (or less) validity;
4. is specific to a particular use;
5. refers to the inferences drawn, not the instrument;
6. is a unitary concept;
7. is concerned with the consequences of using the assessments;

DEFINITIONS OF VALIDITY

There may be some confusion between reliability and validity, because in some cases both the terms sound similar. For example, a homemade Yardstick always measures 1 cm. greater than a standard Yardstick. The homemade Yardstick is reliable but not valid at all. So it is often said that all valid tools are reliable but converse is not always true.

The *validity* of any measuring instrument, depends upon the accuracy with which it measures what it purports to measure.

Validity is the most important quality to consider in assessment, because it is concerned with:

- the appropriateness,
- meaningfulness and

- usefulness of the specific inferences made from the assessment results.

According to Joppe (2000) :

Validity determines whether the research truly measures that which it was intended to measure or how truthful the research results are. In other words, does the research instrument allow you to hit “the bull’s eye” of your research object? Researchers generally determine validity by asking a series of questions, and will often look for the answers in the research of others. (Joppe, M., 2000)

Wainer and Braun (1998) describe the validity in quantitative research as “construct validity”. The construct is the initial concept, notion, question or hypothesis that determines which data is to be gathered and how it is to be gathered. They also assert that quantitative researchers actively cause or affect the interplay between construct and data in order to validate their investigation, usually by the application of a test or other process. In this sense, the involvement of the researchers in the research process would greatly reduce the validity of a test.

4.3.2 : DETERMINATION OF VALIDITY

Validity is never assumed. It is always approached as a hypothesis. It uses theory, logic and scientific methods to collect and assemble data to support or fail to support proposed score interpretations at a given point in time.

An ideal validation would include evidence from all four categories: content-related, criterion-related, construct-related and consequences of using.

We can draw valid inferences from assessment results when we have a full understanding of:

1. The nature of the assessment procedure and specifications that were used in developing it.
2. The relation of the assessment results to significant criterion measures
3. The nature of the psychological characteristics or constructs being assessed and
4. The consequences of using the assessment.

Though not always practical, one must gather as much relevant evidence as is feasible with the constraints of the situation. We should also look for various types of evidence when evaluating standardized tests. They may be as follows:

Type of evidence	Questions to be answered
Content related	How adequately does the sample of assessment tasks represent the domain of tasks to be measured?
Criterion related	How accurately does performance on the assessment (e.g. test) predict future performance (predictive study) or estimate present performance (concurrent study) on some other valued measure called a criterion?
Construct related	How well can performance on the assessment be explained in terms of psychological characteristics?
Consequences	How well did use of the assessment serve the intended purpose (e.g. improve performance) and avoid adverse effects (e.g. poor study habits)?

Validity may be measured in different ways. According to Cronbach and Meehl (1955): “The categories into which the recommendations divide validity studies are: predictive validity, concurrent validity, content validity, and construct validity. The first two of these may be considered together as criterion-oriented *validation procedures* (Cronbach, L. J. and Meehl, P. E., 1955). “

According to Best and Kahn : “There are several types of validity and different types of tests and uses of tests need different types of validity.” Mason and Bramble (1989) has considered three basic approaches to the validity of tests and measures. These are content validity, construct validity, and criterion-related validity. But we shall consider in a different way for our own convenience.

1. Validity by means of judgments

Validity may be determined by means of judgments. Validity by judgment can be done in two ways: Content validity and Face validity.

(i) Content validity

Cronbach and Meehl (1955) defined Content validity in the following way:

“*Content validity* is established by showing that the test items are a sample of a universe in which the investigator is interested. Content validity is ordinarily to be established deductively, by defining a universe of items and sampling systematically within this universe to establish the test.”

According to Best and Kahn, “Content Validity refers to the degree to which the test actually

measures, or is specifically related to, the traits for which it was designed,” It shows how sufficiently the body of knowledge and skills have been mastered what is expected to master. Content validity is assured by carefully examining the text book, curriculum, syllabi, objectives and by the judgment of subject matter specialist or sometimes by a panel of experts on the subject. They give their judgment regarding the content of the test or tool. For this reason some experts called it Curricular validity, Rational validity or Logical validity.. Content validity can not be measured accurately, because judgments by experts are based on their own concepts.

Validation by competent judgment is most satisfactory under two conditions :

- (1) the sampling of items is wide and judicious;
- (2) adequate standardization groups are utilized;
- (3) test should serve the requirement level of students;
- (4) language should be up to the level of the students;
- (5) anything which is not in the curriculum should not be included in the test items;
- (6) each part of the item should be given proper weightage.
- (7) more items should be selected from more important parts of the content.

The following steps ensure content validity:

- Prepare list of content matter or behavioural changes to be tested
- Assign weightage to above based on relative importance
- Prepare a table of specifications
- Create test according to table of specifications

(ii) Face Validity

Face Validity can also do validity by judgments. The method is less authentic but useful in many purposes. A test is said to have face validity when it appears to measure whatever the author had in mind. The method is useful to know the validity of a particular tool in a particular purpose. For example, this type of validity shows the usefulness of a test in military industry etc. It is also useful when it is necessary to decide what items are useful for what purposes. Test content should not appear to be irrelevant, inappropriate, silly or childish. An item may be useful for military purpose, another for industry, some items of a test may be relevant for children but some are relevant

only for adults. So validation should be done according to the need and situational environment.

Mosier has suggested four types of face validity:

- (a) By assumption
- (b) By definition
- (c) By appearance
- (d) By Hypothesis

The face validity should be considered as an initial step in testing and not a final word.

2. Criterion-related Validity

Experimentally validity can be find out by determining correlation between the test and some independent criterion. Criterion-related Validity refers to validity in relation to an external criterion. This criterion may be an objective measure of performance or a qualitative measure such as judgment of the character or excellence in work done. High correlation, thus obtained, is the measure of or evidence of validity. But two conditions must be satisfied.

- the criterion is to be set up independently;
- both the test and the criterion should be reliable;

Unlike content validity, criterion validity can be numerically expressed, because it is a comparison of test scores on the same behaviour:

- obtained by some other measuring instrument at the same time (Concurrent validity) or
- with subsequent scores obtained by another test given at some future time (Predictive validity)

Criterion-related validity is a broad term and can be divided into two types with different time frames viz : (a) Predictive validity (b) Concurrent validity.

According to Cronbach and Meehl (1955): “The pattern of a criterion-oriented study is familiar. The investigator is primarily interested in some criterion, which he wishes to predict. He administers the test, obtains an independent criterion measure on the same subjects, and computes a correlation. If the criterion is obtained some time after the test is given, he is studying *predictive validity*.

If the test score and criterion score are determined at essentially the same time, he is studying *concurrent validity*. Concurrent validity is studied when one test is proposed as a substitute for another (for example, when a multiple-choice form of spelling test is substituted for taking dictation), or a test is shown to correlate with some contemporary criterion (e.g., psychiatric diagnosis)."

(i) *Predictive validity*

It is concerned with the use of test performance to predict future performance on some other valued measure called a criterion. E.g.: Scholastic aptitude test scores may be used to predict course grades.

This type of validity refers to the usefulness of the test in predicting some future performance based on selected criterion. Marshal and Hales (1972) said, "The Predictive validity coefficient is a Pearson Product moment correlation between the scores on the test and an appropriate criterion, where the criterion measure is obtained after the desired lapse of time."

If a test is designed to choose some good teachers and the test scores show high correlation between the test score and future performance, then it can be said that the test has good predictive validity. In salesmanship professional selection, a test will be said to have predictive validity if the test result posses a high correlation with the future performances of the person.

In many cases satisfactory criteria are difficult to achieve, hence predictive validity assessment may not be accurate. Sometimes it is also difficult to find out the reason of fault whether it lies in the test or in the criteria of success or both.

(ii) *Concurrent validity*

When a newly constructed test resembles closely with another test of known validity, then it is said that the new test has concurrent validity. The validation of the new test is done by comparing its result with the valid test.

Concurrent validity is determined for the following reasons:

- To check the results of a newly constructed test against some existing test that has a considerable amount of validity evidence supporting it;
- A brief simple testing procedure maybe substituted for an complex time consuming measure if it provided a satisfactory estimate of study performance;

- To determine if a testing procedure has potential as a predictive instrument;

Sometimes, an old tool may have to be replaced for its complexity in application eg., Minnesota Multiphasic Personality Inventory (MMPI). So when a new tool is developed and its validity is to be assured, the first condition will be to ensure the information given by the cumbersome old tool and newly developed tool will be equivalent. Then both the tools, old and new, are applied to the same groups of sample, and the results are compared. This type of empirical checking is called concurrent validation.

A comparative study of the Predictive and Concurrent validity has revealed that for the same test Predictive validity is lower than Concurrent validity. The reason is that the degree of association between the test and the criterion decreases over time. For example, the academic aptitude test score will be more highly related with the present academic achievement of the examinees than with the academic achievement to be obtained five years later.

3. Construct Validity

Cronbach and Meehl (1955) have done researches on Construct validity. According to these authors: “*Construct validation* is involved whenever a test is to be interpreted as a measure of some attribute or quality which is not *operationally defined*. The problem faced by the investigator is, “What constructs account for variance in test performance?” Construct validity calls for no new scientific approach. Much current research on tests of personality is construct validation, usually without the benefit of a clear formulation of this process. “

Construct validity approach is more complex than other forms of validity measurement. It is based on the gathering of data over a long period of time. It has been found for many years that an instrument, purports to measure a particular trait or traits, becomes doubtful even after repeated testing and correlating it with other standard instruments.

The matter has become more complex since the development of multifactor theory and multifactor methods of analysis by Thurstone. Thurstone found that the concepts like ‘intelligence’, ‘introversion’ and ‘neurotic tendency’ could be broken down in to several variables or ‘primary traits’.

Thus, the tests, which were used and considered standard for a longtime, has become doubtful to many psychologists.

According to Hunter and Schmidt (1990), construct validity is a quantitative question rather

than a qualitative distinction such as “valid” or “invalid”; it is a matter of degree. Construct validity can be measured by the correlation between the intended independent variable (construct) and the proxy independent variable (indicator, sign) that is actually used.

Some authors have defined construct validity as the study of test scores in relationship not only to variables that the test is intended to assess, but also study of those variables that have no relationship to the domain underlying it.

Anastasi (1968) has defined Construct validity as, “.. the extent to which the test may be said to measure a theoretical construct or trait.”

So in short, Construct validity is concerned with the meaning and interpretation of the test scores obtained in terms of psychological or theoretical construct.

Construct related validity for a test includes:

- a description of the theoretical framework that specifies the nature of the construct to be measured
- a description of the development of the test and any aspects of measurement that may affect the meaning of the test scores (e.g. test format)
- the pattern of relationship between the test scores and other significant variables (e.g. high correlations with similar tests and low correlations with tests measuring different constructs) and
- Any other type of evidence that contributes to the meaning of test scores. (e.g. analyzing the mental process used in responding, determining the predictive effectiveness of the test)

A construct is a non-observable trait such as intelligence, which explains our behaviour. It is a trait of ability, temperament, or attitude which is hypothesized to explain certain behaviour such as ‘intelligence’, ‘introversion’, ‘creative thinking’ etc. So construct validity will cover both the test and the theory on which the test have been constructed and this is done through a long continued experimentation based on imagination, reasoning and observation. For example, first imagination suggests that a construct (say X) may be accounted for by the test performance. Then by applying reasoning, the researcher considers that individual’s high score on the test may also be due to another attributes (say Y). Then after repeated experimentation, observations are made and if the expectation

Methods of Validity Estimation

(1) Validity by means of judgments : Content validity and Face validity

(2) Criterion-related Validity : Predictive validity & Concurrent validity

(3) Construct Validity : (i) Factor Analysis (ii) Convergent Validity & (iii) Discriminant Validity

is confirmed then the interpretation is accepted. If some of the deductions are proved to be inaccurate, then the interpretation is changed by changing the theory, new concepts are included or even the previous concepts may be changed. Thus, a new construct is developed like the development of a scientific theory. Construct validity may be established by the following procedures :

(i) Factor Analysis method

(ii) confirming Convergent Validity

and (iii) confirming Discriminant Validity

In **Factor analysis method** the researcher proposed a factorial structure according to his imagination faced on the characteristics he wants to assess it and the theory, which he had put forward for testing. Then the theory, which was hypothesized, is tested against the scores obtained by factor analysis. These factorial relationships are then used to confirm the meaning of the new test scores. Thus construct validity is assured.

This factor analysis technique is a new and sophisticated statistical method. Intercorrelations of a large number of tests can be measured by this method by using small number of 'factor' or 'traits'. For example, it is often found that 3 or 4 factors may account for the intercorrelations among 15 or more tests. The validity is, thus, defined by factor loading, which are given by the correlation of the test with each factor e.g., a vocabulary test may correlate 0.85 with the verbal factor extracted from the test. This Coefficient is the factorial validity of the test.

When a test or proposed trait correlates strongly with instruments that are designed to measure the same trait or that are thought to measure it, then it is said that the test has **Convergent Validity**. It must be considered that any test can not be equally measurable by all methods. So different possible methods are applied for determining Convergent Validity.

Discriminant Validity is determined by assessing the correlation between a particular trait with other trait or traits by same or different methods. Low correlation obtained by this method proved Discriminant validity. According to Guilford, "In rating by outside observers, for example, there is the well known 'hale error', which is seen in the fact that the rater is inclined to rate the observed person similarly in all traits. The rater has general conception of the person as being at the

Let us check our progress I

Write your answers in the space given below:

1. Give an example of Content Validity

.....
.....

2. What are the difference between Convergent Validity and Discriminant Validity

.....
.....

central level (Guilford, J.P. and Fruchter, B., 1985).”

4.3.3 : FACTORS AFFECTING VALIDITY

Validity affects due to various reasons. Some of the reasons are given below:

(a) Group Differences :

Criterion-related validity depends on the characteristics of the group on which the test is administered. Sex, age and personality traits may affect Coefficient of Correlation. Magnitude of Validity coefficient depends on the homogeneity or heterogeneity of the group. Because Validity Coefficient is the coefficient of correlation between the test and the criterion measures used in the procedure of validation. In homogeneous group validity coefficient tends to be smaller. So more heterogeneous groups should be used for obtaining higher validity coefficient. According to Lovell and Lawson (1973) validity coefficient should be at least +0.70. But often this is not possible due to unavailability of better tests.

(b) Correction for Attenuation in the Validity Measurement :

We have already discussed that reliability is the pre condition of validity. If a test is of low reliability, it will also have low validity. Thus it is said that the degree of correlation is attenuated. Such a correction is given by the formula as follows :

$$rc = \frac{r_{xy}}{\sqrt{r_{tx} \cdot r_{ty}}}$$

Where r_c = Correlation between test x and criterion y corrected for attenuation.

r_{xy} = Obtained validity coefficient, that is, obtained correlation between test x and criterion y.

r_{tx} = reliability coefficient of test x.

r_{ty} = reliability coefficient of criterion y.

Thus, it is found that validity coefficient has been raised. But it should be kept in mind that correlation for attenuation does not, always, give perfectly valid result, because perfect reliability and validity do not exist.

(c) Test length :

Homogeneous lengthening of a homogeneous test increases reliability. Hence, it will also in-

An Example

5. Correlation (r_{xy}) between a figure-classification test and a form-perception test was 0.40; the reliability coefficients for the test (r_{tx}) and criterion (r_{ty}) were 0.70 and 0.50 respectively. Find out the corrected validity coefficient.

Ans. We know that formula for Validity after Correction for Attenuation is :

$$rc = \frac{r_{xy}}{\sqrt{r_{tx} \cdot r_{ty}}} \quad \text{Here } (r_{xy}) = 0.40 ; (r_{tx}) = 0.70 \text{ and } (r_{ty}) = 0.50$$

$$\text{So, } rc = \frac{0.40}{\sqrt{0.70 \cdot 0.50}} = 0.68$$

crease validity of the text. This will be most noticeable in predictive or factorial validity. The new validity, after lengthening, of the test may be determined by the following formula :

$$r_{y(nx)} = \frac{r_{yx}}{\sqrt{\frac{1-r_{xx}}{n} + r_{xx}}} = \frac{n \cdot r_{yx}}{\sqrt{\left(\frac{1-r_{xx}}{n} + r_{xx}\right) \cdot n^2}}$$

$$= \frac{n \cdot r_{yx}}{\sqrt{n - n \cdot r_{xx} + n^2 \cdot r_{xx}}} = \frac{n \cdot r_{yx}}{\sqrt{n + n \cdot r_{xx} (n - 1)}}$$

Where $r_{y(nx)}$ is the expected validity of the test (Y) after lengthening it n times

r_{yx} = validity coefficient for predicting criterion Y from X

r_{xx} = Reliability of test X

n = No. of times it is lengthened and

$r_{y(nx)}$ = the validity of the lengthened test.

An Example

6. Test X has a reliability coefficient 0.60 and validity with a criterion 0.30. If the length of the test is tripled then what validity could be expected from the new test?

Ans. : Here $n = 3$; $r_{yx} = 0.30$; $r_{xx} = 0.60$

$$r_{y(3x)} = \frac{3 \times 0.30}{\sqrt{3 + 3 \times 0.60(3-1)}}$$

$$= \frac{0.90}{\sqrt{3 + 1.8 \times 2}} = \frac{0.90}{\sqrt{3 + 3.6}} = \frac{.9}{\sqrt{6.6}} = 0.35$$

So the validity will increase from 0.30 to 0.35

(d) Validity of Right and Wrong Responses :

In a true-false test we have a two-alternative situations. Either the response will be correct or false. Hence the assumption is that the examinee that actually does not know the correct answer will guess at random. When the examinee guesses an answer, the probability of correct answer is 50%. When there are three alternatives it is reduced to 33% and when the alternatives are four, it will be 25% and so on. This has led to stock scoring formula of the following form:

$$S = R - \frac{W}{K - 1},$$

R = *Right response*

W = *Wrong response*

K = number of alternative responses of each item.

In true-false type test the formula reduces to:

$$S = R - W, \text{ because here } k = 2$$

But this formula should be cautiously applied in speed or power test.

(e) Criterion Contamination :

Validity of a test is also dependent upon the validity of the criterion itself. Sometimes it is seen that the criterion upon which the test have been constructed is not valid. Again, sometimes criterion scores are contaminated or rendered invalid due to adoption of faulty method. Thus the validity of the test is reduced. For example, teachers prefer students' score based on academic achievement test (AAT). This AAT scores are also considered for course selection. But it is often found that course selection based on this AAT scores do not make satisfactory results, because this contaminates the criterion and hence validity coefficient is reduced.

There are some other factors, which should be considered seriously and are to be kept in mind because they also lower the validity of the research tools. These are :

- Tasks that provide an inadequate sample of achievement to be assessment;
- Tasks that do not function as intended due to
 - use of improper types of samples;
 - lack of relevance;

- ambiguity;
- clues;
- bias;
- inappropriate difficulty etc.
- Improper arrangement of tasks and unclear directions;
- Too few tasks for the types of interpretation to be made (e.g. interpretation by objective based on few test items);
- Improper administration: inadequate time allowed, poorly controlled conditions;
- Judgemental scoring that uses inadequate scoring guides, or objective scoring that contains computational errors;
- Unclear direction
- Inappropriate level of difficulty of items
- Poorly constructed test items
- Ambiguity etc.

As validity is a key element in test construction, so proper validation should be done before application of the test.

RELATION BETWEEN RELIABILITY AND VALIDITY

A close relationship exists between Reliability and Validity; because both refer to different aspects of the same thing, namely, test efficiency. Reliability is concerned with the stability of the test scores. But validity is concerned with the evaluation in terms of outside and independent criteria. Thus in short:

- Validity refers to the meaning of the test scores.
- Reliability refers to the consistency of the measurement. It is a measure of reproducibility of a test.

To be valid a test must be reliable. A highly reliable test is always a valid one. For example, if a test has the Reliability Coefficient of 0.81, then its index of Reliability will be $\sqrt{0.81} = 0.90$. It means the correlates 0.90 with true measure which constitute the criterion. Sometimes a test may be

A close relationship exists between Reliability and Validity. in short:

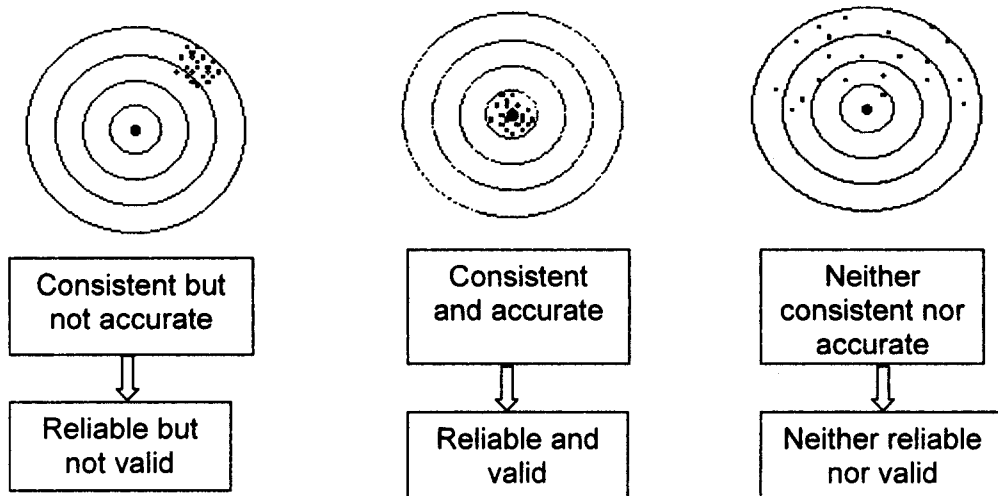
- **Validity refers to the meaning of the test scores.**
- **Reliability refers to the consistency of the measurement. It is a measure of reproducibility of a test.**

theoretically valid but and show little or no correlation with anything else. For example, Word Cancellation Test scores may be made highly reliable so that the index of reliability becomes high. But the correlation of these tests with such criterion as speed or accuracy is so low that they show little practical validity.

Relationship between reliability and validity is that of the target. Let us consider the center of the target as the concept that we are trying to measure. Imagine that for each person we are measuring, we are taking a shot at

the target. If we measure the concept perfectly for a person, we are hitting the center of the target, i.e., the bull's eye. If we don't, we are missing the center. The more we are off for that person, the further we are from the center.

The figure below shows three possible situations. In the first one, we are hitting the target consistently, but we are missing the center of the target. That is, we are consistently and systematically measuring the wrong value for all respondents. This measure is reliable, but not valid at all. The second, we consistently hit the center of the target. Our measure is both reliable and valid. The third scenario shows a case where our hits are spread across the target and we are consistently missing the center. Our measure in this case is neither reliable nor valid.



IMPORTANCE AND USES OF RELIABILITY AND VALIDITY

We often think of reliability and validity as separate ideas but, in fact, they are related to each other. In test construction importance of validity and reliability is unquestionable, because a test tool, which is not valid and reliable, can not be used at all. Such tests are doubtful and measurement from those tools produce results which can not be used in their practical applications and no prediction can be made from them.

Validity is never assumed. It is always approached as a hypothesis. It uses theory, logic and scientific methods to collect and assemble data to support or fail to support proposed score interpretations at a given point in time.

We are most likely to draw valid inferences from assessment results when we have a full understanding of:

1. The nature of the assessment procedure and specifications that were used in developing it.
2. The relation of the assessment results to significant criterion measures
3. The nature of the psychological characteristics or constructs being assessed and
4. The consequences of using the assessment

Though not always practical, one must gather as much relevant evidence as is feasible with the constraints of the situation.

In actual practice, we want measuring instruments that are high on both validity and reliability. But in practice, we may find any of four relationships between validity and reliability:

- *High reliability, but low validity* — the indicators measure something consistently but not the intended concept;
- *High validity, but low reliability* — the indicator represents the concept well but does not produce consistent measurements;

- *Low validity and low reliability* — the worst case; the indicators neither measure the concept nor produce consistent results of whatever they measure; or
- *High validity and high reliability* — what we hope for; the indicators consistently measure what they were intended to measure.

When poor validity or reliability results occur, a researcher will seek the source of error, revise the measuring instrument as appropriate, and test again for validity and reliability and only then it will be used. \

LET US SUM UP

A good research tool must have some essential qualities, because a good tool only can give quality data. In selecting tools for collecting data in research situations a researcher should evaluate them in terms of some essential characteristics. The main characteristics of a good research tool are : i) Validity ii) Reliability iii) Objectivity iv) Usability v) Economy and vi) Interest.

We have discussed her only two methods : Reliability and Validity. A close relationship exists between Reliability and Validity; because both refer to different aspects of the same thing, namely, test efficiency. Reliability is concerned with the stability of the test scores. But validity is concerned with the evaluation in terms of outside and independent criteria. We can to draw valid inferences from assessment results when we have a full understanding of:

1. The nature of the assessment procedure and specifications that were used in developing it;
2. The relation of the assessment results to significant criterion measures;
3. The nature of the psychological characteristics or constructs being assessed and
4. The consequences of using the assessment.
5. Reliability and validity can help us in the above purposes.

SUGGESTED READINGS

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ASSIGNMENTS

1. Discuss the relation between length of the test and reliability of the test. Is reliability influenced by difficulty value of the item – Discuss.

2. Discuss the major criteria of alternate- forms test. How can reliability of an alternate-forms be increased?
 3. Distinguish between reliability and validity of test scores. Discuss the significance of different types of criterion- related validity of test scores.
 5. Discuss, with examples, the factors that influence the validity of the test scores.
 6. Discuss importance of 'reliability' and 'validity' in educational research.
-

BLOCK - 5

Regression And Prediction

CONTENT STRUCTURE :

Introduction

Objectives

5.1.1 : Basics of Regression and Prediction

5.1.2 : Further Conceptualization about Regression

5.1.3 : Origin of Concept of Regression in Solutions of Real-life Problems

5.2.1 : Concept of Regression and Prediction : Illustrations

5.2.2 : The Regression Equations

5.3.1 : Multiple (Linear) Regression and Prediction

5.3.2 : Multiple Regressions and Multiple R

5.3.3 : Uses of Regression and Prediction in Educational Research

Let Us Sum Up

Suggested Readings

Assignments

INTRODUCTION

When considering the relationship between two variables (say X and Y), the researcher will typically calculate some measure of the relationship between those variables, such as a correlation coefficient (e.g., r_{xy} , the Pearson product—moment correlation coefficient). Another way of looking at how two variables may be related is through regression analysis, in terms of prediction. That is, the ability of one variable to predict a second is evaluated. Here we adopt the usual notation where X is defined as the *independent or predictor variable*, and Y as the *dependent or criterion variable*.

OBJECTIVE

After completion of this Unit You will be able to —

- (a) understand concepts underlying linear regression,
- (b) understand concept of prediction after setting regression equation,
- (c) compute to solve problems of regression and prediction in the field of educational research,
- (d) be acquainted with the basics of multiple regression,
- (e) state uses of regression and prediction in educational research.

Unit-1 : Introduction to Regression and Prediction

5.1.1 BASICS OF REGRESSION AND PREDICTION

We may recall that in Unit 8, Module 3 of Paper V we have been acquainted thoroughly with the Measures of Relationship. In that Unit we have learnt actually the concept of correlation or covariation and we have also learnt product moment correlation, rank difference correlation, biserial and point biserial correlations. It is not difficult to think that each of the above measures of correlation indicated some kind association of two variables under some given condition for each of them. The said relationship measures degree of association only between two variables, say X and Y. The association also attempts to indicate to what extent changes in X is associated with the corresponding changes in Y.

We may recall that the degree of such association or relationship is essentially a ratio (without any unit of the measure). Not only this, rather this ratio expresses the extent to which changes in one variable are accompanied by -or are dependent upon -changes in a second variable. As an illustration let us consider the variable X represents a group of students' scores in IQ obtained by administering a test of general intelligence and Y represents students' score on achievement in mathematics, and the coefficient of correlation between X and Y is found equal to 0.85 only. Definitely this obtained coefficient of correlation is very high; that any change in IQ is accompanied with a high degree of change in Y.

If this coefficient of correlation is held reliable, our common belief may be that if one student's IQ is lower than average of the group then his/her achievement in mathematics may be also lower than average of the group. But how can we rationalize our this belief?

In order to search for answer to the above question, we must have to move further in getting further understanding about the association or correlation between two variables. The answer to the above question remains in other concept of statistics which are relation, prediction and of course the nature of relationship, etc.

What is relation? In which manner we may express relation between or among variables?

Mathematicians say that a relation is a set of ordered pairs. In the above example, we have for a group of students' determined correlation between a pair of score in intelligence and mathematics - for each of the students belong to that group. Further, mathematicians generally express the relationship in a much generalized manner, by 'function'. A function is a rule, rule of correspondence. It is a rule often designated by the letter 'f' or 'F'. For the above cited example we may write down the relation or correspondence as $Y = f(X)$ [Y is a function of X]; or achievement in mathematics is a function of general intelligence. For a bit simplicity we may take a restricted meaning and say that here the value of Y is determined by the value of X. In our known research terminology we may say that X is the independent variable and Y is the dependent variable. Then scores in general intelligence is independent variable and scores in achievement in mathematics is the dependent variable. We may recall that while we have learnt about the concept of correlation, we have understood that correlation does not indicate causation; rather it expresses concomitant relationship, not cause-effect relationship. In research parlance we may assume that, of the two variables one variable is independent and the other is dependent one. If we are reasonable to hold that X (general intelligence)

is independent and Y (achievement in mathematics) is dependent and we like to know the exact nature of relationship we must have to understand the exact nature of the expression $Y = f(X)$ by some of our familiar relationship through which mathematicians generally express relationship, say straight line or any type of curve; that is linear or non-linear.

For example, if we like to express relationship between general intelligence (X) and achievement in mathematics by 'r' (product moment correlation), then obviously the relationship between X and Y be expressed by a general equation of a straight line – $Y = bX + a$. [Please see next Sub-section for understanding Further Concept of Linear Regression.]

By expressing the above relationship in this way we may have additional benefits to find the answer to the question: If coefficient of correlation between general intelligence (X) and achievement in mathematics is 0.80 of a randomly selected group of students and Ramesh (a student who belongs to the population from which the above group has been drawn) has an IQ score equal to 105 Or 85, then what score is he most likely to earn in mathematics? (Suppose some other statistics are known). The answer to the question may be found out if we understand the mathematics how to predict and also know exactly linear relationship between the two variables put into an appropriate equation of straight line. (This line is generally called regression line) Up to this, let us put in our mind that coefficient of correlation can be expressed in a straight line and knowing value of correlation between two variables we may predict the most probable score of a particular subject.

Next we may expand the above example further. Let us suppose that not only general intelligence, but study habits and intrinsic motivation may come in the scene of relationship study and each is jointly contributing positively to score in achievement in mathematics. In this case the dependent variable is only achievement in mathematics (say, Y) and the independent variables are three say X_1 (intelligence), X_2 (study habits), and X_3 (intrinsic motivation). Any solution to prediction should involve these three different independent variables and single dependent variable although the relationship is linear (we assume here). In this case the most likely expected relationship is expressed in a straight line (regression) but here this regression is said to be multiple regression (having more than one independent variable in the functional relationship model.) In this way we may think of many more independent variables in the structure of regression line as social reality is complex and involves many independent variables to come to act jointly over the dependent variable of question. Here the relationship is linear and is expressed by straight line form.

Mind that when the form of relation is not expressible by straight line the resulting regression will be non-linear one. However, in both the cases regression is expressed by an equation, describing the form of relationship under certain conditions.

Let Us Check Our Progress

1. Relate the concepts of correlation coefficient and regression
2. What do you mean by $y = f(x)$?
3. Give your interpretation about the mathematical expression ;

$$Y = a + bX$$

5.1.2 : FURTHER CONCEPTUALIZATION ABOUT REGRESSION

Let us recall the basic equation of a straight line as

$$Y = bX + a$$

Here X (the predictor variable) is being used to predict Y (the criterion variable). The *slope* of the line is denoted by b and indicates the number of Y units the line changes for a one-unit change in X . The Y -intercept is denoted by a is the point at which the line intersects or crosses the Y axis. To be more specific, a is the value of Y when X is equal to zero. Hereafter we use the term *intercept* rather than Y -intercept to keep it simple.

Consider the plot of the straight line $Y=0.5X + 1.0$ as shown in Fig. 1. Here we see that the line clearly intersects the Y axis at $Y = 1.0$; thus the intercept is equal to 1. The slope of a line is defined, more specifically, as the change in Y divided by the change in X .

$$b = \frac{\text{changes in } Y}{\text{changes in } X} \text{ or } \frac{Y_2 - Y_1}{X_2 - X_1}$$

For instance, take two points shown in Fig. 1., (X_1, Y_1) and (X_2, Y_2) , that fall on the straight line with coordinates $(0, 1)$ and $(4, 3)$, respectively. We compute the slope for those two points to be $(3-1)/(4-0)=0.5$. If we were to select any other two points that fall on the straight line, then the slope for those two points would also be equal to 0.5. That is, regardless of the two points on the line that we select, the slope will always be the same, constant value of 0.5. This is true because we only need two points to define a particular straight line. That is, with the points $(0,1)$ and $(4,3)$ we can draw only one straight line that passes through both of those points, and that line has a slope of 0.5 and an intercept of 1.0.

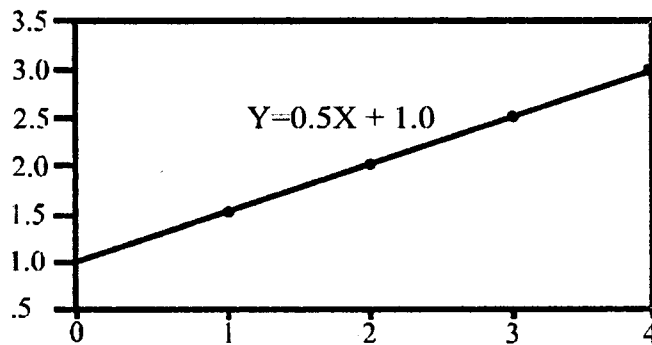


Fig. 1 Plot of line : $Y = 0.5X + 1.0$

Let us take the concepts of slope, intercept, and straight line and apply them in the context of correlation so that we can study the relationship between the variables X and Y. Consider the examples of straight lines plotted in Fig. 2. In Fig. 2(a) the diagonal line indicates a slope of + 1.00, which is used as a reference line. Any line drawn from the lower left portion of the plot to the upper right portion of the plot indicates a slope of a positive value (i.e., greater than 0). In other words, as X increases, Y also increases. This describes a positive relationship or correlation between variables X and Y. In Fig. 2(b) the slope is equal to 0 as the line is horizontal to the X axis. As X increases, Y remains constant ; the correlation is also equal to 0. In Fig. 2(c) the diagonal line indicates a slope of —1.00, which is used as a reference line. Any line drawn from the upper left portion of plot to the lower right portion of the plot indicates a slope with a negative value

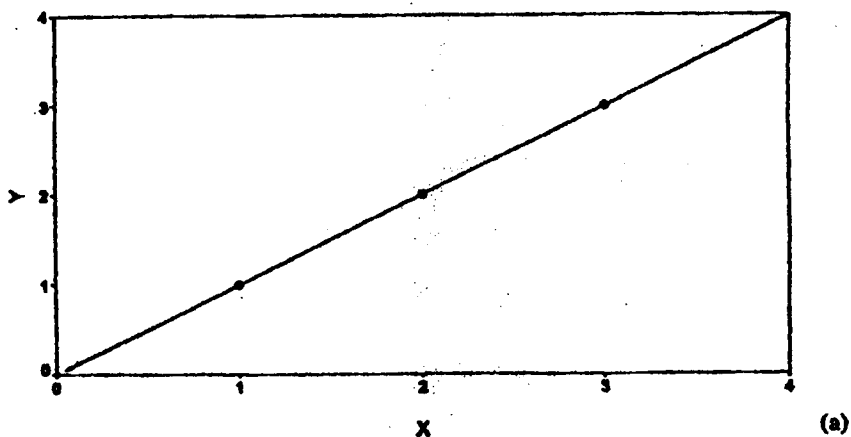


Figure 2. (a)

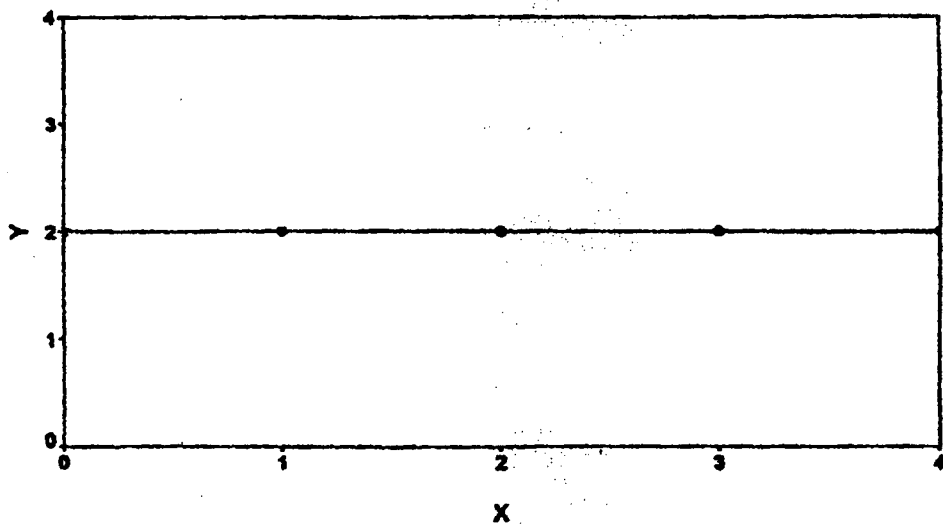


Figure 2. (b)

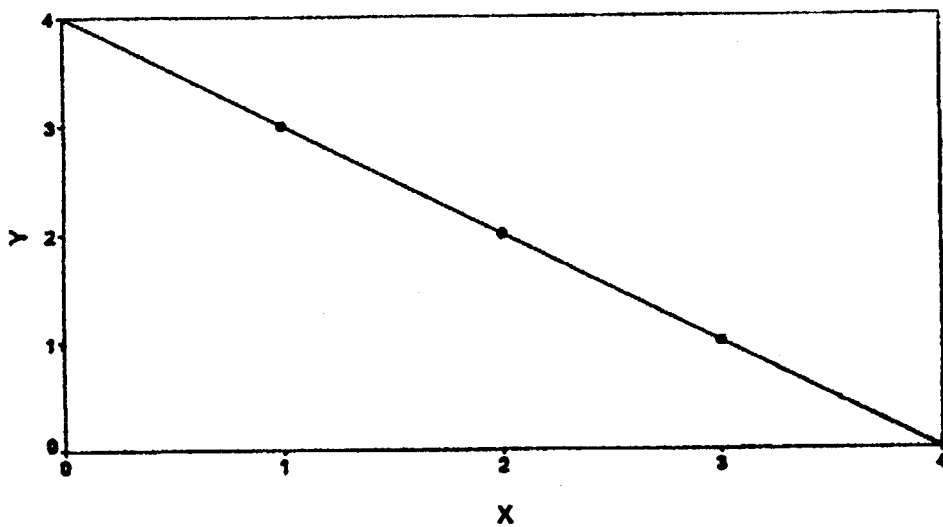


Figure 2. (c)

(i.e., less than 0). In other words, as X increases, Y decreases. This describes a negative relationship or correlation between variables X and Y . Notice that the sign of the slope (i.e., positive or negative) will be the same as the sign of the correlation coefficient. That is, if both X and Y are increasing, the slope and the correlation coefficient will both be positive ; if X is increasing while Y is decreasing, the slope and the correlation coefficient will both be negative.

The population simple linear regression equation :

Let us take these concepts and place them into the formal context of simple linear regression. First consider the situation where we have the entire population of individuals' scores on both variables X (IQ score) and Y (Achievement in Math). Typically, X is used to predict Y ; thus X is defined as the predictor variable and Y as the criterion variable. Next we define the linear regression equation as the equation for a straight line. This yields the equation for the regression of Y the criterion, given X the predictor or, as we like to say in statistics, the regression of Y on X .

The *population regression equation* for the regression of Y on X is

$$Y_i = \beta_{YX} X_i + \alpha_{YX} + \epsilon_i$$

where Y is the criterion variable, X is the predictor variable, β_{YX} is the population slope of the regression line for Y predicted by X , α_{YX} is the population intercept of the regression line for Y predicted by X , ϵ_i are the population residuals or errors of prediction (the part of Y_i not predicted from X_i), and i represents an index for a particular individual (or object). The index i can take on values from 1 to N , where N is the size of the population, written as $i = 1, \dots, N$.

The *population prediction equation* is

$$Y'_i = \beta_{YX} X_i + \alpha_{YX}$$

where Y'_i is the predicted value of Y given a specific value of X . Thus, we see that the population prediction error is defined as

$$\epsilon_i = Y_i - Y'_i$$

There is only one difference between the regression and prediction equations. The regression equation explicitly includes prediction error as ϵ_i , whereas the prediction equation includes prediction error implicitly as part of Y'_i .

Consider for a moment a practical application of the difference between the regression and prediction equations. Frequently a researcher will develop a regression equation for a population with known values of X and Y , and then will use the prediction equation for an equivalent population to

actually predict Y from known values of X (i.e., Y will not be known until later). Using the above example, the admissions officer first develops a regression equation for a population of students currently attending the university so as to have a current measure of Achievement in Math. This yields the slope and intercept. Finally, the prediction equation is used to predict future achievement in Math and make admission decisions for next year's population of applicants based on their IQ scores.

The population slope and intercept in simple linear regression can be computed as

$$\beta_{YX} = \frac{N \sum_{i=1}^N XY - \left(\sum_{i=1}^N X \right) \left(\sum_{i=1}^N Y \right)}{N \sum_{i=1}^N X^2 - \left(\sum_{i=1}^N X \right)^2} \text{ and } \alpha_{YX} = \mu_Y - \beta_{YX} \mu_X \text{ where } \mu_Y \text{ is the population mean for Y,}$$

and μ_X is the population mean for X. Note that the previously used method for calculating the slope and intercept of a straight line is not used in regression analysis. The numerator of the slope comes from the covariance formula and the denominator of the slope comes from the variance formula.

The above discussion may be hard to grasp. However, please wait, and try to understand the next section.

5.1.3 : ORIGIN OF CONCEPT OF REGRESSION IN SOLUTIONS OF REAL-LIFE PROBLEMS

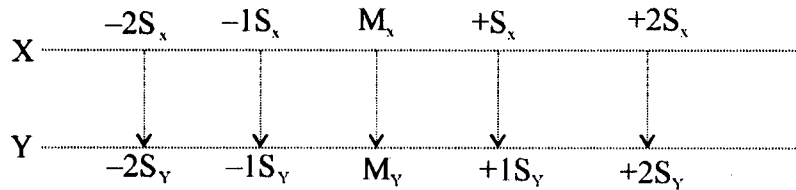
The phenomenon of regression is precisely observed by Francis Galton in his studies of inheritance. He first referred to it as “reversion” and latter as “regression”. Thereby the symbol *r* was chosen for the correlation coefficient. Today we refer to as regression on the mean. *It is theoretically a straight line of best fit.*

The fact of regression on the mean is, of course, characteristics of any relationship in which correlation is less than perfect. Consequently, we would expect that a very short person would tend to have short children, but children less short than he, and that the brightest student in the class would tend to earn a good grade, but not necessarily the best in the class.

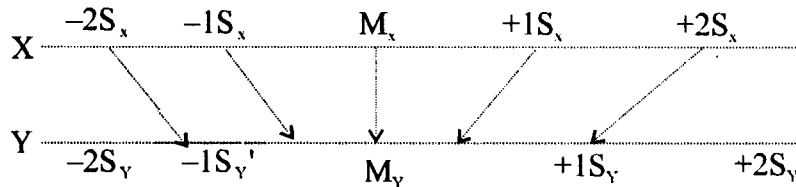
If we wish to study the regression of Y on X scores, we wish to study how the Y scores “go back to”, how they “depend upon” the X scores. Galton called in his studies “regression toward medioc-

urity". Statistically if we intends to predict Y from X and the correlation between X and Y is zero, then our best prediction is to mean. That is any given X, say X_s , we can only predict the mean of Y. The higher the value of r, however, the better the prediction. If $r = 1.00$, then prediction is perfect and we have functional relationship of $Y = f(X)$. To the extent that the correlation departs from 1.00, to that extent predictions form X to Y are less than perfect. If we plot the X and Y values when $r = 1.00$, they all will lie on a straight line. The higher the correlation, the closer the plotted values will be to the regression line.

Case 1 when $r = +1$



Case 2 when $r = +.50$



Case 3 when $r = +.00$

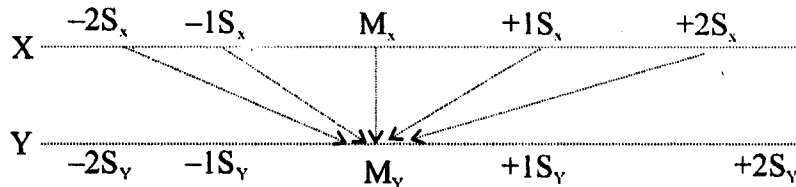


Figure 3 : Regression for three values of r

The figures depict that the higher the value of r, the less the amount of regression toward mean.

Unit-2 : Regression and Prediction : Illustrations

5.2.1 : CONCEPT OF REGRESSION AND PREDICTION : ILLUSTRATIONS

Let us now understand more about the concept of regression

Illustrative Examples

Let us understand regression and prediction with the aid of the following two examples and illustrations

To illustrate and explain the notion of statistical regression, we are going to cite two examples in simple manner.

Example A

Table 1 : Regression Analysis of Two Sets of Scores

Given $r = .90$

Y	X	XY	Y'	d
1	2	2	1.2	-.2
2	4	8	3.0	-1.0
3	3	9	2.1	.9
4	5	20	3.9	.1
5	6	30	4.8	2

.....
 $\Sigma:$ 15 20 69 0

$M:$ 3 4

$\Sigma^2:$ 55 90 1.90 [Σd^2]

$$\Sigma y^2 = 55 - (15)^2 / 5 = 10$$

$$\Sigma x^2 = 90 - (20)^2 / 5 = 10$$

$$\Sigma xy = 69 - (15)(20) / 5 = 9$$

$$b = \Sigma xy / \Sigma x^2 = 9/10 = .90 \text{ [b = slope]}$$

$$a = M_y - bM_x = 3 - (.90)(4) = -.60 \text{ [a = intercept]}$$

$$Y' = a + bX = -.60 + .90 X$$

Example B

Table 2 : Regression Analysis of Two sets of Scores

Given $r = .00$

	Y	X	XY	Y'	d
.....					
	1	5	5	3	-2
	2	2	4	3	-1
	3	4	12	3	0
	4	6	24	3	1
	5	3	15	3	2
.....					
Σ:	15	20	60		0
M: 3	4				
Σ ² :	55	90			10.00 [Σd ²]

$$\Sigma y^2 = 55 - (15)^2 / 5 = 10$$

$$\Sigma x^2 = 90 - (20)^2 / 5 = 10$$

$$\Sigma xy = 60 - (15)(20) / 5 = 0$$

$$b = \Sigma xy / \Sigma x^2 = 0 / 10 = .0$$

$$a = M_y - bM_x = 3 - (.0)(4) = -3$$

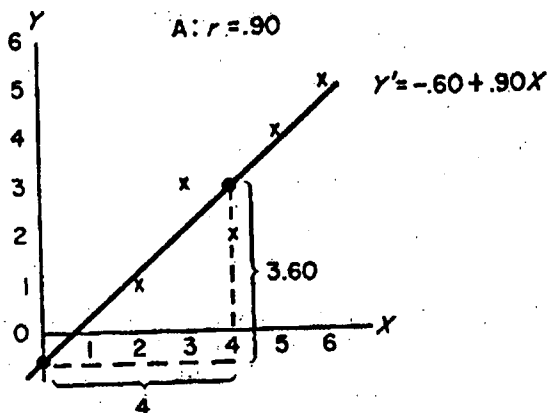
$$Y' = a + bX = 3 + (0)X$$

The basic equation of simple linear regression is :

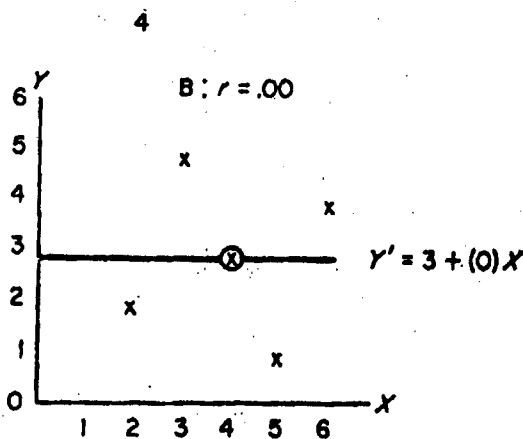
$$Y' = a + bX$$

where X = the scores of the independent variable (predictor); a = intercept constant; b = regression coefficient; and Y' = predicted scores of the dependent variable (criterion). Practically, a regression equation is a prediction formula: Y values are predicted from X values. The correlation between the observed X and Y values in effect determines how the prediction equation “works”.

The two sets of X and Y values of Tables 1 and 2 are plotted in Figure 4. Lines have been drawn in each plot to “run through” the plotted points. If we had a way of placing these lines so that they would simultaneously be as close to all the points as possible, then the lines should express the regression of Y on X. The line in the top plot (Fig. 4.b) (where $r=.90$) runs close to the plotted XY points. In the bottom plot, where $r=.00$, it is not possible to run the lines close to all points. The points here are placed randomly, since $r=.00$.



[Fig. 4a]



[Fig. 4b]

In order to calculate the regression statistics of the two examples. We must calculate the deviation sums of squares and cross products. This has been done at the bottom of Table fig. 1 & 2. The formula for the *slope or regression coefficient b* is :

$$b = \frac{\sum xy}{\sum x^2}$$

The correlation between X and Y are $r = .90$ (Example A) and $r = .00$ (Example B) determine respectively the slopes of the regression lines (when standard deviations are equal, as they are in these cases). *The slope indicates the change in Y with a change in one unit of X*

In the $r = .90$ example a change of 1 in X, we predict a change of .90 in Y. Trigonometrically, this is expressed as the length of the line opposite the angle made by the regression line (i.e. 4 in the Figure 4a) divided by the length of the line adjacent to the angle (i.e. 3.6).

In Figure 4a, if we drop a perpendicular from the regression line – the point where the X and Y means intersect, for instance – to a line drawn horizontally from the point where the regression line intersects the Y axis, or at $Y = -.60$, then $3.6/4.0 = .90$.. A change of 1 in means a change of .90 in Y.

The plot of the X and Y values of Example B, bottom part of Figure 4b is quite different in Example A we can easily draw a line through the points and achieve a fairly accurate approximation to regression line but in Example B this is hardly impossible. Here the regression line is parallel to X axis. but it intersect Y axis at 3 only. Further here the scatter or dispersion of the plotted points around the two regression lines. In Example A they cling rather closely to the line. If $r = 1.00$, they would all be on the line. When $r = .00$ on the contrary they scatter widely about the line. The lower the correlation, the more the scatter.

Now we are going to calculate the regression statistics of the two examples. We are to calculate the deviation sums of squares [sum of squared mean deviation $(X - M_x)^2$ or $\sum x^2$] and cross products i.e., $\sum (X - M_x)(Y - M_y)$ or $\sum xy$. The necessary calculations have been made at the bottom of Table 1 for Example A and Table 2 for Example B.

The formula for the slope or regression coefficient b is :

$$b = \sum xy / \sum x^2$$

The two 'b's are .90 and .00. The intercept constant, a, is calculated with the formula :

$$a = M_Y - b M_X$$

The a's for two examples are respectively -.60 and 3. For Example A, $a = 3 - (.90)(4) = -.60$. The intercept constant is the point where regression line intercepts the Y axis. To draw the regression line we are to use a ruler between the intercept constant on the Y axis and the point where the mean of Y and the mean of X meet. [In Figure 4a these points are indicated with small circles.]

The final steps in this process in context of the Examples A and B are to write regression equations and then using the equations, calculate the predicted values of Y, or Y', given the values of X.

The equations are given in the last line of Table 1 and Table 2. Let us first take the case in Example B. Here $r = .00$, and $Y' = 3 + (0) X$ or $Y' = 3$. This means all predicted Y's are 3, the mean of Y. Therefore, when $r = .00$ the best prediction is the mean.

When $r = 1.00$, at the other hand, one simply adds a, the constant, to the X scores.

When $r = .90$, prediction is less than perfect and one predicts Y' values calculated with the regression equation. For instance, in case of Example A, to predict the first Y' scores, we calculate :

$$Y_1' = -.60 + (.90)(2) = 1.20$$

We note that, for Example A if we plot the X and the predicted Y or Y', values, the plotted points all lie on the regression line. That is, *the regression line of the Figure 4a represents the set of predicted Y values given the X values and the correlation between the X and the observed Y values.*

We can now calculate the predicted values of Y. We see that the higher the value of correlation, the more accurate the prediction. The accuracy of predictions of two sets of scores (observed Y and predicted Y' values) can be shown by calculating the differences between the original (observed) Y values and the predicted Y' values, or $Y - Y' = d$ and then calculating $\sum d^2$. Such differences are called **residuals**. In Table 1 $\sum d^2 = 1.90$ ($r = .90$) and in Table 2 $\sum d^2 = 10.00$ ($r = .00$). That is higher the correlation, the smaller the deviations from prediction and thus the more accurate the prediction.

Regression Equation and Prediction

Up to this point we have learnt some aspects of straight line fitting or evolving regression equation with bivariate data. However, we have assumed the bivariate relationship will be linear. In this way the straight line is the line of best fit to the Y values. This line is determined by all of the scores in the bivariate distribution. Such a line is called regression line and its equation is regression

equation. The prediction may then be made by noting the Y values of the point on the line that corresponds to the particular value of X.

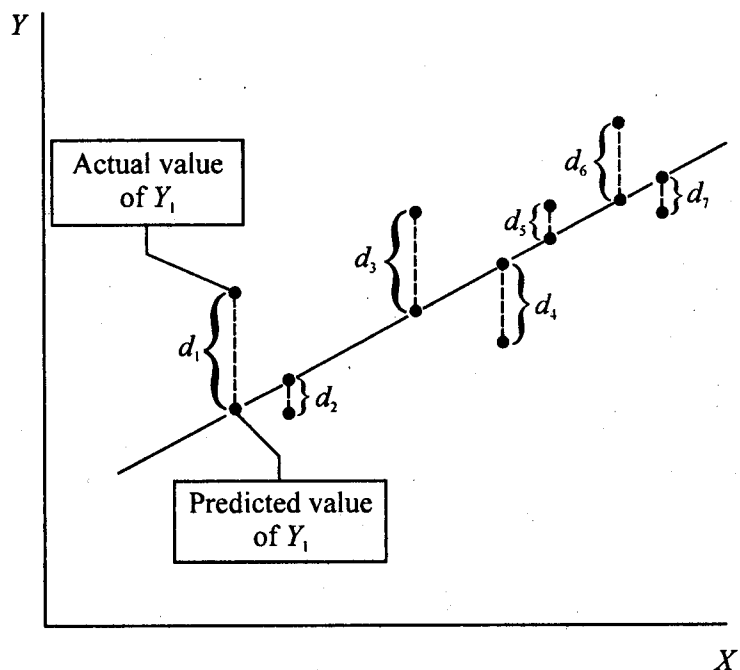


Figure 5 : Discrepancies between Y Values and the Line of Regression of Y on X.

The Figure 5 shows a bivariate distribution in which the discrepancy between each actual value of Y and Y' , its corresponding predicted value as determined by the regression line, is indicated by symbol d. The least square criterion calls for the straight line to be laid down in such a manner that the sum of squares of these discrepancies is as small as possible [$\sum d_Y^2$ is a minimum value]

One important property of least-square solution is that the location of the regression lines and the value of the correlation coefficient will fluctuate less under the influence of random sampling than would occur if another criterion were used. In short, these values are more stably determined.

First, just as the regression line is a least squares solution to the problem of the straight line of best fit, so the mean is a least squares solution to the problem of finding a measure of central tendency. Both are chosen so as to minimize the sum of squares of discrepancies.

Second, the regression line actually may be thought of as a kind of mean one way to think of a 'running mean', a mean that tells us the mean or expected value of Y, for a particular value of X.

Paradoxically, there is another straight line of best fit. If one wish to predict X from the knowledge of Y rather than not predicting Y from X (as stated before), the least squares criterion would be applied to minimize discrepancies in X [$\Sigma(X-X')^2$] rather than in Y [$\Sigma(Y-Y')^2$]. Unless $r = 1.00$ (plus or minus), the two lines thus determined will not be the same. Figure 6 set below shows the two regression lines.

However, in practical work in prediction, the interest is in predicting in one direction, not both directions. Therefore, it is always possible to define the variables to be predicted in Y and the variable used to make the prediction as X. In educational research we are used to study prediction of Y (dependent variable) on X (independent variable) in solution of problems in correlational studies.

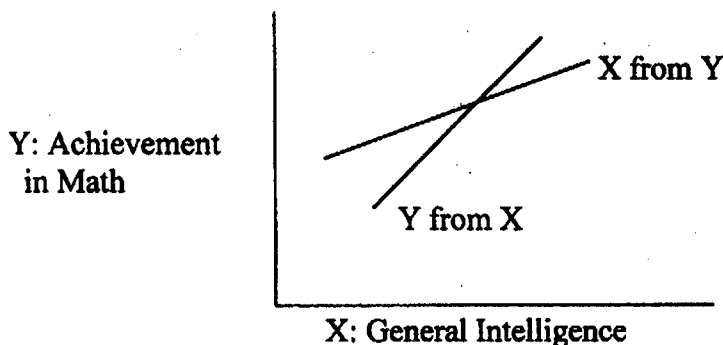


Figure 6 : Two Regression Lines

Let Us Check Our Progress

1. Regression is called 'running mean'.—Explain.
2. Σdy^2 is a minimum value. Explain.
3. Distinguish between regression of Y from X and regression of X from Y.
4. Explain 'best fit' and residuals.

5.2.2 : THE REGRESSION EQUATIONS

A. Regression Equation in Standard Score Form

The regression equation for predicting Y from X, in standard score form may be written as

$$z'_Y = r z_X$$

where

z'_Y is the predicted standard score value of Y

r is the coefficient of correlation between X and Y

z_X is the standard score value of X from which z'_Y is predicted

Since the z-score equivalent of the mean is zero, the predicted standard score value of Y is

$$z'_Y = (r) (0) = 0,$$

or in other words, the mean of Y. We see that the prediction will be the same, irrespective of the value of r , so regression line will always pass through the point defined by mean of Y and the mean of X.

Secondly, if $r = 0$, then the predicted standard score value of Y will always be zero.

B. Regression Equation in Raw Score Form

Although standard score formula helps us to understand some of the characteristics of the straight line of best fit, most practical problems in prediction are tackled in terms of raw scores rather than standard scores. The formula in terms of raw score may be written as $(Y' - M_Y)/S_Y = r (X - M_X)/S_X$

$$\text{or } Y' = [r (X - M_X)] (S_Y/S_X) + M_Y$$

where Y' is the predicted raw score in Y.

S_X and S_Y are the two standard deviations

M_X and M_Y are the two means for X and Y scores respectively.

r is the correlation coefficient between X and Y.

Example C

Given : Y: faculty rating ; X: achievement in mathematics test score

$$M_X = 115.6 \text{ (predictor)} ; M_Y = 3.48 \text{ (criterion)}$$

$$S_X = 11.9; M_Y = 0.85 ; \text{ and } r = + 0.65$$

Problem: Kamal earns a test score of 130. What rating do we predict for him?

Solution :

Because rating is to be predicted from test score, assign Y as the symbol for rating and X for test score. Insert the means, standard deviations and the correlation coefficient in the raw score equation and simplify it.

$$\begin{aligned} Y' &= [r (X - M_X)] (S_Y/S_X) + M_Y \\ &= (rX) (S_Y/S_X) - (r M_X) (S_Y/S_X) + M_Y \\ &= (.65) (.85/11.9) X - (.65) (.85/11.9) (115.6) + 3.48 \\ &= .0464X - 1.89 \text{ \{regression equation\}} \end{aligned}$$

Now insert the value of X from which the prediction is to be made, and find the predicted value of Y :

$$\begin{aligned} Y' &= .0464X - 1.89 \text{ [find that the equation is in the form of } Y' = bX + a \text{ or } Y' = a + bX] \\ &= (.0464) (130) - 1.89 \\ &= 4.14 \end{aligned}$$

Then Kamal's predicted faculty rating score is equal to 4.14

If Kakoli's test score is 100 (X), then we can also find her predicted Y score from the regression equation $Y' = .0464X - 1.89$, just by inserting 100 in place of X in this equation. Do the sum and get that the result is 2.75

Since the regression equation, $Y' = .0464X - 1.89$, is a straight line, it is easy to make a graph of the equation and then to read the graph to make prediction from various values of X.

Roughly the resulting graph may look like as shown below.

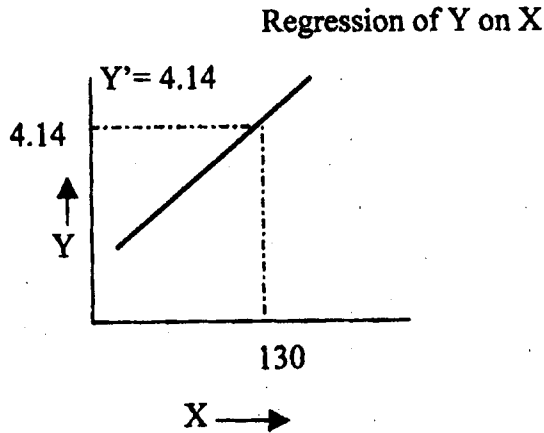


Figure 7 : Regression of Y on X

Standard Error of Prediction

We know that regression equation states what value of Y is expected (Y') when X has a particular value. Of course the predicted value Y' is not likely to be the actual value of Y that corresponds to the particular X. The predicted value is only an estimate of mean value of scores. Only when the correlation is unity will the actual value regularly and precisely equal the predicted values. What is needed is a way to measure the predictive error, the variability of the actual Y values about the predicted value (Y'). Such measure is the standard error of estimate, S_{YX}

The Standard Error of Estimate of Y on X can be written as

$$S_{YX} = \sqrt{\left[\frac{\sum (Y - Y')^2}{n} \right]}$$

Recall that the expression $(Y - Y')$ is also written as d, the residual. *Thus the standard error of estimate is a kind of standard deviation; it is the standard deviation of the distribution of obtained Y score about the predicted Y scores.* When correlation is perfect ($r=1.00$), every value of $Y - Y'$ is zero, and therefore S_{YX} is zero. In that case there will be no error of prediction. On the contrary, when the correlation is zero, $Y' = M_Y$ for all values of X. We may therefore substitute M_Y for Y' in the earlier stated standard error formula and it will be equal to S_Y . Thus we have, the value of S_{YX} ranges from zero when the correlation is perfect to S_Y , when there is no correlation at all.

We may also use this alternative formula of Standard Error of Prediction:

$$S_{YX} = S_Y \sqrt{1 - r^2}$$

Then if S_Y is 4.8 and r is equal to .74, the $S_{XY} = 4.8 \sqrt{1 - (.74)^2} = 3.2$

This standard error formula is normally distributed.

Example D

Given : $M_X = 80$; $M_Y = 100$; $r = +.60$

$S_X = 10$; $S_Y = 20$

Problem: For those who scores 90 in X, what proportion may be expected to score 120 or better in Y?

Solution: We have find out here the predicted value of Y. For this we have to find out the concerned regression equation (already known to you in Example C).

Let us insert the given values to estimate Y' value.

$$\begin{aligned} Y' &= (.60) (20/10) X - (.60) (20/10) 80 + 100 \\ &= 1.20X + 4.00 \end{aligned}$$

$$\begin{aligned} \text{Then for } X = 90, \text{ we have } Y' &= (1.20)(90) + 4.00 \\ &= 112.00 \end{aligned}$$

$$\begin{aligned} \text{Next we are to calculate } S_{XY} &= S_Y \sqrt{1 - r^2} \\ &= 20 \sqrt{1 - (.60)^2} \\ &= 16.00 \end{aligned}$$

Now we have to calculate z-score to find out the range with the help of normal curve.

$$\begin{aligned} z &= (Y_{\text{obt}} - Y') S_{YX} \\ &= (120 - 112) / 16 = +.50 \end{aligned}$$

Let us now consult normal curve. We find that. 3085 of the cases will fall beyond a z of +.50 in a normal distribution. This is the answer to the problem. For those who score 90 in X, 31 per cent may be expected to have Y scores of 120 or better.

Let Us Check Our Progress

1. Write down the general Regression equation involving two variable in raw score form and in standard score form.
2. Write down formula of Standard Error of Prediction.
3. What is the importance of this estimation in regression analysis?

Unit-3 : Multiple Regression

5.3.1 : MULTIPLE (LINEAR) REGRESSION AND PREDICTION

Multiple (Linear) Regressions

Multiple linear regressions assume linearity assumption in relationship. Multiple linear regression involves two or more independent (predictor) variables, $X_1, X_2, X_3, \dots, X_k$, where k may be any value over one in this model. But all the independent variables attempt to predict jointly Y , single dependent variable (criterion). We can, for example, consider achievement in mathematics by general intelligence, study habits, intrinsic motivation here. Suppose we wish to predict to reading achievement, Y , from verbal aptitude (X_1), and achievement motivation (X_2). Or we want to calculate the regression of reading achievement on both verbal aptitude and achievement motivation. In this particular case, the general form of regression equation looks as $Y' = a + b_1X_1 + b_2X_2$. The most general regression equation may be expressed as

$$Y' = a + b_1X_1 + b_2X_2 + \dots + b_kX_k$$

The solution of this type of regression is very complicated. Now appropriate available statistical packages are used for this purpose. However, later on we shall learn to solve some simplified solutions for multiple linear regression and prediction.

Example E

How we can predict academic success measured through Grade Point Average (predictor) from knowledge of General Intelligence and Academic Motivation measured through study hours in a week. Let us solve the above problem.

For simplicity, we are assigning the following symbols for denoting three variables as:

Academic Success : X_1 (criterion)

General Intelligence : X_2

Academic Motivation : X_3

Given :

$$N = 450$$

$$M_{x1} = 18.5$$

$$M_{x2} = 100.6$$

$$M_{x3} = 21$$

$$S_{x1} = 11.2$$

$$S_{x2} = 15.8$$

$$S_{x3} = 6$$

$$r_{12} = .60$$

$$r_{13} = .32$$

$$r_{23} = -.35$$

Writing the Multiple Regression Equation

For the present problem our multiple regression equation in standard form will be

$$x' = b_{12.3}x_2 + b_{13.2}x_3$$

When written in raw score form, the multiple regression equation for three variables may be expressed as

$$(X_1 - M_{x1}) = b_{12.3} (X_2 - M_{x2}) + b_{13.2} (X_3 - M_{x3})$$

Upon transposing and reorganizing terms, we may write the above equation as

$$X' \text{ (predicted)} = b_{12.3} X_2 + b_{13.2} X_3 + K \text{ (a constant)}$$

Now for solving the above equation, we must have to find out values of $b_{12.3}$, $b_{13.2}$ (these are termed as partial regression coefficients) and K.

The usual formulas are —

$$b_{12.3} = r_{12.3} (S_{1.23}/S_{2.13}) \text{ and } b_{13.2} = r_{13.2} (S_{1.23}/S_{3.12})$$

Now we are to find out values of partial 'r's and partial Ss

Calculation of partial r's

$$r_{12.3} = \{r_{12} - r_{13}r_{23}\} / \left\{ \sqrt{(1-r_{13}^2)} \right\} \left\{ \sqrt{(1-r_{23}^2)} \right\}$$

Substituting appropriate values of correlation coefficients (given) we have

$$r_{12.3} = .80$$

Now the formula for

$$r_{13.2} = \{r_{13} - r_{12}r_{23}\} / \left\{ \sqrt{(1-r_{12}^2)} \right\} \left\{ \sqrt{(1-r_{23}^2)} \right\}$$

Now substituting given values of required r's we have

$$r_{13.2} = .71$$

Again formula for

$$r_{23.1} = \{r_{23} - r_{12}r_{13}\} / \left\{ \sqrt{(1-r_{12}^2)} \right\} \left\{ \sqrt{(1-r_{13}^2)} \right\}$$

Putting appropriate values of r's we get

$$r_{23.1} = -.72$$

Calculation of Partial standard deviations

$$S_{1.23} = S_1 \left\{ \sqrt{(1-r_{12}^2)} \right\} \left\{ \sqrt{(1-r_{13.2}^2)} \right\}$$

$$S_{2.13} = S_{2.31} = S_2 \left\{ \sqrt{(1-r_{23}^2)} \right\} \left\{ \sqrt{(1-r_{12.3}^2)} \right\}$$

$$S_{3.12} = S_{3.21} = S_3 \left\{ \sqrt{(1-r_{23}^2)} \right\} \left\{ \sqrt{(1-r_{13.2}^2)} \right\}$$

Substituting values of standard deviations and partial correlation coefficients we have

$$S_{1.23} = 6.3$$

$$S_{2.13} = 8.9$$

$$S_{3.12} = 4.0$$

Computation of partial regression coefficients and of multiple regression equation

From the above calculated values we have

$$b_{12.3} = .57, \text{ and}$$

$$b_{13.2} = 1.12$$

Therefore multiple regression equation in standard form may be written as

$$x' = .57 x_2 + 1.12 x_3$$

In score form the multiple regression equation may be expressed as

$$X'_1 = .57 X_2 + 1.12 X_3 - 66$$

If Uttam (a student) has an intelligence score of 120 and academic motivation score of 20; his most expected academic success measured by Grade Point Average is

$X'_{\text{Uttam}} = (.57)(120) + (1.12)(20) - 66 = 25$ as predicted from Uttam's scores on general intelligence and academic motivation.

In multiple regression analysis the partial regression coefficients have special importance as they independently speak for the weights of the variables in the regression equation. The b values tell which variable is contributing to the multiple regression equation in which way or to what extent. Therefore, we need to estimate if the partial regression coefficients are significant.

The partial regression coefficient (b) has a Standard Error as follows

$$SE_{b_{12.34\dots m}} = \{S_{1.234\dots m}\} / \{S_{2.34\dots m}\} \left\{ \sqrt{(N - m)} \right\}$$

in which

m = the number of variables correlated

N = size of sample

(N – m) = number of degrees of freedom

In the given example partial regression coefficient $b_{12.3}$ is .57, then

$$SE \text{ of } b_{12.3} = (6.3)/(14.8) \left\{ \sqrt{(450-3)} \right\} = .02$$

The .95 confidence interval for the $b_{12.3}$ of .57 is lying within the interval of $.57 + (1.96)(.02)$ and $.57 - (1.96)(.02)$ or from .53 to .61. The partial regression coefficient is quite stable and is highly significant. The value of SE of b tells us whether the given variable is contributing anything to the prediction of the criterion by way of the multiple regression equation. If the b for any variable involved in the multiple regression is not significantly greater than zero, then the coefficient involving the variable can safely be dropped from the regression equation.

The Beta (β) Coefficient – Standardized Regression Coefficient

The partial regression coefficients (b's) in a single multiple regression equation can not be compared among themselves. But that can be performed if the regression coefficients are expressed in standardized form. When b's are transformed into z-score, it is called beta coefficient.

The relation of b with beta (β) can be written as

$$\beta_{12.34 \dots n} = (b_{12.34 \dots n})(S_2)/(S_1)$$

The multiple regression equation for n variables may be expressed as

$$z'_1 = \beta_{12.34 \dots n} z_2 + \beta_{13.24 \dots n} z_3 + \dots + \beta_{1n.23 \dots (n-1)} z_n$$

Beta coefficients are called “beta weights” to distinguish them from the “score weights” (b's) of the raw score form multiple regression equation.

When we like to express all our scores in z-scores all means reduce to zero and all standard deviations become equal to 1.00. At this instance we are able to determine from the correlation alone the relative weight with which each independent variables “enter in” or contributes to the criterion, independently of the other variables (predictors).

In our present example (Example D) we have

$$\beta_{12.3} = (.57)(15.8)/(11.2) = .80 ; \text{ and}$$

$$\beta_{13.2} = (1.12)(6.0)/(11.2) = .60$$

$$z'_1 = .80z_2 + .60z_3$$

Let us recall that X_2 stands for general intelligence and X_3 is academic motivation. Therefore, the beta weight for general intelligence is greater than that for academic motivation. The results expressed in the beta weights tell us that general intelligence has a proportionately greater influence (contribution) than academic motivation in determining academic success.

Let Us Check Our Progress

1. What do you mean by multiple regressions?
2. Distinguish between 'b' and 'β'
3. State special importance of beta weights in multiple regression equation and analysis

5.3.2 : MULTIPLE REGRESSIONS AND MULTIPLE "R"

Multiple R in Terms of Beta Coefficients

Now we shall see how multiple correlation is linked with beta coefficients. R^2 can be expressed as

$$R^2_{1(23 \dots n)} = \beta_{12.34 \dots n} r_{12} + \beta_{13.24 \dots n} r_{13} + \dots + \beta_{1n.23 \dots (n-1)} r_{1n}$$

In respect of the above example we may write down,

$$R^2_{1(23)} = \beta_{12.3} r_{12} + \beta_{13.2} r_{13}$$

Putting appropriate values, we find that

$$\begin{aligned}
 R^2_{1(23)} &= (.80) (.60) + (.60) (.32) \\
 &= .48 + .19 \\
 &= .67
 \end{aligned}$$

Therefore, $R_{1(23)} = .82$ (only positive root)

$R^2_{1(23 \dots n)}$ gives the proportion of the variance of the criterion (dependent variable) measure (X_1) attributable to the joint action of the variables $X_2, X_3 \dots X_n$. In the present example $R^2_{1(23)}$ is equal to 0.67 ; and accordingly 67% of whatever the sampled subjects differ in academic success (X_1) can be attributed to differences in general intelligence (X_2) and academic motivation (X_3).

Again the total contribution may be separated out further into the independent contribution of general intelligence (X_2) and academic motivation (X_3). Thus we may say that 48% is the contribution of general intelligence to the variance of academic success and 19% in the contribution of academic motivation. The remaining 33% of the variance of academic success must be attributed to factors not measured in the given problem.

5.3.3 : USES OF REGRESSION AND PREDICTION IN EDUCATIONAL RESEARCH

Technically regression and prediction is used mainly for two purposes : (a) analysis of data in establishing generalized relations between / among one or more than one independent variable(s) [called predictor(s)] and one dependent variable (called criterion) and (b) prediction through or after extrapolation.

In educational research the above techniques have special bearing and benefits. It is generally used in interrelationship studies falling within the broad research approach of descriptive studies. In experimental research in education we may also use some time regression technique and do prediction work.

The regression coefficient, either partial (b) or standardized (β) are also beneficial in educa-

tional research. Regression coefficients can help us explain the independent weights or contribution to the regression equation model. By checking the significance of these coefficients we may take decision about what predictors are relatively important in explaining the total variance of the criterion variable, what predictors should be deleted from the regression equation if their weights (b or β) are not significant or selection of what predictors in the regression model are more economic to explain the complex field of education.

Indirectly multiple regression analysis has linkage to multiple R. In practice R without multiple regression equation has no interpretive meaning.

Regression and Prediction deals with many real-life problems not only in education but also in many fields of research like business, economics, planning, engineering, geography, sociology, psychology, bio-medical disciplines, agriculture, etc.

Guilford states that there are four general types of prediction in research parlance. These are :

1. Attributes from other attributes — when we predict career choice from sex, race, personality types, etc.
2. Attributes from quantitative measurements — when we predict delinquency or leadership from scores on tests of ability, etc.
3. Measurements from attributes — when we predict possible test scores from sex, socioeconomic status, or economic/racial status, etc.
4. Measurements from other measurements — when we predict achievement in school from IQ test scores, etc.

We should take in our mind that regression may also be non-linear. Even relationship of many independent variables (predictors) with more than one dependent variables (criterion) at a single regression equation model can be explored in multi-variate analysis.

Multiple Regression and Scientific Research

We may also add here some special uses of multiple regression and scientific research. From the researcher's point of view, it is useful and practical tool; it does its analytic job successfully and efficiently.

- It is also useful to test hypothesis of “if p, then q” type — i.e., to determine causation.
- In behavioral sciences including education it is efficient it is efficient in establishing relation between predictors and criterion if the basic relational statement is of the type $\alpha_0 + \alpha_1 X_1 = Y$ in a single research design.
- Multiple regression analysis is conceived as a refined and powerful technique of “controlling” variance which is said to be most technical function of a good research design. It gives how much of the criterion variable (Y) presumably due to each of the predictor variables included in the multiple regression model. It also gives some idea of the relative amounts of influence of the predictor variables. It also gives the combined influences of the predictor variables on Y (criterion).
- Mathematically, though it is quite complicated, use of multiple regression analysis has been easier with the availability low cost computer systems and specialized computer software.
- Multiple regression analysis is applicable to both qualitative and quantitative independent variables.
- Multiple regression analysis does not confine itself with only the cases when relationship is linear, it may be useful for the cases when correlations are non-linear too. Cohen and Cohen (1983) opine that multiple regression analysis “is a very general and flexible data-analytic system that may be used whenever a quantitative variable (the dependent variable) is to be studied as a function of, or in relationship to, any factors of interest (expressed as independent variables)

correlation analysis". They maintain, "The form of relationship is not constrained : it may be simple or complex, for example straight line or curvilinear, general or conditional, or combinations of these possibilities".

LET US SUM UP

In this Unit we have learnt some further uses of correlation coefficients (linear). These further uses are regression and prediction. First we have been acquainted with some basic concepts of regression and prediction. Secondly, we have understood the nature of regression line (not a curve as such) and also some basic concepts of general equation of a straight line also. The new terms, we have learnt, in Unit are regression, prediction, regression coefficient, partial regression coefficient, standardized regression coefficients and linear and multiple regression. Thirdly, we have been acquainted with how to solve educational research problems through use of regression analysis techniques. Finally, we have been able to understand the possible uses of regression and prediction in educational research studies.

SUGGESTED READINGS

- Guilford, J.P. (1956). Fundamental Statistics in Psychology and Education. London: McGraw-Hill
- Garrett, H.E (1973) Statistics in Psychology and Education .Bombay: Vakils, Feffer and Simons
- Karlinger, F.N. ((1978) Foundations of Behavioral Research (2nd Edition). Delhi: Surjeet Publications
- Minium, E.W. (1978) Statistical Reasoning in Psychology and Education. New York: John Wiley and Sons

ASSIGNMENTS

1. Explain the Terms: Regression, Prediction, Regression Coefficients, Linear

Regression, Multiple Regression with suitable illustrations and example from the fields of educational research.

2. Write a note on —

(a) Uses of Regression and Prediction in Educational research.

(b) Uses of Multiple Regression in Educational Research.

3. Given the following data for two tests –A [English] and B [History]

History (X)

English (Y)

Mean = 75.00

Mean = 70.00

SD = 6.00

SD = 8.00

Correlation between X and Y (r) = 0.72

(a) Compute the regression equation in score form [Y from X only]

(b) Predict the most probable score in English of Manish (a student) whose history mark is 65. Find the Standard Error of Prediction

(c) If the above correlation coefficient is .84 (standard deviations remain same as above) what would be most probable score of Manish if now he gets 50 in History?

4. The following data are first year Engineering student of University Alpha :

Aptitude Score (X)

J.E. Test Grade (Y)

Mean = 560

Mean = 2.65

SD = 75

SD = .35

Correlation between X and Y (r_{XY}) = 0.50

- (a) Write down the raw score form regression equation for predicting Y from X and simplify it.
- (b) Jatin and Varna score 485 and 710 respectively, on the aptitude test. Predict the J.E. Grade for each.
- (c) What assumption is necessary for this prediction to be valid ?
- (d) What is the value of standard error of estimate of Y from X ?

5. Given the following data

X (Predictor)	Y (Criterion)
Mean = 50	Mean = 100
SD = 15	SD = 20

$$r_{XY} = 0.70$$

- (a) Write the raw score regression equation for predicting Y from X
- (b) Maya and Malabika score 60 and 30 respectively in X. What Y' score do you predict for each ?
- (c) Calculate standard error of prediction of Y from X.

6. Given the following data for 56 students

X_1 = Scholastic Aptitude (Criterion)

X_2 = Memory for objects

X_3 = Cube imitation

Mean (X_1) = 101.71

Mean (X_2)

Mean (X_3) = 3.35

$$SD = 13.65$$

$$SD = 3.06$$

$$SD = 2.02$$

$$r_{12} = 0.41$$

$$r_{13} = 0.50$$

$$r_{23} = 0.16$$

- (a) Work out to generate multiple regression equation
- (b) Compute $R_{1(23)}$ and $R^2_{1(23)}$ and interpret the results.
- (c) If a student's raw score is 12 in X_2 and 4 in X_3 , what is his most probable score in X_1 ?

BLOCK - 6

RESEARCH REPORT

CONTENT STRUCTURE

Introduction

Objectives

6.1.1 Importance of Research Report

6.1.2 Style Format of a Research Report

6.1.3 Guidelines for writing Research Report

Some general rules for typing Research Report

Some other Guidelines for writing Research Report

6.2.1 Writing qualitative Research Report

6.2.2 Evaluating a Research Report

Let Us Sum Up

Suggested Reading

Assignment

Answers to 'Check Your Progress'

INTRODUCTION

The purpose of research is not well served unless the findings are made known to others. The findings of research should invariably enter the general store of knowledge. Thus writing a research report is a challenging task. Is there any particular style format for writing research report? This Unit will first try to answer this question. Before submitting the final research report a researcher should check and evaluate the report. Or an interested person can judge and assess a research reported submitted to a University or to the concerned funding agency or to the editor of a scientific journal for publication. This Unit will also highlight the steps to be considered to evaluate a research report. Generally quantitative research report differs from qualitative research report writing. This Unit will highlight this issue.

OBJECTIVES

By the end of this Unit you will be able to

- explain the importance of research report;
- describe the format given by American Psychological Association (APA);
- write examples of each steps given by APA;
- distinguish different steps of research reporting;
- show the difference between quantitative and qualitative research reporting;
- describe the steps of evaluating a research report;
- apply this knowledge in actual writing of a research report.

Unit - 1 : Research Report

6.1.1 IMPORTANCE OF RESEARCH REPORT

After conducting a research study, a researcher's task is to prepare a research report. A research report is a written document, which communicates the methods and findings of research study to others. It is more than a summary of findings; it is a record of the research process. Once Charles Darwin expressed "*We naturalists' life would be a happy one if we had only to observe and never to write.*" But the work of a researcher should be recorded because there is something in a research, which must be uncovered, communicated and offered to the society. The writing of research report is equally challenging as the research itself. The purpose of research report is not to convince the readers but to let them know what has been done, why it was done, what results are obtained and what the conclusions are. It records the purpose, importance, limitations, procedures, findings and conclusions in such a way that may benefit-

- The researcher to clarify and systematize his/her work.
- The other researchers to guide their work of similar nature.
- Others to make use of the findings of the study.

Writing of research report requires imagination, logical analysis, creativity and resourcefulness. The writing differs somewhat depending on whether the study is quantitative or qualitative in nature. Quantitative researches focus on hypotheses testing, whereas qualitative researches are mostly exploratory in nature and bridge a variety of approaches or methods. These differences will be discussed later.

6.1.2 STYLE FORMAT OF A RESEARCH REPORT

Now the question arises here - is there any all agreed format for writing a research report. In fact, there are many style formats in writing the research report. However, in order to have uniformity, especially social sciences including education, the international research community prefer the style format suggested by APA. Here we follow the format given by the *Publication Manual of the American Psychological Association* [APA], [2001]. APA style is the style of writing used by journals published by the American Psychological Association. The style is documented in the *APA Publication Manual* (5th ed., 2001). *APA format* described in it is a widely recognized standard for scientific writing in psychology and education. According to this manual there are seven major sections in any research report. Here are brief outlines of each section:

Title Page : It contains title, author's name, and institutional affiliation.

Abstract : It is a comprehensive summary of the content.

Introduction : It contains a general introduction, review of related literature, purposes of the study, and hypotheses.

Methods : this section may be divided into some subsections - Participants (sample), Apparatus (instrument), and Procedure of the study.

Results : it includes presentation of data and analysis of data.

Discussion : The purpose of this section is to interpret and evaluate the results obtained.

References : It provides a list of all citations in the text of research report.

The general principles, in this context, may be cited as :

- Clear communication of ideas, propositions, arguments, etc;
- Continuity of words, concepts, themes from the beginning to the end;
- Smoothness and economy of expression of ideas, logic, etc;
- Correctness of presentation of data, references, date, year, etc.
- Free from personal bias, belief, prejudice, etc.

We shall discuss this format in other way for better understanding. Generally, the components of a research report submitted for a degree requirement consist of three parts- preliminary pages, the main body of the report, and the appendixes. Now we shall describe these stages separately.

PRELIMINARY PAGES

1. **Title page** - The title page usually includes the title of the report, the author's name, the degree requirement being fulfilled, the name and location of the college or university awarding the degree. The title should describe the purpose of the study as clearly as possible.
2. **Approval Sheet**- If any approval required, a page of the report allots space for necessary certificate from the supervisor.
3. **Acknowledgments page** - The acknowledgments page allows the writer to express appreciation to persons who have contributed significantly to the completion of the report.
4. **Preface (if any)**- Sometimes a preface or forward, one or two pages long, follows the acknowledgment page, containing some initial remarks and a brief statement of scope, aim and general character of the research.
5. **Table of contents** - The table of contents is basically an outline of your report that indicates on which page each main section (or chapter) and subsection begins.

6. **List of Tables and figures (if any)** - The list of tables and figures, which is presented on a separate page, gives the number and title of each table and figure and the page on which it can be found.
7. **Abstract (if any)** -The abstract describes the most important aspects of the study, including the problem investigated, the type of participants and instruments, the design, the procedures, the major results, and the major conclusions. Generally, it ranges from 100 to 150 words.

MAIN BODY OF THE REPORT

1. **Introduction** - The introduction section is the first section of the main body of the report and includes a well-written description of the problem, a review of related literature, a statement of the hypothesis, and definition of terms. The introduction also includes operational definitions of terms used in the study that do not have a commonly known meaning.
 1. **Introduction of the Problem-** This is a general introduction of the research. This includes researcher's intention about the research.
 2. **Review of Related Literature** - The review of related literature describes and analyzes what has already been done related to the problem.
 3. **Statement and Title of the study-** Here the researcher clearly states the problem and finally mentions the title of the study.
 4. **Purpose and Objectives of the study-** After stating the purposes the researcher clearly states the objectives of the study.
 5. **Assumption and Hypothesis of the study** - A good hypothesis in a quantitative study states as clearly and concisely as possible the expected relationship (or difference) between two variables, and defines those variables in operational, measurable terms. Researcher should mention the assumptions underlying the hypotheses.
 6. **Delimitation of the study-** Here researcher states how s/he delimits the study in workable form.

7. Significance of the Study- It includes the importance and significance of the study in future.

8. Definition of important terms- Researcher here defines the important terms in the research title.

2. Method - The method section includes a description of participants, instruments, design, and procedure.

1. Participants - The description of participants in a quantitative study includes a definition and description of the population from which the sample was selected and may describe the method used in selecting the participants. The description of participants in a qualitative study will include description of the way participants were selected, why they were selected, and a detailed description of the context in which they function.

2. Instruments - The description of each instrument should relate the function of the instrument in the study (for example, selection of participants or a measure of the dependent variable), what the instrument is intended to measure.

3. Design - There are different types or approaches of research. Researcher mentions which type of research it is.

4. Procedure - The procedure section should describe each step followed in conducting the study, in chronological order, in sufficient detail to permit the study to be replicated by another researcher.

3. Results - The results section describes the statistical techniques or qualitative interpretation that were applied during data analysis. Information about the process applied during data analysis should be provided. Tables and figures are used to present findings in summary or graph form and add clarity to the presentation. Good tables and figures are uncluttered and self-explanatory; it is better to use two tables (or figures) than one that is crowded. Tables and figures follow their related textual discussion and are referred to by number, not name or location. Each research finding or result should be discussed in terms of its agreement or disagreement with previous results

obtained by other researchers in other studies or hypotheses stated at the start of the study. Overgeneralization refers to the statement of conclusions that are not warranted by the results and should be avoided.

4. **Discussion (Conclusions and Recommendations)** - The researcher should discuss the theoretical and practical implications of the findings and make recommendations for future research or future action.

THE REFERENCE SECTION

1. **Footnotes**- Although footnotes spread throughout the text of the body, it really is part of the reference section.
2. **References (Bibliography)** - The reference or bibliography section of the report should list all the sources, alphabetically by authors' last names that were directly used in writing the report. Every source cited in the paper must be included in the references, and every entry listed in the references must appear in the paper. The required style manual will guide the format of various types of references.
3. **Appendix** - appendixes include information and data pertinent to the study that either are not important enough to be included in the main body of the report or are too lengthy - for example, tests, questionnaires, and cover letters, raw data, and data analysis sheets.
4. **Index (if any)**- Although an index is very useful for the readers, yet typed reports seldom contain an index.

6.1.3 GUIDELINES OF WRITING RESEARCH REPORT

Some of the more commonly used rules and reference formats from the manual are listed here. However, this small Unit is no substitute for the 440 pages *APA Manual* itself

SOME GENERAL RULES FOR TYPING RESEARCH REPORT

- A good quality paper of 8½" x11" should be used.
- All margin should be 1½"-top, bottom, left and right.
- Only one side of the sheet is used for typing.
- All materials should be double-spaced.
- Throughout the script an indentation of seven spaces should be used at the beginning of paragraphs, quotations, and footnotes.
- Ditto marks should not be used.

SOME OTHER GUIDELINES FOR WRITING RESEARCH REPORT

Spacing

Double-spacing is required throughout most of the manuscript. When single-spacing would improve readability, it is usually encouraged. Single spacing can be used for table titles and headings, figure captions, references (but double-spacing is required between references), footnotes, and long quotations (APA, 2001, p. 326).

Abbreviations

- Avoid abbreviations (acronyms) except for long, familiar terms (MMPI).
- Explain what an abbreviation means the first time it occurs like- Socio economic status (SES)
- If an abbreviation is commonly used as a word, it does not require explanation (IQ).
- The following abbreviations should NOT be used outside parenthetical comments:
 - **cf.** [use **compare**]
 - **e.g.** [use **for example**]
 - **etc.** [use **and so forth**]
 - **i.e.** [use **that is**]
 - **viz.** [use **namely**]
 - **vs.** [use **versus**]

- Do not use periods within degree titles and organization titles (PhD, APA).
- Do not use periods within measurements (lb, ft, s) except inches (in.).
- Use s for second, m for meter.
- To form plurals of abbreviations, add s alone, without apostrophe (PhDs, IQs.).
- In using standard abbreviations for measurements, like m for meter, do not add an s to make it plural (100 seconds is 100 s).

Capitalization

- Capitalize formal names of tests (Word Association Test).
- Capitalize major words and all other words of four letters or more, in headings, titles, and subtitles outside reference lists, for example, "A Study of Teaching Effectiveness."
- Capitalize specific course and department titles.
- Do not capitalize names of laws, theories, and hypotheses (the law of effect).
- Do not capitalize when referring to generalities (any department, any introductory course).

Italics (Underlining)

- Do not italicize or underline common foreign abbreviations (vice versa, et al., a priori).
- Do not italicize or underline for mere emphasis.
- Italicize or underline the titles of books and articles, species names, introduction of new terms and labels (the first time only), words and phrases used as linguistic examples, letters used as statistical symbols, and volume numbers in reference lists.

Numbers

- Spell out common fractions and common expressions (one-half, Fourth of July).
- Spell out large numbers beginning sentences (Thirty five participants...).
- Spell out numbers, which are inexact, or below 10 and not grouped with numbers over 10 (one-tailed *t* test, eight items, nine pages, three-way interaction, five trials).
- Use numerals for numbers 10 and above, or lower numbers grouped with numbers 10 and above (for example, from 6 to 12 hours).
- To make plurals out of numbers, add *s* only, with no apostrophe (the 1950s).
- Use combinations of written and Arabic numerals for back-to-back modifiers (five 4-point scales).
- Use combinations of numerals and written numbers for large sums (over 3 million people).
- Use numerals for exact statistical references, scores, sample sizes, and sums (multiplied by 4, or 3% of the sample).
- Use the percent symbol (%) only with figures (7%) not with written numbers (seven percent).

Quotation Marks

- Use quotation marks for an odd or ironic usage the first time but not thereafter, for example, "This is a "Bottom-down" research, but this bottom-down research never claims that . . ."
- Use quotation marks for article and chapter titles cited in the text but not in the reference list. (In Smith's (1992) article, "APA Style and Personal Computers," computers were described as "here to stay" (p. 311).)
- For quotations over 40 words in length, indent and single space the whole block. Indent five more spaces (one-half inch, 1.25 cm) if there are paragraphs within the long quotation after the first. Always provide author, year, and page citation.
- Expand or clarify words or meanings in a quotation by placing the added material in quotes. For example, "it [motivation] energizes, ..."

- Reproduce a quote exactly. If there are errors, introduce the word *sic* italicized and bracketed—for example [*sic*]*—*immediately after the error to indicate it was part of the original source.

Table notes.

- Place tables close to where they are first mentioned in your text, but do not split a table across pages.
- Number tables consecutively as they appear in your text. Use only whole numbers.
- Label each table beginning with the table number followed by a description of the contents.
- Do not change the number of decimal places within a column.
- Do not change the units of measurement within a column.
- Use a zero before the decimal point when numbers are less than one. Write “0.23” not “.23” unless the number is a statistic that cannot be larger than one, for example a correlation $r = .55$, or a probability $p < .01$.
- Add notes to explain the table contents. These may be general notes or footnotes.
- Use asterisks to indicate statistical significance explained in the probability level note at the bottom of the table. “Assign a given alpha level the same number of asterisks from table to table within your paper, such as $*p < .05$ and $**p < .01$.”
- You may use both single space and double space within a table to achieve clarity.

References

- For two-author citations, spell out both authors on all occurrences.
- For multiple-author citations (up to five authors) name all authors the first time, then use et al., so the first time it is Smith, Jones, Pearson and Sherwin (1990), but the second time it is Smith et al.

- For six or more authors, use et al. the first time and give the full citation in references.
- Include a page reference after the year, outside quotes. For example: The author stated, “The effect disappeared within minutes” (Lopez, 1993, p. 311).
- Always give page numbers for quotations, for example: (Cheek & Buss, 1981, p. 332) or (Shimamura, 1989, chap. 3, p. 5).
- Your text and the reference list must agree. “References cited in text must appear in the reference list; conversely, each entry in the reference list must be cited in text” (APA, 2001, p. 215).

Abbreviating within a reference

Here are approved abbreviations for use in a reference list :

● chap. for chapter ● ed. for edition ● rev. ed. for revised edition ● 2nd ed. for second edition ● Ed. for Edited by ● (Eds.) for multiple editors ● Trans. for Translated by ● p. for page number, with a space after the period	● pp. for page numbers (plural) ● Vol. for a specific Volume ● vols. for a work with xx volumes ● No. for Number ● Pt. for Part ● Suppl. for Supplement, ● Tech. Rep. for Technical Report

APA reference style

The APA *Publication Manual* now instructs authors to use hanging indents for references, and to use *italics* for titles. The hanging indent is one-half inch (1.25 cm), just like paragraph indents. All titles in references are set in sentence caps, but titles quoted in the text are set in heading caps. No quotation marks are used around titles of articles in references, but quotes are used when citing

article titles in the text. The APA *Publication Manual* (2001) contains 95 examples of different reference types (pp. 240-281). Here are a few examples of the most commonly used formats.

For Books

Format : Author's last name, first initial. (Publication date). *Book title*. Additional information.
City of publication: Publishing company.

Examples :

Carson, R. (1956). *The sense of wonder*. New York: Harper and Row.

Cobb, E. (1977). *The ecology of imagination in childhood*. New York: Columbia University Press.

Bogdan, R.C., & Bilken, S. K. (1992). *Qualitative research for education: An introduction to theory and methods*. Boston: Allyn and Bacon.

For Encyclopedia & Dictionary

Format : Author's last name, first initial. (Date). Title of Article. *Title of Encyclopedia* (Volume, pages). City of publication: Publishing company.

Examples :

Merriam-Webster's collegiate dictionary (10th ed.). (1993). Springfield, MA: Merriam-Webster.

For Magazine & Newspaper Articles

Format : Author's last name, first initial. (Publication date). Article title. *Periodical title, volume number (issue number if available)*, inclusive pages.

Note : Do not enclose the title in quotation marks. Put a period after the title. If a periodical includes a volume number, italicize it and then give the page range (in regular type) without "pp." If the periodical does not use volume numbers, as in newspapers, use *p.* or *pp.* for page numbers.

Note : Unlike other periodicals, *p.* or *pp.* precedes page numbers for a newspaper reference in APA style.

Examples :

Henry, W. A., III. (1990, April 9). Making the grade in today's schools. *Time*, 135, 28-31.

Kalette, D. (1986, July 21). California town counts town to big quake. *USA Today*, 9, p. A1.

For Website or Webpage

Format :

Online periodical :

Author's name. (Date of publication). Title of article. *Title of Periodical*, volume number, Retrieved month day, year, from full URL

Online document :

Author's name. (Date of publication). *Title of work*. Retrieved month day, year, from full URL.

Note : When citing Internet sources, refer to the specific website document. If a document is undated, use "n.d." (for no date) immediately after the document title. Break a lengthy URL that goes to another line after a slash or before a period. Continually check your references to online documents. There is no period following a URL.

Note : If you cannot find some of this information, cite what is available.

Note : If a document is contained within a large and complex website (such as that for a university or a government agency), identify the host organization and the relevant program or department before giving the URL for the document itself. Precede the URL with a colon.

Examples :

Dove, R. (1998). Lady freedom among us. *The Electronic Text Center*. Retrieved June 19, 1998, from Alderman Library, University of Virginia website: <http://etext.lib.virginia.edu/subjects/afam.html>

Devitt, T. (2001, August 2). Lightning injures four at music festival. The Why? Files. Retrieved January 23, 2002, from <http://whyfiles.org/137lightning/index.html>

This is a general format style of writing a research report. Now the question is - do both quantitative and qualitative researchers follow the same research report format? Generally quantitative researchers follow the above mentioned style format. But it may be quite different for the researchers who are trying to write research report in qualitative research.

Let Us Check Our Progress

1. What are the numbers of sections of a research report as mentioned in APA Manual 2001?
2. All margins in research reporting should be———.
3. What portion of research report contains findings and recommendations?
4. Research tools is include in ————— heading.
5. What do you mean by the following abbreviation within a reference:
 - a. ed
 - b. Ed
 - c. pp

Unit - 2 : Research Report---Writing

6.2.1 WRITING QUALITATIVE RESEARCH REPORT

According to Sharon Merriam “there is no standard format for reporting qualitative research”. Qualitative research is more open flexible in nature. In writing qualitative research the researcher does not follow a rigid and structured format. Therefore the researcher in this area uses some non-conventional and creative style of writing. If so it is difficult for the reader to comprehend the report, therefore the researcher should follow some structural format otherwise they cannot communicate their methodologies and findings. Therefore in qualitative research reporting, researcher has to balance between the creative style and structured format. There are some similarities and differences between quantitative and qualitative research, which are discussed below:

Title Page : Same as quantitative research.

Introduction : Qualitative research is an exploratory research not confirmatory research and therefore it does not include any hypothesis. However, it includes research questions or issues, which the researcher wants to discover. The questions are generally open-ended and general form.

Method : Here qualitative researchers reflect on their biases, their disciplinary background, and discuss how these factors may affect the validity of the research.

Result : Here qualitative researchers present a bulk of evidence to support their arguments. This is more crucial in this type of research because data in qualitative research is not numerical. Here researchers try to convince others to validate their points of arguments.

Discussion : Qualitative researchers state here the overall conclusions and mention additional interpretations of the findings. Researchers also determine whether the results are consistent with other results published in related research studies.

References : Same as qualitative research.

The best way to learn how to write the report of qualitative research is to read journals of this area of studies.

6.2.2 EVALUATING A RESEARCH REPORT

There is no Universally accepted prescription or design for assessing the quality of a research report.

The researcher must write the research report after considering the above-mentioned guidelines. However there may be something, which the researcher should follow before submitting the report. According to Best and Kahn, the following questions are suggested for a critical evaluation a research report-

1. Title and Abstract-

- Are they clear and concise?
- Do they promise no more than the study can provide?

2. Problem and Hypotheses-

- Is the problem clearly stated?
- Is the problem properly delimited?
- Is the significance of the problem recognized?
- Are the hypotheses clearly stated and testable?
- Are assumptions and delimitations stated?
- Are important terms defined?

3. Review of related literature-

- Is it adequately covered?
- Are important findings noted?
- Is it well organized?
- Is an effective summary provided?
- Is the literature cited directly relevant to the problem and hypotheses?

4. Method section-

- Is the research design described in detail?
- Is it adequate?
- Are the samples described in detail?
- Are relevant variables recognized?
- Are data gathering instruments appropriate?
- Are reliability and validity of the instrument?

5. Results section-

- Is the statistical treatment appropriate?
- Is appropriate use made of tables and figures?
- Is the analysis of data relationships logical, perceptive, and objective?

6. Discussion section-

- Is the discussion clear and concise?
- Is the problem/hypotheses restated appropriately?
- Is the analysis objective?
- Are the findings and conclusions justified by the data presented and analysed?
- Did the author(s) generalize appropriately or too much?

7. Overall writing of paper-

- Is it clear, concise, and objective?
- Are the parts of the paper properly related to each other ?

Besides, when an evaluator judges the quality of research report he/she may follow the above presentations to make his/her judgement objective, precise and comparable to any set standard.

LET US SUM UP

Writing a research report is important part of any research process. This is not an easy task. There are so many styles to write the report. The researcher may get confused to select the style. However in psychology and education the researchers generally follow the format given by APA Manual. There are seven parts in this format. But for better understanding we consider three major parts- preliminary, main body, and references. In each part there are many subdivisions. APA also suggests many guidelines for typing and writing the research report. All of them are not included in this unit. Some important instructions have been discussed here. The style of writing of quantitative and qualitative research is not same. The differences were also discussed here. The writing of a research is creative work. Sometimes researcher may deviate the format as given by APA. Therefore before submitting the report a researcher must evaluate his report. The steps of evaluation of a research report have been discussed in the last part of this unit.

SUGGESTED READING

Best, J.W. & J.V. Kahn (1999). **Research in Education** (7th edition). Prentice-Hall of India Pvt. Ltd. New Delhi.

Dwivedi, R. S. (2008). **Research Methods in Behavioural Sciences**. Macmillan Ltd.

Kothari, C. R. (1999). **Research Methodology** (2nd Edition). Wishwa Prakashan, New Delhi.

Koul, L. (1998). **Methodology of Educational Research** (3rd Revised edition). Vikas Publishing House Pvt. Ltd.

Neuman, W. L. (2007). **Social Research Methods: Qualitative and Quantitative Approaches**. (6th Edition). Pearson Education.

Sukhia, S. P., P. V. Mehrotra & R. N. Mehrotra (1991). **Elements of Educational Research**. (3rd Revised Edition). Allied Publishers Ltd.

Singh, A.K. (2002). **Tests, Measurement And Research Methods In Behavioural Sciences**. Bharati Bhawan.

Johnson, B. & L. Christensen (2008). **Educational Research Quantitative, Qualitative and Mixed Approaches**. (3rd Edition). Sage Publications, New Delhi.

ASSIGNMENT

1. What are the importances of writing a research report?
 2. Describe the seven sections of research report as mentioned by APA.
 3. Describe preliminary, main body and reference sections of a research report with necessary illustration.
 4. The writing of qualitative research differs from quantitative research-Explain.
 5. How can a researcher evaluate a research report?
 6. Write in your own words the importance of evaluation of research report in education.
-

ANSWERS TO 'CHECK YOUR PROGRESS'

1. seven
2. one and half inches.
3. discussion.
4. instrument
5. a. edition
b. edited by
c. pages

Two Year
POST GRADUATE DEGREE PROGRAMME
in
E D U C A T I O N

SEMESTER-II

EDO-01

Fundamentals of Education and Research
(Open Course)

Self-Learning Material



DIRECTORATE OF OPEN & DISTANCE LEARNING
UNIVERSITY OF KALYANI
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June 2019

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Director's Message

Satisfying the varied needs of distance learners, overcoming the obstacle of distance and reaching the unreached students are the threefold functions catered by Open and Distance Learning (ODL) systems. The onus lies on writers, editors, production professionals and other personnel involved in the process to overcome the challenges inherent to curriculum design and production of relevant Self Learning Materials (SLMs). At the University of Kalyani a dedicated team under the able guidance of the Hon'ble Vice-Chancellor has invested its best efforts, professionally and in keeping with the demands of Post Graduate CBCS Programmes in Distance Mode to devise a self-sufficient curriculum for each course offered by the Directorate of Open and Distance Learning (DODL), University of Kalyani.

Development of printed SLMs for students admitted to the DODL within a limited time to cater to the academic requirements of the Course as per standards set by Distance Education Bureau of the University Grants Commission, New Delhi, India under Open and Distance Mode UGC Regulations, 2017 had been our endeavour. We are happy to have achieved our goal.

Utmost care and precision have been ensured in the development of the SLMs, making them useful to the learners, besides avoiding errors as far as practicable. Further suggestions from the stakeholders in this would be welcome.

During the production-process of the SLMs, the team continuously received positive stimulations and feedback from Professor (Dr.) Sankar Kumar Ghosh, Hon'ble Vice- Chancellor, University of Kalyani, who kindly accorded directions, encouragements and suggestions, offered constructive criticism to develop it within proper requirements. We gracefully, acknowledge his inspiration and guidance.

Sincere gratitude is due to the respective chairpersons as well as each and every member of PGBOS (DODL), University of Kalyani. Heartfelt thanks is also due to the Course Writers-faculty members at the DODL, subject-experts serving at University Post Graduate departments and also to the authors and academicians whose academic contributions have enriched the SLMs. We humbly acknowledge their valuable academic contributions. I would especially like to convey gratitude to all other University dignitaries and personnel involved either at the conceptual or operational level of the DODL of University of Kalyani.

Their persistent and co-ordinated efforts have resulted in the compilation of comprehensive, learner-friendly, flexible texts that meet the curriculum requirements of the Post Graduate Programme through Distance Mode.

Self Learning Materials (SLMs) have been published by the Directorate of Open and Distance Learning, University of Kalyani, Kalyani-741235, West Bengal and all the copyright reserved for University of Kalyani. No part of this work should be reproduced in any form without permission in writing from the appropriate authority of the University of Kalyani.

All the Self Learning Materials are self writing and collected from e-book, journals and websites.

Director
Directorate of Open and Distance Learning
University of Kalyani

SEMESTER-II		
EDO-01 : Fundamentals of Education and Research (Open Cour) (Full Marks-100)		
Block	Contents	Study hours
Block-1 Foundation of Education	Unit-1 : Basic concepts of Education 1.1 : Meaning, Nature, and Scope of education 1.2 : Functions, and agencies of Education	1 Hour
	Unit-2 : Philosophical bases of Education 2.1 : Concepts of philosophy and education 2.2 : Important aspects of philosophy 2.3 : Relationship between philosophy and education 2.4 : Meaning of educational philosophy	1 Hour
	Unit-3 : Sociological bases of Education 3.1 : Meaning and Nature of Sociology 3.2 : Relationship between sociology and education 3.3 : Education as a Process of Socialization 3.4 : Concept of Educational Sociology	1 Hour
	Unit-4 : Historical bases of Education 4.1 : Historical Perspectives of Pre-primary Education 4.2 : Historical Preview of Primary Education (1854-1947) in India 4.3 : Historical Review before independence (1854-1947) 4.4 : Historical Review of Higher Education Before Independence	1 Hour
Block-2 Psychology of Learning and Teaching	Unit-1 : Introduction to Learning 1.1 : Meaning and Nature 1.2 : Factors of Learning (Motivation, Maturation, Memory, forgetting and Attention).	1 Hour
	Unit-2 : Learning Theories and implications 2.1 : Classical Conditioning 2.2 : Operant Conditioning 2.3 : Gestalt, and Constructivism	
	Unit-3 : Teaching 3.1 : Meaning and concept 3.2 : Levels of teaching 3.3 : Stages of teaching	1 Hour
	Unit-4 : Educational Technology 3.1 : Meaning and Nature 3.2 : approaches, and Scope	1 Hour

Block	Contents	Study hours
Block-3 Curriculum Development and Evaluation :	Unit-1 : Introduction to curriculum 1.1 : Concept, Nature, Types and Functions of Curriculum 1.2 : Foundation of Curriculum and Curriculum framework (Philosophical, Sociological and psychological)	1 Hour
Block-4 Measurement and Evaluation :	Unit-1 : Basic concepts of Measurement and Evaluation 1.1 : Concept and Factors of Measurement and Evaluation 1.2 : Formative and Summative evaluation 1.3 : Continuous and Comprehensive evaluation (CCE)	1 Hour
Block-5 Research in Education	Unit-1 : Basic concepts of Research 1.1 : Meaning and nature and steps of research 1.2 : Concept of educational research 1.3 : Different types of research in Social Science 1.3.1 : Basic, Applied, and Action 1.3.2 : Qualitative, Quantitative, and Mixed 1.3.3 : Historical, Descriptive, and Experimental	1 Hour
	Unit-2 : Review and Hypothesis 2.1 : Review of Related Literature-meaning and importance 2.2 : Hypothesis and Research question	1 Hour
	Unit-3 : Population and Sample 3.1 : Population and Sample 3.2 : Sampling techniques-Probability (Simple Random, Stratified Random,) and Non-probability (Incidental, Purposive)	
	Unit-4 : Tools of data collection 4.1 : Criteria of a good research tool 4.2 : Nature, Merits and Demerits of tools-Observation, Questionnaire, Interview, Likert scale	
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EDO-01
Fundamentals of Education and Research (Open Course)
Block-1
Foundation of Education

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INTRODUCTION

The term 'education' is a very common and a popular word that is uttered by many of us but understood by a very few in its right perspective. It is in one way or the other appears to be as old as the human race, though during the course of time, its meaning and objectives have inevitably undergone certain changes. As a student of education course, and, as a future teacher, it is essential for you to understand the meaning of education, its conceptual features and different perspectives that have shaped its meaning from time to time. Understanding the concept of education and its dynamic features will help you to develop insights about the purpose of becoming a teacher and help you while educating your students.

OBJECTIVES

After going through this Block, you will be able to :

- Understand the meaning, nature of education.
- Explain the scope of education.
- State the functions of education.
- Describe various agencies of Education.
- Explain the relationship between Sociology and Education.

Block-1

Unit-1

Basic concepts of Education

1.1.1 : MEANING OF EDUCATION

You are, by now, familiar with the term ‘education’, ‘educated person’ ‘educating’ and so on. You must have also used these terms on several occasions in conversation with others. What do we mean by education? Does ‘teaching’ or ‘instructing’ become education? Or is it learning in an institution? Does developing the child into good human being known as education? Is it possible to have one meaning of education? There are many more such questions that come to our mind when we attempt to understand the concept of education.

The term ‘education’ has been interpreted by different people in different ways. Some people refer to it as formal schooling or to lifelong learning. Some others refer to it as acquisition of knowledge, skills and attitudes. Some say that education is nothing, but training of people’s mind in a particular direction to bring about desired changes. If you ask a statesman, an artisan, a teacher, a parent, a philosopher and a student about what education means to them, you would be surprised to know the multiple interpretations and views people have about education. This only shows that education doesn’t have one precise universally accepted definition. It has various meanings with various functions. Analysis of these meanings would help us to understand what education really is. To begin with, let us look into how the term ‘education’ has evolved and some of the views of great thinkers that exemplifies the concept and meaning of education.

1.1.2 : ETYMOLOGICAL MEANING OF EDUCATION

Etymologically the term ‘Education’ has been defined many ways. It is speaking, the word education is derived from the Latin word ‘educare’ meaning ‘to raise’ and ‘to bring up’. According to few others, the word ‘education’ has originated from another Latin term ‘Educere’ which means ‘to lead forth’ or ‘to come out’. These meanings indicate that education seeks to nourish the good qualities and draw out the best in every individual. Education seeks to develop the innate or the inner potentialities of humans. Some other educationists believe that the word ‘education’ has been derived from the Latin term ‘Educatum’, which means the act of teaching or training.

The meanings of these root words lead us to believe that education aims to provide a nourishing environment that would facilitate or bring out and develop the potentialities in an individual.

In Hindi, the term “Siksha” has come from the Sanskrit word “Shash”. “Shash” means to discipline, to control, to order, to direct, to rule etc. Education in the traditional sense means controlling or disciplining the behaviour of an individual. In Sanskrit “Shiksha” is a particular branch of the Sutra literature, which has six branches –Shiksh, Chhanda, Byakarana, Nirukta, Jyotisha and Kalpa. The Sutra literature was designed to learn the Vedas. Siksha denotes rules of pronunciation. There is another term in Sanskrit, which throws light on the nature of education. It is “Vidya” which means knowledge. The term “Vidya” has originated from “Bid” meaning knowledge.

If you refer to Dictionary of Education (edited by C.V. Good, 1973), you will find that education is defined as “the aggregate of all the processes by which a person develops abilities, attitudes and other forms of behaviour of practical values in the society in which s/he lives; the social process by which people are subjected to the influence of selected and controlled environment (especially that of the school), so that they may obtain social competence and optimum individual development”.

The concept of education has been used in a variety of contexts with different meanings. To give a precise definition of education, just as we define certain concepts in science or other technical subjects, is difficult, as there is no one meaning of education held in common by people.

Etymologically, the word ‘Education’ has been derived from different Latin words.

- (a) ‘*educare*’ which means ‘*to bring out*’ or ‘*to nourish*’.
- (b) ‘*educere*’ which means ‘*to lead out*’ or ‘*to draw out*’.
- (c) ‘*educatum*’ which means ‘*act of teaching*’ or ‘*training*’.
- (d) ‘*educatus*’ which means ‘*to bring up, rear, educate*’.
- (e) ‘*çducâtîô*’ which means ‘*a breeding, a bringing up, a rearing.*’

1.1.3 : DEFINITIONS OF EDUCATION

If we mention certain definitions of education of great educators of the East and the West, we may have a clear picture of the nature and meaning of the term education.

1. Education is the manifestation of perfection already in man. Like fire in a piece of flint, knowledge exists in the mind. Suggestion is the friction; which brings it out.

Swami Vivekananda

2. By education I mean an all-round drawing out of the best in child and man’s body, mind and spirit.

Mahatma Gandhi

3. The highest education is that which does not merely give us information but makes our life in harmony with all existence.

Rabindranath Tagore

4. Education is something, which makes a man self-reliant and self-less. **Rigveda**
5. Education is that whose end product is salvation. **Upanishada**
6. Education according to Indian tradition is not merely a means of earning a living; nor it is only a nursery of thought or a school for citizenship. It is initiation into the life of spirit and training of human souls in the pursuit of truth and the practice of virtue. **Radhakrishnan**
7. Education develops in the body and soul of the pupil all the beauty and all the perfection he is capable of. **Plato**
8. Education is the creation of sound mind in a sound body. It develops man's faculty specially his mind so that he may be able to enjoy the contemplation of supreme truth, goodness and beauty. **Aristotle**
9. Education is the child's development from within. **Rousseau**
10. Education is enfoldment of what is already enfolded in the germ. It is the process through which the child makes the internal-external. **Froebel**
11. "Education is the process of living through a continuous reconstruction of experiences." **John Dewey**

Thus we find that definitions and interpretations of the term 'Education' have differed from age to age and from person to person according to differences in social conditions, physical environments and lives of the person who expressed those views. Some of the scholars have emphasized one aspect of Education while others have emphasized the other aspect, according to their own outlook on life. These different views are there because of complexity of human environment, different philosophies of life and different Educational theories and practices. These reasons are jointly or separately responsible for difference in interpretation of the term 'Education'. It is really very difficult to give one precise and complete meaning of Education.

1.1.4 : NATURE OF EDUCATION

As is the meaning of education, so is its nature. It is very complex. Let us now discuss the nature of education:

1. Education is a life-long process-Education is a continuous and lifelong process. It starts from the womb of the mother and continues till death. It is the process of development from infancy to maturity. It includes the effect of everything which influences human personality.
2. Education is a systematic process-It refers to transact its activities through a systematic institution and regulation.

3. Education is development of individual and the society-It is called a force for social development, which brings improvement in every aspect in the society.

4. Education is modification of behaviour-Human behaviour is modified and improved through educational process.

5. Education is purposive: every individual has some goal in his life. Education contributes in attainment of that goal. There is a definite purpose underlined all educational activities.

6. Education is a training-Human senses, mind, behaviour, activities; skills are trained in a constructive and socially desirable way.

7. Education is instruction and direction- It directs and instructs an individual to fulfill his desires and needs for exaltation of his whole personality.

8. Education is life-Life without education is meaningless and like the life of a beast. Every aspect and incident needs education for its sound development.

9. Education is continuous reconstruction of our experiences-As per the definition of John Dewey education reconstructs and remodels our experiences towards socially desirable way.

10. Education helps in individual adjustment: a man is a social being. If he is not able to adjust himself in different aspects of life his personality can't remain balanced. Through the medium of education he learns to adjust himself with the friends, class fellows, parents, relations, neighbours and teachers etc.

11. Education is balanced development: Education is concerned with the development of all faculties of the child. it performs the functions of the physical, mental, aesthetic, moral, economic, spiritual development of the individual so that the individual may get rid of his animal instincts by sublimating the same so that he becomes a civilized person.

12. Education is a dynamic process: Education is not a static but a dynamic process which develops the child according to changing situations and times. It always induces the individual towards progress. It reconstructs the society according to the changing needs of the time and place of the society.

13. Education is a bipolar process: According to Adams, education is a bipolar process in which one personality acts on another to modify the development of other person. The process is not only conscious but deliberate.

14. Education is a three dimensional process: John Dewey has rightly remarked, "All educations proceeds by participation of the individual in the social consciousness of the race." Thus it is the society which will determine the aims, contents and methods of teachings. In this way the process of education consists of 3 poles—the teacher, the child and the society.

15. Education as growth : The end of growth is more growth and the end of education is more education. According to John Dewey, “an individual is a changing and growing personality.” The purpose of education is to facilitate the process of his/her growth.

Therefore, the role of education is countless for a perfect society and man. It is necessary for every society and nation to bring holistic happiness and prosperity to its individuals.

1.1.5 : SCOPE OF EDUCATION

Scope means range of view out look field or opportunity of activity operation and application. Education has a wider meaning and application.

1. Educational philosophy

Philosophy of education covers aims of education, nature of education, importance of education, function of education its very old and essential part of education.

2. Educational psychology

Main aim of education is the development of child. Psychology helps to understand the child better and development of child with respect of physical, mental, emotional, social adjustment, individual difference, personality, thinking, reasoning, problem solving.

3. Educational sociology

A child lives in the society so its important for him to know about the society the nature of society, type of society, interdependence between culture and society.

4. History of education

It is also important to know background, origin, development, growth and aspect of the subjects.

And also education system method of teaching during ancient period, medieval period, British period and modern period.

5. Economics of education

For the growth of business and market the world class economical education is important for each and important.

6. Method of teaching

In ancient time the pupil were passive listeners but now they actively participate with the teacher in the process of education. So the skill and proficiency of difference teaching methods needs to be developed.

7. Educational administration and supervision

The educational institution and the system has to be supervised and administrated smoothly so that the process of education goes well. Regulation of fund, democratic administration, autonomy, personnel management etc.

8. Problems of education

This scope includes problems of teaching management of education and also suggestion and remedies for it.

9. Population education

Viewing at the undesirable growth of population, an awareness is created through population education.

10. Environmental education

Ecological in balances have drown the attentions of intelligence today. So looking at the environmental problems study of environment education has great importance.

1.1.6 : FUNCTIONS OF EDUCATION

Education is essential for every society and individual. It is life itself but not a preparation for life. Man has various qualities. These qualities of the individual should be developed for the improvement of the country. So, education plays a complementary role for overall individual, social and national development. It enables an individual to realize his highest self and goal. The key functions and roles of education towards individual, society and country are listed below.

Functions of education towards individual :

- (1) Development of inborn potentialities-Education helps the child to develop the inborn potentialities of child providing scope to develop.
- (2) Modifying behavior-Education helps to modify the past behavior through learning and through different agencies of education.
- (3) All-round development-Education aims at the all round development of child-physical, mental, social, emotional, and spiritual.
- (4) Preparing for the future-After completion of education the child can earn its livelihood getting proper education, which has productivity. The education should be imparted according to the own interest of the child.
- (5) Developing personality-The whole personality of the child is developed physically, intellectually, morally, socially, aesthetically and spiritually. He is recognized in the society.

- (6) Helping for adjustability- Man differs from beast. Man has reasoning and thinking power. Man tries his best to adjust with his own environment through education.

Functions of education towards society :

- (1) Social change and control :

The society is never station. It is progressive and dynamic. The child lives in society. It is the social environment where the personality of the child can be developed. The old traditions, customs are preserved and transmitted with the situations, which are ever changing. We should not think or believe in the blind beliefs, which are hindrances towards our development. Education helps to walk with the development of science and technology.

- (2) Reconstruction of experiences :

Education is life-long process. Life is education and education is life. Life is full of experiences. One cannot live with his past experiences which are unable to adjust in the society. So education helps the individual to reconstruct the experience and adjust with the environment.

- (3) Development of social and moral value :

Society is always in tension with narrowism. There is no social or moral value. Now the man is behaving like an animal. Animality can be changed with moral education. Education teaches the moral value and social value like co-operation, tolerance, sympathy, fellow feelings, love affection, respect towards elder, helping the poor and needy persons.

- (4) Providing opportunity or equality :

Indian Constitution has introduced the term 'equality' because we are not getting equal opportunities in all aspects. Education teaches us to give equal opportunities in all aspects irrespective of caste, creed, color, sex and religion.

Functions of education towards nation :

- (1) Inculcation of civic and social responsibility-Education helps to make rising generation to understand its rights and duties as citizens of a democratic country.
- (2) Training for leadership-The leadership quality of the individual is developed when he participates in all spheres of social, political, religious and educational activities.
- (3) National integration-We are living in one country having diversities in respect of color, caste, language, diet, dress, habits and physical environment.

Educational integration leads to emotional integration. Education trains people for unity, not for locality, for democracy and not for dictatorship.

- (4) Total national development-Education helps for bringing about total national development by developing its all aspects i.e. social, economic, cultural, spiritual, moral, educational, etc.

Therefore, really education is an essential ingredient for all ages and stages of the life of an individual, society as well as the nation. Education can be a real panacea for all social evils.

1.1.7 : AGENCIES OF EDUCATION

Education is a life-long process. That is, it begins at birth, and ends at death. Education transforms the helpless infant into a matured adult, and this makes education to be significant and remarkable. This transformation is achieved through the contribution of various institutions and bodies. The various institutions and bodies which have contributed to the upbringing and education of the individuals are the agencies of education, which include the home, school, peer-group, mass media, religious institutions, and the community.

1. The Family/Home as an Agent

The family or home is made up of the father, mother and children and it is regarded as the primary agent of education (National Teachers Institute 2000). The family as an agent of education, parents are the most important agent for the child at the very early stages of his development from the child depends on them for his physiological and psychological needs. This is based on the premise that home is the first station of a child and where he learns the appropriate behaviour. The child acquires the values of the society from his family. If the family fulfills its educational function a firm basis would have been laid for the school to build upon

2. The school

The family alone can not provide all that is required for the education of that is required for the education of that child. He is therefore sent to the school where professionally trained personnel are involved in the upbringing of the child. The school is an institution where the behaviour of individual is shaped to prepare him to be an effective and functional member of his society. It is the school that can be regarded as a factory where the child is processed into a refined personality that can cope with the increasing complexity in labour market and also initialization. Like the family, the school is an institution where the culture of the society is transmitted it's also help the child to develop skills necessary for survival in the society.

3. The peer group as an agent

This is the social relationship between people who fall within the same age range peer group exerts great influence on the education of individuals. This is because every group has a common interest Peer group, according to Musgrave (1979) is a group in which the child spends more time with, other children interacting closely both at home and the school. In the course of their interaction, children emulate themselves exhibit especially those of their interest.

When a child interact with others, the freedom and equal status ,of the peer group help the child to acquire culture of democracy. The members of the peer group express their feeling freely ask questions and even demonstrate their potentialities. The respect and loyalty which members have for the group assist them to learn.

4. Mass Media as an Agent

The mass media comprises of the newspapers, radio television, computer, internet. Etc. Mass media provides information education and entertainment. Its has been observed that the mass-media available to a child goes a long way to determines.

A child that is exposed to newspaper and fond of story on a particular column of the newspaper the tendency is to show interest in reading the aspect of the newspaper. The habit he develops for reading is academic and education value. That is why newspaper and magazine should publish stories that are of value to the society in order to enhance all round development of the child.

Mass media also assists in transmitting cultural values. The programmes propagated by the mass media not only gives the children to have ideal of the nature of other people culture. It also helps the child to have broader knowledge and understanding of the lives of other people.

5. Religious institutions

Religion is one preoccupation of man through which he intends to attain a perfect relationship with his creator. Religious institutions promote education by establishing schools. Offering scholarship to indigent but outstanding learners, and donating to education funds.

6. The Community

Another crucial agency of education is the community. It offers definite environments that supply the learner's personal experiences which the school taps. The extrinsic role of the community in educational development is not less significant unless a ;community ,offers the needed land a proprietor may find it very difficult to establish school. Despite the grant aiding communities continue to provide funds and facilities to the schools and monitor the teaching learning process in their own ways. The different spheres of the life of the community promote intellectual development by serving as foci of research activities at the higher levels of education.

Thus education is a process that depends on inputs from many agencies. the experience of life that the recipient of formal education carry into the teaching learning situations derive from such agencies as the home. School, peer group mass medial religious institutions, and community. The agencies provide the experiences intrinsically by emphasizing good morals tolerance, humility, nationalism, nationalism, love honesty, and other attributes.

Block-1

Unit-2

Philosophical bases of Education

INTRODUCTION

Since the inception of this world man has been constantly trying to know the truth. This “knowing” is philosophy. It is philosophy, which has interpreted man and his activity in general. Human life cannot properly be understood without philosophy. There is close relationship between philosophy and life. Conception of life originates from philosophy. Philosophy gives self-consciousness and develops a spirit of enquiry after truth. Life and education are inseparably connected. One cannot be separated from the other. Hence life has a philosophical base and so education also has a philosophical base.

1.2.1 : MEANING AND CONCEPT OF PHILOSOPHY

Philosophy is an eternal quest after truth. Philosophy finds its origin in wonderer curiosity. It is as old as human life. The subject matter of Philosophy is as wide as human experience.

Francis Bacon (1561-1626), a great English philosopher considered Philosophy as the great mother of the Sciences.

Philosophy is a search for, an attempt at a universal explanation of the nature of things. It is a continuous seeking of insight into basic realities like the physical world, life, mind, society, knowledge, and values. Education is also a quest for knowledge and therefore, Education divorced from philosophy would become an aimless endeavour.

The word ‘philosophy’ has a Greek origin; Greek word ‘Philosophia’ consists of two words that is ‘phileo’ meaning love, and ‘sophia’ meaning wisdom. So, the literal meaning of Philosophy is ‘love of wisdom’, Wisdom is not only knowledge. One may have knowledge, but he may not be wise. Wisdom constitutes knowledge plus its implications on all circumstances. Here are some definitions of Philosophy which will help you to understand the term ‘Philosophy’ more clearly.

1. In the words of Plato “Knowledge of the true nature of different things is philosophy.”
2. Dr. Radhakrishnan considers philosophy as a “logical enquiry into the nature of reality.”
3. According to Henderson philosophy is a search for “a comprehensive view of nature, an attempt at universal explanation of the nature of things.”

Philosophy wants to understand man in relation to the whole universe. Philosophy deals with the nature of human mind and personality. Plato (427-347 B.C.) defined philosopher as “He who has taste for every sort of knowledge and who is curious to learn and is never satisfied, may be just termed as a philosopher.” Philosopher is never satisfied and always running after truth. Philosophy seeks to provide a complete account of the man’s world. It is reflective and critical in nature. Philosophy right from the earliest times is interested in the common problems of the mankind. It helps us to achieve wisdom, which would influence our conduct of life.

By the phrase ‘Philosophy of life’ we mean ‘outlook of life’; i.e. how we regard things, events, relationships, and the values. For example, one individual sets a very high value to acquisition of wealth, another to acquisition of health, and another to acquisition of power. Now these are there philosophies of life. Aristotle (344-322 B.C.), the great Greek Philosopher remarked “Everyone follows a philosophy, whether he is aware of it or not.”

1.2.2 : IMPORTANT ASPECTS OF PHILOSOPHY

Philosophy is concerned with the three important aspects of human life and development. These are as follows :

- (1) Metaphysics : theory of reality;
- (2) Epistemology : theory of knowledge;
- (3) Axiology : theory of value.

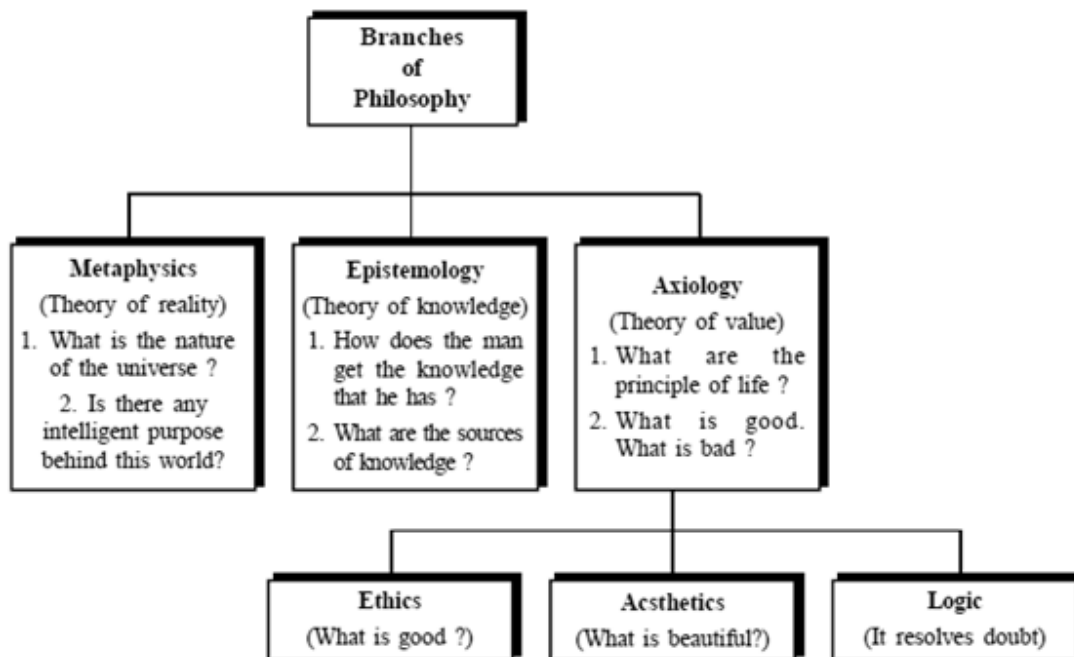
(1) Metaphysics or problems of reality is the study of existence, and deals with the questions of reality. The usual questions are: What is the nature of the universe? Is there any intelligent purpose behind this world?

(2) Epistemology or problems of knowledge is the most fundamental branch of philosophy. It deals with the problems of knowledge. It discusses the following types of questions such as : How does the man get the knowledge that he has? What are the sources of knowledge?

(3) Axiology or problems of value is that branch of philosophy which deals with the problems of values. It has been divided into three branches.

- (a) Ethics which discusses the criteria of right and wrong.
- (b) Aesthetics which discusses the nature and criteria of beauty.
- (c) Logic which studies truth.

This branch of Axiology arises such questions as : What are the principles of life? What is good or bad? Philosophy is an investigation, a search on the part of man to understand the problems of reality, knowledge, and value.



Question :

Let Us Check Our Progress

Answer in brief.

1. What do you understand by 'Philosophy'?
2. Write down the aspects of Philosophy.
3. What do you mean by 'Aesthetics'?

1.2.3 : MEANING OF EDUCATION

You have already learnt the meaning of education. It is a lifelong process. Education tries to develop the innate potentialities of the individual in a harmonious manner. Education is harmonious development of all the powers of the human being i.e. physical, social, intellectual, aesthetic and spiritual. Thus, education is intimately connected with the life and experience of an individual.

Education is also thought of as a process of acquisition of knowledge. Education is used to refer both to a process and to a product. As a product education is the sum total of what is received

through learning-the knowledge, skills, ideals, values that are the outcomes of learning. As a process it refers to the act of developing these skills or values in someone else.

According to Swami Vivekananda (1863-1902) “education is the manifestation of perfection that is already in man”. A great Swiss educator, namely Pestalozzi (1746-1827) has expressed the meaning of education in his words, “Education is the natural, harmonious, and progressive development of man’s innate powers”.

Tagore (1861-1941) has observed “Education gives us the wealth of inner light. Education means the harmonious development of all the powers of the human being — physical, social, intellectual, aesthetic and spiritual. The essential elements in the creative process are creative mind, a well-integrated self, socially useful purposes and experiences related to the interests, needs and abilities of the individual as a participant in social living. The entire process of growth and development which is caused by learning from experience is called education.

1.2.4 : PHILOSOPHY, EDUCATION & THEIR INTERDEPENDENCE

Let us now focus our attention on the interrelationship of philosophy and education. You have learnt the meaning of philosophy and education. Now it is very important to know their interrelationship.

The interdependence of Philosophy and education is seen from the fact that the great philosophers of all times in all societies have also been great educators and their philosophy is reflected in their educational systems. If we look on the history of education, we will find galaxy of philosophers, who are educationists too. Socrates, Plato, and Aristotle who were great philosophers tremendously were concerned with education and also influenced the Western thoughts profoundly. Plato’s Republics claimed by the educator as one of the greatest of their classics. Other great western philosophers Locke, Rousseau, Kant, Hegel, Dewey, etc. are examples of philosophers who have much to say about the nature, aim and methods of education. The ideas and ideals of Buddha were of great educational value.

The modern Indian philosophers like Gandhi, Tagore, Aurobindo, Radhakrishnan are great educators too. So, the history of education proves that philosophers have been great educationists. The interdependence can be better understood by analysing the implications of philosophical principles in the field of education.

Education and philosophy are inseparable because the ends of education are the ends of philosophy i.e., wisdom; and the means of philosophy is the means of education i.e., inquiry, which alone can lead to wisdom. Separation of philosophy and education inhibits inquiry and frustrates wisdom.

Both the world of ideas and the world of practical activity constitute education : In order to behave intelligently in the educational process, education needs direction and guidance which philosophy can provide. Philosophy suggests a way of improving the quality of life because it helps us gain wider and deeper perspective on human existence.

The relationship between education and philosophy is just like the relationship between the lame man who is able to see, but unable to walk, and the blind man who is able to walk, but unable to see. In order to reach the destination the blind and the lame should cooperate each other. The lame will show the direction and the blind will move accordingly; so also are our philosophy and education. Education without philosophy is blind and philosophy without education is invalid or lame.

The main task of philosophy is to determine what constitutes good life, where as the main task of education is how to make life worth living. So philosophy and education are mutually re-constructive. They give and take from each other. Philosophy points out the way to be followed by education. James Ross says, Philosophy and education are two sides of a coin: the former is the contemplative side while the latter is the active side.

John Dewy, the famous educational philosopher of America describes the relation between philosophy and education as education is the laboratory of philosophy, where the validity of philosophical truth is tested. Education is dependent on philosophy for 'guidance' and philosophy is dependent on education for 'formulation'. Philosophy therefore, is inseparable from education. So whoever has tried to philosophise about education has been called educational philosopher or education thinker.

Philosophy determines the various aspects of education like the aims of education, curriculum, teaching method, discipline. etc with a view to help man to lead rational life.

1.2.5 : MEANING OF EDUCATIONAL PHILOSOPHY

From the above discussion we find that Philosophy deals with the goals and essentials of good life while education provides the means to achieve those goals of good life. Educational philosophy is a distinct but not a separate discipline. It takes its content from education and its methods from philosophy. The process of philosophizing about education requires an understanding of education and its problem. It can be said that educational philosophy is the application of philosophical ideas to educational problems. Educational philosophy is a species of the genus philosophy, with the differentia that its proper scope is confined to the field of education.

Educational Philosophy is a species of the genus philosophy with the differentia that its proper scope is confined to the field of Education.

It can be said that philosophy is the theory while education is the practical. Practice unguided by theory is aimless, inconsistent and inefficient just as theory which is not ultimately translatable into practice, is useless and confusing. Philosophy deals with the ends while education deals with the means and techniques of achieving those means. According to John Dewey and his followers all philosophy is philosophy of education. John Dewey made it quite clear that in order to solve the social problem of life the main function of philosophy is to study the related problems and present a proper view-point. Philosophy should confine its programmes to the study of social problems alone. Bertrand Russell is of the opinion that educational philosophy is a new branch or a new subject which discusses educational problem from philosophical point of view. It can be said that educational philosophy is the study of the purpose, process, nature, and ideals of education.

Educational philosophy may be different in different societies. Even in the same country educational philosophy changes time to time. So we can say that educational philosophy is society specific and time specific. In India at the ancient period the educational philosophy was “to know thyself” or self realization. In mediaeval period educational philosophy was realization of religious aims. In British period the philosophy of education was to impart education to a few person who will serve the British ruler. In modern period Indian Constitution uphold the philosophy of democracy, socialism, and secularism.

Educational philosophy is a subject like philosophy. If we examine its historical basis we find that it is an ancient subject like philosophy because all thinkers and philosophers of all times have also been great educators.

Question :

Let Us Check Our Progress

Write your answers in about 50 words.

1. Explain relationship of philosophy and education.
2. Cite three examples that demonstrate intimate relationships of philosophy and education.
3. Mention the main tasks of philosophy.

SUMMING UP

We discussed the concept of philosophy, education, their interdependence, nature and importance of educational philosophy and Indian philosophy and its relation to education.

Philosophy, it may be concluded, indispensable for every aspect of life and much for education which prepares the man for complete living. From different angles of the educational problem there

is a demand for a philosophical foundation of education. All educational questions are ultimately questions of philosophy. It is the basis of education, All educational efforts and achievements become purposeful by philosophy. It is essential if we want to evolve a required type of personality of the child after education. Real educational progress is the product of philosophy. Great educational advances have always been brought forth by intuitive insights of great philosophers. Now India is on the threshold of modernization. She has dedicated herself to the pursuance of the modern values of democracy, socialism, and secularism. The Constitution of India which is an expression and declaration of the highest ideals, values, and aspirations of the Indian people as a whole seeks to all its people equality, liberty, and justice, So there is an urgent need for a critical evaluation of our philosophical tradition. Such an evaluation involves reassessment and re-interpretation of the past, identification of such strands as are supportive of the new outlook and an assessment of the extent to which they can be harmonized with it. Of the many positive elements in our traditions are: devotion to duty and discipline, selfless action, belief in the oneness of all life, spirit of toleration, concern for welfare of all mankind commitment to truth and non- violence. Traditional ideas and values should not be taken as rigid and inflexible. They need to be continually reassessed and re-interpreted in the light of new experience.

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ASSIGNMENTS

1. what do you understand by Philosophy?
2. Write down the aspect of Philosophy?
3. How is philosophy related to education?

Block-1

Unit-3

Sociological bases of Education

1.3 : INTRODUCTION

Education is socially manifested, socially oriented and socially controlled for maintenance of social order and achieving social goals. Education and society are interrelated. Society needs education, and education performs its role to fulfill social needs. It is a social product, and also a social process. As a social process, education leads to social interaction and establishes relationship between the person, and the interacting social groups, for modifying behaviour of participants in a socially desired goal.

It originates in the society and it must fulfill the needs and aspirations of the society. There is thus an intimate relationship between education and society. Modern education has two-fold functions. It must help in individual development as well as social progress. An individual can only develop in the right direction in social environment. Education helps to solve the multifarious social problems.

1.3.1 : MEANING AND NATURE OF SOCIOLOGY

Sociology has come from two words Societas and Logos meaning “society” and “science” respectively. Hence scientific study of society is commonly known as sociology. Society is more than a mere assemblage of individuals. It involves interaction and interrelation between individuals and groups. In fact, society exists only in the articulate consciousness of human beings. On the other hand, the individual depends upon the society for his existence and self-development. It is society that acts as the selective agent and determines which of the possibilities will be allowed to develop through interaction with social groups and situations the original tendencies are modified, coordinated and shaped into individual is influenced by social direction. Sociology aims at explaining the inter-personal and group relationships. It explains occupational, religious or social groups, the nation or the state. It studies various social changes that are taking place within group life and analyses such processes of interaction as competition, Conflict, co-operation, accommodation and assimilation. It examines social change and social control, analyses the concepts of civilization and culture and deals with such social problems as crime juvenile delinquency, poverty and other social evils with a view to their solution.

1.3.2 : RELATIONSHIP BETWEEN SOCIOLOGY AND EDUCATION

Sociology and Education maintain a close relationship; since, they have the same goal to achieve. The main inclinations of the two disciplines are to develop the personality of the learner and to achieve human accomplishment. Social agencies of education are needed to arrive at this end. Various social organizations, and mainly the schools, colleges and universities are the social agencies for fulfilling individual and social needs. These grow within the society for social purposes and these accomplish human perfections for achievement of social progress, social harmony and social efficiency for maintaining better group relations.

The cultural heritages, social norms of value judgement and ideas of co-existence and respect for freedom of others are developed and nourished in a stimulating educational environment as the society creates conditions for human relations and human interactions. This type of social process and human relations are the concern of sociology.

The societal approach to education makes the individual of understanding himself in relation to the external world. The individual cannot be isolated from his cultural heritage or social surroundings and the school provides this type of environment.

The input of the school, that is, the student flow of the school comes from different family background of the community. Social relations and interactions between the family and the academic centres are spontaneously developed. It is not isolated from the society or the community. They rather, work together.

The social forces, concerning economy, power, politics, and religions, casteism and the like, sometime penetrate into academic centres. Academic authorities are to tactfully handle these social forces very cautiously. It is, therefore, said that the hurdles of social life is unavoidable in educational administration.

So, associative and dissociative forces work together in schooling system. Sociology deals with group life, and group relations. The class room of the school consists of a group of students. They may or may not be homogeneous in nature. They are likely to come from different socio-economic or cultural background. The fundamental process of group life is there. The school is to deal with all these sociological processes of group life. Cooperation, competition, and conflict are the three basic interaction processes and are interrelated in several ways. The schools accept corporate and cooperative life amongst the children; it also tolerates competition for achievement of academic goal. However, conflict may lead to rivalry and aggression. If situation arises, the school has to deal with this extreme form of rivalry; but in real social conditions this is difficult to deal with, if social control measures are not applied. Again group dynamics and group activities are not only manifested

within the school conditions but also in social conditions. The sociometric method of measuring interpersonal relationships which find expression both in educational situations and social situations cannot be overlooked.

The principles of curriculum construction, are now-a-days significantly influenced by sociological rules and principles. Whatever curriculum is framed that is to be constructed according to social relevance. “curriculum,” according to Mudaliar Commission, “must be vitally and organically related to community life.” Even methods of teaching have some relevance to sociological principles. “Good methods which are psychologically and socially sound may raise the whole quality of their life;” that is, the students, life.

Finally, the concept of social control is now-a-days being utilized in school administration and school discipline. The application of the system of reward and punishment in school situation is, also a sociological contrivance in the form of reinforcement either positive or, negative. It is obvious, therefore, that the relationship between sociology and education is close and intimate.

However, this intimacy cannot be extended too far. There are innumerable branches of sociology which are beyond the scope of education. Criminology, History of Sociology, Human Geography, Industrial Sociology, Political Sociology, Social Psychiatry etc., are not relevant to education. It is only Educational Sociology which is intimately connected with educational aim, curriculum, methods administration and teacher education programme. It stands as a special branch of knowledge for educational purposes.

1.3.3 : EDUCATION AS A PROCESS OF SOCIALIZATION

It is well-known fact, that first education starts with socialization. Without exposition to human environment, and school system of education, better socialization of children, is not possible. Education is, obviously, recognized as a process of socialization. An individual is born with a biological heritage. For survival of the new born baby the biological needs of the baby is fulfilled by the parents and the family members. He or she grows and develops. This growth takes place in a social environment and gradually, the infant acquires social heritages, like language, habits, customs, manners and social values and norms. The child grows and learns continuously, through the process of social interactions, as he comes in contact with social environment like family and school and gradually, he acquires the capabilities for performing his social role.

The definition of H.M.Johnson is significant in this context. “Socialization is the learning that enables the learner to perform social role.” In terms of Ogburn and Nimkoff, without socialization an individual is not fit for social living “socialization is the process by which the individual learns to conform to the norms of the group.” “Socialization,” Believes, Roucek and Warren, “is the process,

begun in infancy, by which human organism, learning socially approved attitudes, ideas, and behaviour patterns, from contact with other persons, comes to assume the roles which pattern his social behaviour and which correspond to his status in various social group. Personality is acquired in the process of socialization.” In terms of La-piere, personality is the “product of socialization”. MacIver believes that by virtue of socialization the members of the society acquires the capacity to establish a long-lasting relation amongst themselves, and they become conscious of their duties for developing the complex-web of social relations. It is evident that all these socialization processes lead to personality development. An individual becomes a person through social living. The individual is exposed to social environment like, family, community, school, religious organization, mass-media etc., and acquires the variegated ways of life of the social environment in which the individual is exposed. The entire process is socialization, and it is a product of learning from the family, school and other agencies.

1.3.4 : MEANING AND DEFINITION OF EDUCATIONAL SOCIOLOGY

Emile Durkheim, the French sociologist, for the first time felt the need of sociological approach to Education. He considered education “to be something essentially social in character, in its origin and its functions.” He emphasized that education is not a static phenomenon but a dynamic and ever-changing process. Every society with its own changing socio-cultural needs will require an education to meet those needs. Since needs, change continuously therefore education must also change. The needs of different societies differ therefore education should be dynamic.

Educational sociology is a branch of sociology, which is confronted with the problems of relationship between society and education. It makes an effort to achieve the aims of sociology through educational process, which is nothing but an interaction between the individual and the society. The knowledge of social interaction is one of the most important elements for social progress. Thus the development of the individuality is dependent on the reaction of the individual to his social environment.

Hence we can say “By educational sociology we mean the science which describes and explains institutions, social groups and social processes, and social relationships in which or through which the individual gains and organizes his experiences.”

According to Brown, Educational Sociology is the study of interaction of the individual and his cultural environment. Thus social interaction is the key area of educational sociology. The individual becomes a person as a product of this interaction.

Educational Sociology is particularly interested in finding out how to manipulate the educational process for better personality development.” John Dewey emphasized the importance of the

socialization of the individual for education. He considered that through the participation of the individual in social process the complete development of education takes place.

The educational process is nothing but a social process. The school is a social institution, which purifies the society, progress it and makes the individual conversant with the society. Thus, Educational Sociology is the study of those phases of sociology that are of significance for educative processes.

Education sociology treats the school problems as of greatest importance to the nation. They are the problems of society and all social institutions, social direction, individual motivation and of effective group-actions. Educational sociology analyses and evaluates the groups and institutions in which learning takes place and the social process involved in learning and teaching. It analyses and evaluates the social trends and ideologies, which affect education. It helps us to understand that education is a means of social change. It throws light on human interaction and relationships within the school and the community. It emphasizes that learning is a social process. It is the total cultural milieu in which and through which the learning experience is acquired and organized.

Question :

Let Us Check Our Progress

Name certain social forces that influence education.

What is the nature of group life in the class room?

How does sociology influence curriculum, method of teaching and administration of school?

Block-1

Unit-4

Historical bases of Education

INTRODUCTION

History of Education, theories, methods, and administration of schools and other agencies of information from ancient times to the present. Education developed from the human struggle for survival and enlightenment. It may be formal or informal. Informal education refers to the general social process by which human beings acquire the knowledge and skills needed to function in their culture. Formal education refers to the process by which teachers instruct students in courses of study within institutions.

The aim of this unit is to develop an understanding of the history of education from previous system of education in India.

1.4.1 : HISTORICAL PERSPECTIVES OF PRE-PRIMARY EDUCATION

Development in the West :

The idea of nursery education is quite old. More than 2000 years ago Plato stressed the benefits of education for the very young child. Since Plato's days children have been cared for through many forms and given guidance outside the home for diverse reasons.

Comenius, recognising the importance of early childhood' education both in the home and school, gave to the world the idea of parent -education in his "School of the Mother's knee."

Early in the 18th Century centres for Pre-School children in England were established to emphasise religious and moral discipline. During 1810-1830, 'Infant-schools' were founded in Italy, Germany and England. Rousseau emphasized full right to childhood! "Nature", he said, "required children to be children before they are men" Pestalotzzi reiterated the principle of Comenius that "thing to be done should be learnt by doing them." "knowing and doing," said Pestalotzzi, "must proceed together"

In the later part of the 19th Century, Froebel gave, to the world the concept of to days kindergarten, in which the development of the individual is aimed at through play activities. Kindergarten schools may be considered the fore runners of the modern pre-schools.

The first Nursery school was established in England in 1909, by two sisters Margaret Macmillan and Rachel Macmillan "Educate every child as if he were your own," Rachel Macmillan preached.

At about the same time, In Maria Montessori, a young woman physician in Italy, established school where children were encouraged to use various materials by developing their motor and mental skills. Dr. Maria Montessori named this Pre-school as a 'CASA BAMBINI', that is children's home, meaning that nursery school must be like a home to children. This name implies that in a nursery school, the atmosphere is not strict, formal or business like, but affectionate and intimate as in a home.

In the U.S.A. the growth of Pro-school education has been so spontaneous that it is difficult to trace its origin accurately. The influence of Macmillan sisters was significant in starting nursery schools. Impetus was also gained from a variety of organisation with similar interest in child welfare.

Robert Owen established an 'Infant School' in Scotland, and later with the social experiment in Indiana; USA. came the idea that young children should spend as much time as possible out of doors; so that one *could* learn when their curiosity indeed them to ask questions.

Development in India (Before 1947)

The concept of infant school was introduced in India by the British missionaries in the later part of the 18th Century when such school were set up in the Western and Southern regions of India some institution for training teachers for infant schools were also started by these missionaries.

Mahatma Gandhi's scheme for Pre-basic education formulated in the late thirties of 20th Century was the first indigenous scheme for education of very young children and several educational reformers and social workers endeavoured to put it into action at the field level. Jugatrambhai Dave Nanabhai Bhatt and Tarabai Modak were some of the *early* pioneers of the early childhood education movement in our country. They were all inspired by the down-to-earth grass root level approach of Mahatma Gandhi Pre-basic education scheme.

The most dominant influence that can be felt even today. as one surveys the contemporary Indian education scene. particularly with reference to early childhood education. is that of Madam Marla Moitessori who came to India in 1939 as a refugee from the Fascist regime in Italy. Annie Besant, a theosophist, was powerfully influenced by Madam Montessori and she and Rukmini Arundale helped Madam Montessori and set up a teacher training centre at Adyar, near Madras. Many early childhood educators received their training under Madam Montessori at Adyar and then went out to various parts of the country and spread the movement for early, childhood education. Gijubhai Badheka and Tarabai Modak were among the early educators who being inspired by Madam Montessori, adopted her method to suit Indian conditions. They set up the **Nutan Bal Shikshan Sangh** in 1925. A training centre at Bhavanagar Dakshinamoorti was started by Gijubhai and. Jater, one was set up by Tarabai at Dadar, Bombay. The movement took strong roots in the Saurashtra region of the then province, and also in Madhya Bharat and the Vidarbha region.

The early pioneers attempted to develop an indigenous educational system, imbibing the basic Gandhian philosophy and integrating it with the educational principles and scientific pedagogy of Madam Montessori.

During the pre-independence period all these efforts were confined to the voluntary sector and received no support from the government. It was for the first time that, in 1944, a government document known as Sargent Committee Report emphasized the importance of pre-primary education and linked it with the child's educational performance in primary school. The report viewed pre-primary education as a necessary adjunct to primary education. Its recommendations are given below :

An adequate provision of pre-primary institutions in the form of nursery schools or classes is an essential adjunct to any national system of education.

Pre-primary education should, in all cases, be free, while it may not be feasible to make attendance compulsory, an effort should be spared to persuade parents to send their children to school voluntarily.

In urban areas, where sufficient children are available within reasonable radius, separate nursery school or department, may be provided. Nursery classes should be attached to junior basic primary school.

The main object of education at this stage is to give children school experience rather than formal instruction.

A reasonable provision of pre-primary education for children between 3 to 6 years of age-about 10,00,000 places in nursery schools or classes.

Nursery school and classes should invariably be staffed with women teacher who have received special training for this work.

The total estimated cost of the proposal set out in this chapter when in full operation is Rs. 3,18,000 crores.

However, this plan has never been implemented in India.

Let Us Check Our Progress

1. Mention one important objective of Primary Education ‘?’
2. Why elementary education is essential’? (Give one reason)

1.4.2 : HISTORICAL REVIEW OF PRIMARY EDUCATION (1854-1947) IN INDIA

“Education in India under the British Government” says Howell, “Was first ignored, then violently and successfully opposed then conducted on a system now universally admitted to be erroneous and finally placed on its present footing”.

Before the British came to India there was a network of indigenous elementary schools in India known as Pathshalas and Maktabas. There were 12,498 indigenous schools in Madras Presidency and about one lakh in Bengal in 1835. This traditions / old system of primary education was prevailing throughout the country under the British rule. However, by the eighteenth Century, it had lost much of its glory and utility, so far as the historical data demonstrate.

The history of education in India under British rule can be divided into four periods : (i) From early to 1812, (ii) 1813-1853, (iii) 1854-1920 and (iv) 1921-1947. The first period is marked by indifference and non-interference by the British with education. The second period is marked by controversies between Orientalists and Anglicists regarding the medium of instruction and content of education. The third may be called the period of an all Indian Education policy. The fourth period may be called the period of provincial autonomy.

According to Wood's despatch (1854), the company was responsible for the education of Indians. It was asked to encourage Indian schools and give financial help for the expansion of primary education. But practically no monetary help was extended for the expansion of primary education. After the revolt of 1857, it paid due attention to education and the next three decades proved very important for primary education. Under the Stanley Charter of 1859 the Indian administration was saddled with the responsibility of primary education. It was authorised to levy tax in-order to collect money for the purpose.

The landmark in the history of official policy relating to elementary education in India was the appointment of the Education (Hunter) Commission in 1882. The Indian Education Commission (1882-83), the first Commission on education in India placed special emphasis on elementary education and recommended that primary education be extended to backward districts: The Commission acknowledged the importance of primary education by declaring that while every branch of education can justly claim the fostering care of the state, elementary education of the masses, and its provision expansion and improvement deserves the greatest attention -to any system of education. The Commission made the following recommendations with regard to primary education—

- (a) Primary education should be entrusted to the newly created Municipal and District Boards (local bodies).
- (b) Definite funds for Primary Education should be set aside by the local bodies.
- (c) Primary education should be imparted through vernaculars.

In these way Hunter Commission tried to boost primary education. By the year 1882 nearly 29,000 primary schools were opened for education with 21 lakhs of children. This provision could give education to only 1.2% of children at that time. But these data do not show progress of primary education in India in real term.

Lord Curzon confessed that the Government had not done its duty in the spread of primary education. According to him the aim of primary education was to provide education to every one through the medium of mother tongue or local dialect and the facility of receiving primary education would be available to anyone desiring to receive it. The primary education needed government patronage. Lord Curzon truly gave a boost to the efforts for the expansion of primary education. He made sincere efforts in this direction. This venture can be called the first phase in the expansion of primary education. As regards expansion of primary education Curzon held two views—the need for expansion was greater than any time in the past and the principal cause of slow progress of primary education was the inadequate grants from Government. He, therefore, sanctioned both non-recurring and recurring grants for primary education, though that venture proved inadequate.

These enabled the provincial Govt. to raise the rate of grant in aid to Local Boards and Municipalities from one third to one half of total expenditure. This liberal policy led to a large increase in the number of primary schools and pupil. In the year 1904, there was Government of India Resolution on Education in India and Lord Curzon was the prime mover of the resolution. He allocated Rs. 35 lakhs for the spread of primary education. Do you think, the sanction was sufficient?

After Curzon the British Government became indifferent towards primary education after handing over its charge to the local bodies. However, three educationists, William Adams, Capt. Wingate and T.C. Hope, urged the government to declare primary education as compulsory. It gave further encouragement to Indians to press their demand for making primary education compulsory. The expansion of education programme became a part of national movement. Sir Ibrahim Rahimtoola and Sir Chiman Lal Setalvad gave birth to this movement. As a result of this movement the Government of Bombay constituted a Committee in 1906 to examine the progress and condition of education. The committee found that the people in general were not prepared for compulsory education. Hence, the old policy remained unchanged. These events demonstrate a centre-periphery communication and motivational distances regarding importance and value of primary education.

In 1893 the ruling prince of Baroda State, Maharaja Sir Sayaji Rao Gaikwad, took initiative and introduced compulsory education in 52 villages of his state. In 1906 a rule was framed to introduce this scheme. It covered all the boys within the age group of 7 to 12 years and all girls in the age group of 7 to 10 years to attain primary school.

Inspired by the noble example of the Maharaja of Baroda, Gopal Krishna Gokhale proposed in the Central Assembly the introduction of free and compulsory education throughout the country. On March 16, 1911, Gokhale brought a Bill in the central Assembly to this effect. But it was rejected by the Government due to lack of adequate support. Gokhale's work was also motivated by Vithal Bhai Patel and he presented a bill in the Bombay Legislative Assembly to introduce free and

compulsory education in the area falling under the jurisdiction of Bombay Municipal Board (1917). In 1918 the bill became an Act with some modification, with a far reaching effect. It was the first law on compulsory Primary Education in India.

An important development took place in the elementary education in diarchy system (Govt. Act. of 1919) the most important thing that happened under diarchy was the rapid development of mass education and passing of compulsory education act in most of the provinces. Indian Ministers took charge of primary education in 1921. The year 1921 may be considered as a landmark in the history of elementary education in India. Compulsory Education Acts were passed in most of the provinces of British India. In 1921 the number of elementary schools was 1,60,070 in the Country.

By 1930 Primary Education became compulsory in the whole country for boys within the 6 to 10 years age group; however primary education was entrusted to the local bodies who were empowered to levy taxes for meeting, the expenditure over primary education.

In May 1928 a Royal Commission was appointed under the chairmanship of Sir John Simon. This Commission appointed an auxiliary committee presided over by Sir PhiJip Hartog to report on the growth of education in British India. The Hartog Committee submitted its reports in 1929. It reported that enrolment had largely increased in primary stage, pointed out that there was waste and ineffectiveness through out the whole system of education including primary education. The main conclusion of the report was that quantity had begun gain at the cost of quality and therefore the immediate need was to improve the quality rather than increase the number still further. In 1929 Hortog Committee also made recommendations for the improvement and development of primary education. It recommended that primary school should be well equipped. The recommendations are :

- (i) Primary education should be made compulsory.
- (ii) Qualitative development of primary schools is necessary instead of increasing the number of primary schools.
- (iii) At least four years should be devoted to primary education.
- (iv) The curriculum of primary schools should be scientific and standard of teachers should be improved.

The Government of India Act. 1935 marked a further step in the onward march to introduce compulsory primary education. The year 1937 was an epoch-making year in the history of elementary education in India as it saw the emergence of the Scheme of Basic Education enunciated by Gandhiji which then was highly applauded. In this period more attention was given on the elementary education.

In the year 1937, Provincial autonomy was introduced and the states increased their educational budgets. In 1937 the speed of development of Primary Education farthered momentum with the

formation of congress ministries in six provinces. During this period the problem of extending compulsory primary education received more attention. The congress ministers laid emphasis on the expansion of primary education in rural areas, so that it may come within the health of common man. In the field of primary education the epoch-making event of this period was the scheme of Basic Education. In the year 1937 two important documents - Abbot Wood Report and Zakir Husain Committee Report were submitted. The Abbot- Wood Report emphasized, that the education of children in the primary school should be based more upon the natural interests and activities of young children and less upon book learning that the mother-tongue should as far as possible be the medium of instruction. The First Conference of National Education at Wardha on 22nd and 23rd October 1937 also recommended some aspects for elementary education. The report of the Central Advisory Board of Education on 'Post-war Educational Development in India' (1944) popularly known as the 'Sargent Plan'. Recommended that a system of universal, compulsory and free education for-all boys and girls between the ages of six and fourteen should be provided. It divided Primary Education into the Junior Basic (6-11) and Senior Basic (11-14) stages. The first type of schools is to be compulsory for all, but the second type is meant only for those who would not proceed to the high school.

This was the last important educational document of the pre-independence period. This document was the most outstanding contribution during the pre-independence era and laid down the foundation of an educational planning in modern India. By 1947 primary education became compulsory in 10,017 villages and 229 grams. Besides it was made compulsory for girls in 1405 villages and 10 towns.

TABLE : LITERACY RATE

Before Independence			
Year	Male	Female	Total
1901	17.16	1.18	9.40
1911	18.48	1.65	10.41
1921	20.65	2.47	12.04
1931	19.80	3.71	12.25
1941	29.31	8.93	20.02

1.4.3 : HISTORICAL REVIEW BEFORE INDEPENDENCE (1854-1947)

It will be worthwhile to have a look briefly at the history of the secondary education : —

Before the advent of the English, there was no formal system of secondary education in India. All that existed was the “Maktabas” and the “Pathshalas”. Important changes in the type of education to be imparted to the youth of India were introduced in the first half of the 19th century. The minute of Lord Macaulay and subsequent resolutions passed by the Government (1835) led to the establishment of schools teaching European literature and science. These schools became immediately popular because of the great interest shown in English education by some of the educated Indians like Raja Ram Mohan Roy.

It was in the year 1835 that Lord Hastings made a declaration which stated that those who knew English or were educated in such schools would be given preference for service in public offices. As a result of this many schools sprang up and caught the eye of the public. It is reported that by the year 1852, there were 32 recognised secondary schools.

1. The Despatch of 1854

By the year 1853 a number of problems had arisen which required immediate solution. As a result of an inquiry made, a despatch (Known as Wood’s Despatch) was issued in 1854 reviewing the development of education, and proposing certain new schemes for adoption. Its chief outcomes as a result of recommendation were :

- (a) The department of public instruction of the Education Department under the Director of Public Instruction be created.
- (b) The scheme to establish universities was also formulated.
- (c) The despatch recommended the setting up of number of high schools.

The main defects as a result of this despatch were : the neglect of mother tongue as a medium of instruction; nothing was done to train teachers for secondary schools, and the course of study became too academic and unrelated to life. Matriculation examination began to dominate a lot. That was the position of secondary education between 1854-1992. The number of government run secondary schools was about 1400. If we were to include school run by missionaries, etc. then the total number was 3916.

2. The Hunter Commission (1882)

In 1882, an Education Commission, known as the Hunter Commission was appointed by the Government to report on the whole question of education in the country. The chief recommendations of this Commission were :

- (i) Since it is very costly for the government to maintain secondary schools, it was thought that the government should take over the entire responsibilities of primary education, leaving secondary education to private enterprise. The commission recommended that “Secondary education as far as possible, be provided on the grant in aid basis and that

the Government should withdraw as early as possible from the direct management of Secondary Schools". The Government must open its schools at places where private enterprise finds it difficult to do so.

- (ii) The second recommendation concerned the bifurcation of curriculum. There should be two groups - groups 'A' for passing the entrance examination and group 'B' for *commercial studies*. Despite this, no *attention was given to the* teacher training and the medium of instruction also continued *to be English*. The number of secondary schools was 5124 with an enrolment of 6 lakhs. It is also said that output in 1902 was three times that of 1882. No mention is made of quality of education.

3. The Calcutta University Commission (1917)

The next important stage was the setting up of the Calcutta University Commission in 1917 under chairmanship of the late Sir Michael. This Commission was primarily for the Calcutta University but also went into the question of secondary education and held the view that the improvement of secondary education was essential for the improvement of university education. Some of its important recommendations were :

1. The dividing line between the University and the "Secondary course is more properly to be drawn at the Intermediate examination than the matriculation.
2. Government should, therefore, create a new type of institution called the Intermediate Colleges - these colleges be either run as independent institutions or might be attached to the selected high schools.
3. Boards of Secondary and Intermediate education be set up in the states. Still the problems relating to "the training of teachers," their salaries and conditions of service were left unsolved.

In 1921-37, when education was under diarchy, the number of secondary schools stood at 13056. Salary scales of teachers were improved.

In between we had the Hartog Committee Report (1929).

It pointed out that Matriculation examination dominated the Indian education scene. There were many failures. It gave suggestions to overcome those.

4. The Sargent Report (1944)

In 1944, the Central Advisory Board of Education which is an All India advisory body set up by Government of India, submitted a comprehensive report on post-war Educational Development containing certain important recommendations. The report, more popularly known as the Sargent Report - after Sir John Sargent who was the then Educational Advisor to the Government of India, visualized a system of universal, compulsory and free education

for all boys and girls between the ages of 6 and 14, the Senior Basic or the Middle School being the final stage in the school career of majority of future citizens. It also recommended that—

- (i) The high school course should cover 6 years, the normal age of admission be eleven years.
- (ii) High school should be of two main types
 - (a) Academic
 - (b) Technical
- (iii) Entry to the High school, as is clear, be on a selective basis.

Soon after the report saw the light of the day India got freedom and we began thinking afresh on the matter.

Let Us Check Our Progress

1. State two main recommendations of Hunter Commission regarding Secondary Education.

1.4.4 : HISTORICAL REVIEW OF HIGHER EDUCATION BEFORE INDEPENDENCE

Introduction :

Even before the establishment of universities in Europe, India had a long history of higher education. There had been a tradition of enlightenment and scholarship in various fields since ancient times. The older universities of Europe came into existence during the medieval period. Even during Vedic-Upanishadic period, India had enlightened the world through famous seats of higher learning. It is on record (Radhakrishnan Commission, 1948-49) that the university of Takshashila flourished up to the end of fifth century AD and that of Nalanda survived up to the 12th century AD. The curriculum in these universities included the study of Vedas, Upanishads, religious scriptures, philosophy and logic. Nalanda was basically a Buddhist centre of learning, but its working resembled the contemporary, Hindu centres of learning such as those located at Vallabhi, Vikramshila, Banaras, Nadia, Ujjain and Kanchi. The purpose of education in these institutions was not utilitarian; rather, learners acquired knowledge for its own sake. The philosophical and religious systems dominated the foundations of education with “idealism” occupying the prominent position and without any place for “materialism” and physical aspects of life.

The organization of these institutions resembled more to the modern concept of “non-formal” education than the traditional “formal” system. The teachers maintained themselves on “guru dakshina” received in the form of presents from the students, and there was no formal arrangement for payments of salaries. No fees was charged in the ancient Indian system and Nalanda, but at a later stage, during the Buddhist period, Takshashila and Nalanda started charging fees from rich students for maintaining the institution. There was no formal system of state funding of universities, however, kings provided endowments in terms of land and buildings, scholarships for poor and needy students and prizes for meritorious students. Since there was no state funding, there was not state interference in the academic or financial matters of the institutions. The greatest motivation for the teachers was the respect and status in the society, which they enjoyed. Higher education was, however, not accessible to all and was available only to the upper and ruling classes of the society. Education was the territory of Brahmins who were responsible for teaching. Shudras, the lowest of the caste hierarchy of Varna Vyavastha, (cast System) were not allowed to study the sacred scriptures.

The foreign invaders destroyed these great seats of learning during the medieval period, which was a period of conquest, destruction and loot. However, Mohammad Ghauri, who was the first Muslim ruler to start a “Madrasha” at Ajmir, encouraged higher education. Some more schools (maktabas) and colleges (madarsahs) were set up by some other Muslim rulers at Lahore, Delhi, Rampur, Bihar, Lucknow, Allahabad, Jaunpur, Ajmir, Fatehpur Sikri and Agra. The curriculum in these institutions included seven liberal arts in line with the contemporary European institutions. The medium of instruction was either Arabic or Persian or both.

Beginning of Modern Higher Education :

The British East India Company, which became sovereign ruler of India gave no attention to education till 1813 when British Parliament directed the Company ‘to accept the responsibility of education of Indians and to spend not less than Rs. 1,00,000 per year for this purpose’. But, the company had been reluctant to make any attempt in this direction, because the officers of the company suspected that western education might encourage growth of nationalism among the people of India. Therefore, they adopted a policy of encouraging the indigenous system of education in Persian and Arabic. This was done to appease the Muslims of Bengal. Similarly, in order to appease the Hindus and to encourage the study of Sanskrit, they also opened Benaras Sanskrit College in 1791.

The western higher education began with the establishment of Hindu College at Calcutta (1817) by the Bengali polity including with the help of Raja Rammohan Roy and David Hare. The objective to provide a channel by which ‘real knowledge may be transferred from European sources to the intellect of Hindus’. The British East India Company founded another Sanskrit College at Calcutta (1825), which was protested by Raja Rammohan Roy on the ground that Hindus should have

received education in European language and science. By this time, the Christian missionaries had started establishing college at other places, with the objective of spreading Christianity through teaching of English and western sciences. Elphinstone College was founded at Bombay (1834), and Madras to prepare natives for public employment. In the same succession, college were set up at Masulipatanam (1844), and Agra (1853). Upto this time, the number of colleges had risen to 25 in all, in the whole country.

Birth of Modern University System in (British) India

In India under the foreign rule, the higher education system did not evolved rather this was established by them. Therefore, the historians say, “In fact since the age of the East India Company rule and definitely upto 1857, it was an age of establishment of colleges though such early colleges were quite different from the colleges of modern days. The majority of these institutions grew out of schools teaching English and contained classes reading the works of Shakespeare, the Calculus, and Smith’s Wealth of Nations and the Ramayana. Even such type of curriculum at that time served some purposes of the individuals who became students”. Therefore, such collegiate education system at that period became quite popular as evidenced by the data given in the following Table 1

Table 1 : Colleges in 1857 in British India

Province	Colleges of General Learning	Colleges of Medicine	Colleges of Engineering (Civil)
Bengal :			
Conducted by Government	7	1	-
Conducted by Missionaries	7	1	-
Bombay :			
Conducted by Government	2	1	-
Conducted by Missionaries	-	1,	-
North Western Province :			
Conducted by Government	4	-	-
Conducted by Missionaries	-	-	-
Madras :			
Conducted by Government	1	1	-
Conducted by Missionaries	2	-	-
Total	23	3	1

Source : Nurullah, S. and J.P. Naik (1951) *History of Education in India*. Bombay : Macmillan, p. 279

The above state of conditions of collegiate education in India in 1857 may not look impressive but this demonstrates culmination of western higher education in the education space of India.

Wood's Despatch and After

On the recommendations of the famous Wood's Despatch (1854) modern universities were established in Calcutta, Bombay and Madras in 1857 on the lines of the then popular model 'of London University with two chief functions of examining non-resident students. To that list two other universities were added subsequently - Punjab (1882) and Allahabad (1887).

These five universities had no teaching functions. They were purely examining bodies and drew their candidates for different examinations from affiliated colleges and schools. The Acts of those universities did not specify the rules and norms for giving affiliation to the colleges and schools. The governing structure of those universities mainly followed those prevalent in London University. The Chancellor, Vice-Chancellor and fellows were the academic policy makers and policy translators and the Senate was the governing council of a university. But there was no upper limit of those fellows and the Senate grew unwieldy. The University Act of 1857 recognized technically the "Affiliating University 'only and especially leaned toward liberal education. Subsequently, the Indian Universities (Degrees) Act was passed in 1860 empowering the newly established universities to confer such diplomas or degrees or licenses as had been or might be approved by the bye-laws or regulations. Sequel to this in 1884, the Indian Universities (Honorary Degrees) Act was passed that empowered the three universities - Calcutta, Bombay and Madras - to confer the Honorary Degree of LL.D. In 1882 the fourth university, Punjab University was created by a special Act of Incorporation. After five years in 1887, the fifth university - Allahabad University - was set up by another Act of Incorporation. It had some specialty. The Act empowered not only to prescribe courses and conducting examination, but also to maintain a staff of professors and even private teachers after the pattern of the Universities of Germany. Thus, besides the London model, German model of universities came in.

The establishment of modern universities in India may be ascribed as plantation of the English university education system in Indian education soil for transmission of western knowledge and learning. It was symbol of elitism although some eminent leaders were groomed by the learning and wisdom offered by these seats of learning and produced impact on further development of our education system.

Collegiate Education

It is imperative that with the development of universities there must be a wave of development of collegiate education. The earliest colleges of this period such as Calcutta Madrasa, Banaras

Sanskrit College were established by Government and were generally modeled on the ancient educational institutions of the Muslims and Hindus. The only college organized by a Committee with whose management Indians were associated was the Hindu Vidyalaya of Calcutta. This was however merged later in the Presidency College established in ~54 by Lord Dalhousie. The colleges in the modern sense of the word started to function after 1857 when universities came to be established. The history tells that the development of collegiate education was fairly rapid during the twenty five years between the establishment of the universities and the appointment of the Indian Education Commission in 1882. The rise in number of colleges during the period between 1857 and 1882 may be cited as with the following table

Table 2 : Number of Colleges during the period from 1857 to 1882

Provinces	No. of Colleges in 1857	No. of Colleges in 1882
Bengal	15	27
Bombay	3	6
North Western Province	5	11
Madras	4	25
Punjab	-	2
Central province	-	1
Total	27	72

Source : Nurallah and Naik : A Students' History of Education in India, p.186

The developmental spurt in collegiate education had two reasons: ~ by this time the number of feeder secondary education system grew soundly, and the students: wished to get university degrees mainly for material gains, very few entered into university for love of knowledge. The contents of the above table show that the development of collegiate education in then British India was lopsided; Bengal and Madras were the main providers.

We shall now take small breadth to note the recommendations of the Indian Commission (1882) on higher education. It is sad to observe that this Commission alotly says that it would not "be necessary for the Commission to enquire into the general working of the Indian universities, which are controlled by corporations comprising representatives of all classes interested in collegiate education". This observation might appeared that the then Government probably had an idea that universities were an independent beyond the general structure of the total education system.

Nevertheless, history of education witnessed development of collegiate education during the 'period from 1882 to 1902. Nuralla and Naik have given two reasons for this development of

collegiate education- (i) the recommendations of the Indian Education Commission helped expansion of secondary education, and (iii) the Commission created a background in which Indian private enterprise could thrive. The following table shows the total number of colleges and their students.

Table 3 : Colleges during 1857 and 1882

Colleges	No. of Institutions	No. of Students
<i>Arts Colleges :</i>		
English	140	17,048
Oriental	5	503
<i>Professional Colleges :</i>		
Law	30	2,767
Medicine	4	1,466
Engineering	4	865
Teaching	5	190
Agriculture	3	70
Total	191	23,009

Source : Nurallah and Naik: Naik: A Students' History of Education in India. p. J 88

The table reveals the fact that only nearly twenty three thousand students were in 191 colleges. It appears a stronger emphasis on liberal type. Secondly, among the professional courses, Law and Medicine were more acceptable to the students. Thirdly, the students' inclination to oriental education was very weak. Thus, the advent of collegiate and university education in India was an engine for social transformation and the road map was definitely toward elitism and prosperous materialistic gains. A serious defect of university education of this period which led to a heated controversy was the neglect of modern Indian languages. Further, all those higher education institutions were healthy grounds for coaching not enlightenment or learning. Sadly, some critics even express such comments on our today's university education.

Period of Reforms: 1902-1921

The nineteenth century passed on for some lopsided development of Indian universities and collegiate education. To control the reign of control and consolidation at the beginning of the twentieth century Lord Curzon appeared in the scene and attempted some exercise of control of higher education, not with ingenuity but by copying the then London University model changed in 1898 in England. Some local criticisms also were hurled against the then university education in India.

The Indian Universities Commission (1902)

Curzon took single handedly the agenda of reform university education and he appointed on 27th, January 1902, a Commission to enquire into the conditions and prospects of the universities established in British India and to consider and report upon proposals for improving the structure, functions and quality of universities. The Commission dealt with two aspects: (i) to determine the type of university organizations that should be ultimately developed in India, and (ii) to propose such transitional arrangements as would enable the country to reach this predetermined goal in the shortest possible time. It is a fact that the Report of this Commission left out the fundamental question on reconstruction of the Indian university system (later on this was dealt in Act of 1904). Thus, in a nutshell, the recommendations of the Commission refer to the following five aspects.

1. reorganization of university government;
2. more strict supervision of colleges by the University , and the imposition of more exacting conditions of affiliation;
3. much closer attention to the conditions under which students live and work;
4. execution of teaching functions by the University within defined limits; and
5. substantial changes in curricula, and in the methods of examination.

The 1st, 2nd and 4th groups of recommendations were incorporated later in the Indian Universities Act, 1904, while the 3rd and 5th ones were left to be dealt with in detailed regulations to be framed by the reorganized universities.

The Indian Universities Act, 1904

Seven important changes were proposed by the Act. Section 3 of the Act clearly provided that “the University shall be .” deemed to have been incorporated for the purpose (among others) of making provision for the instruction of students, with power to appoint University Professors and Lecturers, to hold and manage educational endowments, to erect, equip and maintain University libraries, laboratories and museums, to make regulations relating to the residence and conduct of students, and to do all acts, consistent with the Act of Incorporation and this Act, which lead to the promotion of study and research”. Apparently this Act speaks for University autonomy and authority to shoulder responsibility in the matter of promotion of learning, teaching and maintaining academic environment within the University.

Secondly, the Act specifically proposed that the number of Fellows of a University shall not be less than fifty nor more than a hundred and that a Fellow should hold office for five years only instead of for life.

Thirdly, the Act required that twenty Fellows should be elected at three older Universities and fifteen at the other two (Punjab and Allahabad).

Fourthly, the Act gave statutory recognition to Syndicate and also to give an adequate representation to university teachers on syndicates concerned. Thus, teachers' academic authority on university governance was recognized.

Fifthly, the Act introduced stricter conditions for affiliation of a college to a university and to provide that all affiliated colleges should be periodically inspected by the Syndicate in order to ensure standard of collegiate education. Further extension of affiliation and disaffiliation of colleges be required approval of the Government.

Sixthly, the Act provided that while approving the regulations framed by the Senate, Government may make such additions and alterations as may be necessary and even may frame regulations itself should the Senate fail to do so within a specified period. Virtually, universities were going to be fully controlled and regulated by Government. The autonomy of university is limited or delegated. This nature of control exists till today.

Lastly and seventhly, the Act empowered the Governor- General-in-Council to define the territorial limits of the universities.

The Act, 1904 received much reactions from various corners. Some prominent Indians weighed the Act that Government was trying to vest all power to the hands of European educationists (professors serving in the then Indian Universities). The greatest counter argument was that the Act was creating a situation so that Government might control universities closely and tightly.

The Act made some positive impact on Indian higher education. Incorporation of Section 3 of the Act made some qualitative improvement. Government began to serve the university system with public funds. For instance, the Government of India announced that they would make a grant of Rs. 5,00,000.00 a year for 5 years, for the improvement of collegiate education and universities. The first grant was sanctioned in 1904-05. and the total amount of Rs. 25,00,000.00 so given, Rs. 11,50,000.00 were allotted to universities for administration, inspection, traveling charges, the purpose of land and erection of buildings, and Rs. 13,50,000.00 were given to the Provincial Governments for improvement of colleges. Evidences show that although the grant of Rs. 5,00,000.00 a year was originally meant for five years only, it was later made a permanent recurring grant and a sum of Rs. 1,35,000.00 out of it was assigned for universities and the remaining amount was assigned to collegiate education.

The grant meant for collegiate education was divided amongst the provinces upon principles which took into account their population and the numbers of students in Arts colleges under private

management. As in the universities, these grants to collegiate education also materially assisted in improving the quality of colleges in general, better provision for hostels and the teaching of sciences.

Further, under the Act of 1904, regulations were framed by all universities for the recognition of schools if they desired to present pupils at the Matriculation examination conducted by that University. This control mechanism was, however, a new phenomenon.

Curzon did some job in the promotion of agricultural education. It was under his initiative a Central Research Institute at Pusa was established and laid down the principle that every important province in India must have its own fully staffed Agricultural College. He was to institute scholarship for sending Indian students for technological studies abroad.

Government Resolution on Education Policy (1913) -University Education

During the period from 1903 to 1913 England witnessed some fundamental problems with regard to University education there. The expert opinion came to the conclusion that universities required reorganization as federal type university system was not satisfactory for rapid growth of quality higher learning. These developments had their echo in India and Government had, therefore, to review the question almost within a decade of the passing of the Universities Act of 1904. Thus, another event was the government Resolution on Educational Policy (21 st February) of 1913. In the matter of university education this policy declared that for each Province, that teaching activities of universities would be encouraged, and that the colleges located in *mofussil* towns would be developed into teaching universities in due course. But no definite action along this line was taken for many reasons of which the outbreak of the Great World War most significant. The spirit of that policy is still acceptable.

The Calcutta University Commission (1917-19)

After the turmoil of the Great World War, in 1917 Government appointed the Calcutta University Commission. It is also known as Sadler Commission from its President, Dr. (later Sir) M.E. Sadler, the vice-Chancellor of the University of Leeds. The famous personalities included as member of this Commission were Sir, Asutosh Mookerji and Dr. (later Sir) Zia-uddin Ahmad. Although it deals with the Calcutta University only, the problems that it has studied are more or less common to other Indian universities.

The Commission suggested radical reform for secondary education as it is the bottom source of students to get entry to collegiate and university education system. Looking forward along this direction it recommends: the dividing line between the; university and secondary courses is more properly drawn at the Intermediate examination than at matriculation; Government, then, should

create a new type of institutions called the Intermediate Colleges which would be both academic as well as vocational in nature in the matter of course offering; and separate boards of Secondary and Intermediate education be established.

For reducing load of the University of Calcutta the Commission recommends :-

(i) a unitary teaching university should be established immediately at Dacca; (ii) the teaching resources of the Calcutta city should be pooled together with a view to the establishment of a teaching university at Calcutta; and (iii) the colleges in mofussil should be so developed as to make it possible to encourage the gradual rise of new university centers by concentrating of resources for higher teaching at a few points.

The Commission made the following general recommendations regarding University work.

- (i) The regulations governing the work of the universities should be made less rigid;
- (ii) Honours courses, as distinct from pass courses, should be instituted in the universities in order to make provision for the needs of abler students;
- (iii) Having regard to the comparatively backward condition of the Muslim community in regard to education, every reasonable means should be taken to encourage Muslim students and to safeguard their interests;
- (iv) The duration of degree course should be three years after the intermediate stage;
- (iv) Appointments to professorships and readerships should be made by special selection committees, including external experts;
- (vi) In view of the necessity for paying greater attention to the health and physical welfare of students, a Director of Physical Training, holding the rank and salary of a professor, should be appointed in each university, a Board of Student Welfare, including medical representatives, should be one of the standing boards or committees of each university; and efforts should be made to supervise the conditions of students' residence.

Further, the Commission made important recommendations with regard to female education, teacher training, professional and vocational education, etc.

Immediate Impact

The above three happenings during the period from 1902 to 1921, despite some complex political turmoil including partition of Bengal and other movements, India's higher education landscape witnessed rapid growth with the creation of some new universities after Calcutta University Commission. The number of universities in India increased from five in 1916 to 12 in 1921-22. The new universities were distributed over different provinces of then India. For example we may mention

the new universities as : Mysore University (1916), Patna University (1917), Banaras Hindu university (1915), Aligarh Muslim University (1920) Dacca University (1920), Lucknow University (1920), Osmania University (1918). Further, some restructuring was made of Allahabad University on Dacca University model in 1921. Not only had these had the universities begun to get liberal grants, though not rightly adequate, from Government. Some new Chair was created in some universities and eventually these universities received special financial grants.

Teaching work done by the universities varied. But the work of the affiliating universities took one or more of the three forms: (a) organization of special series of lectures by eminent men of learning, invited to visit the university from other parts of India or from abroad; (b) institution of university chairs in certain subjects (Economics, Sociology, etc); or (c) the establishment of honours schools or post-graduate classes directly conducted by the university. The delivery of lectures by eminent scholars was a particular feature of the work of the Calcutta, Punjab and Madras universities.

Another notable feature of this period was the great improvement of the standard of collegiate education which grew largely (about 350 in numbers). The colleges of this period were better staffed, better equipped, and better housed than those of the earlier period. The most important source of revenue to the colleges is that of fees as the number of students increased and the average fees per student per year increased from Rs. 57 (in 1901-02) to Rs. 84 in 1921-22. Similarly, the income from endowments and subscriptions increased considerably. Additionally, the colleges received grants from Governments. In 1921-22, the total Government expenditure on collegiate institutions of general education was Rs. 49.26 lakhs of which an amount of Rs. 15.28 lakhs was given as grant-in-aid to private colleges. Finally, it is sad to comment that the system of collegiate education developed some serious defects and became “*top-heavy, predominantly literary, and unhelpful for the industrial and commercial regeneration of the country.*” (Naik and Nurullah, p. 279)

Development of Higher Education from 1921-22 to 1936-37

This is a period of education under diarchy or the rule of the two Governments-Central and Provincial with the force of the Government of India Act of 1919. Education became a provincial subject. Education under diarchy faced difficulties to expand with the sudden cessation of financial assistance from the Central Government. But university and collegiate education grew and the concerned development witnessed the following events.

An Interuniversity Board was established in 1924 for making co-ordination among the universities. It became an integral part of the organization of Indian universities. New universities were created sequel to the Government Resolution on Education Policy, 1913 and the Calcutta University Commission (1917-19). The Delhi University, Nagpur university, Agra university and a unitary teaching

university at Chidambaram ill the name of Sir Annarnalai Chttiar. Appropriate changes were incorporated in the Acts of Madras university, Patna University and Allahabad University for improvement in the matters of administration, higher learning and research.

During this period universities underwent internal changes with regard to carrying out research work in larger scale. This had been done by (a) maintenance of libraries and research departments, (b) institutions of research degrees, (c) provision for scholarships and fellowships for research, and (d) university bulletins or publications. While generally appreciating these advances, the Hartog Committee (1929) pointed out several weaknesses that had crept into the organization of university education. It observed that the universities were not producing leaders of society both from the qualitative as well as quantitative points of view. It commented on lowering of standards due to indiscriminate admissions, poor work of secondary schools, and even competitions between universities. The Committee, therefore, strongly felt the need for making the university a more fruitful education space in India.

This period also witnessed the national education movement. The movement resulted in establishment of the Jamia Millia Islamia, Yidyapeeths of Gujarat, Bihar and Kashi, the Yiswa-Bharati, the Gurukul University, Darul-Uloom, Deoband, and Darul-Uloom Nadwatul Ulcma, Lucknow with some oriental approach to higher learning by private entrepreneurs.

Thus, during this period some advancement in higher learning was possible. Some internal adjustments within the officially established universities were also observed. In this way a foundation of university education became strong to test the tide of time. Even after independence the structure of new seats of higher education got workable cement to erect their parts.

Let us now see the main achievements of the period from 1921-22 to 1936-37

Table 4 : Number of H.E. Institutions from 1921-22 to 1936-37

Type of Institutions	Number of Institutions		Number of Scholars	
	1921-22	1936-37	1921-22	1936-37
Universities	10	15	–NA	9,697
Arts Colleges	165	271	45,418	86,273
Professional Colleges	64	75	13,662	20,645

Source : Naik and Nurralah. A Students' History of Education in India, p. 323

Higher Education under Provincial Autonomy (1937-47)

This is the last phase of development of higher education in British India. This period was very troublesome from the national as well as international point of views. The Government of India Act, 1935, marked a further step in the onward march to complete independence. It put an end to the inherently defective diarchical system of administration. This new system of governance, popularly known as Provincial Autonomy, came into operation in 1937 in eleven provinces of British India. The second World War also broke out in September 1939. These two events germinated many more conflicts and debate which shattered smooth official development of higher education although the progress was never stopped as general awakening among the people, the expansion of secondary education, the onward desire for higher education even among women and the socially backward classes.

Quantitatively this period witnessed expansion of university education and the number of students reading in the universities rose from 126,228 in 1936-37 to 241,794 in 1946-47. Thus, in the higher education map there were then 19 universities mostly teaching and affiliating type. But this expansion of university education was not adequate.

The Post-War Plan of Educational Development (1944) commonly called Sargent Report, pointed out certain serious defects in the state of the affairs of the Indian Universities. The greatest weakness was that university education did not link to life and society. rather examination centric . It also observed : “Indian Universities, as they exist today, despite many admirable features do not fully satisfy the requirements of a national system of education. The tutorial system should be widely extended and closer personal contacts established between teachers and students. The importance of establishing a high standard in post-graduate studies and particularly in pre and applied research should be emphasized. Step should be taken to improve the conditions of service, including remuneration of University and College teachers where those now in operation are not attracting men and women of the requisite caliber.”

This is the short *story* of development of higher (university and collegiate) education in British India.

Let Us Check Our Progress

1. Write down at least two forces that have contributed to the development of university (and collegiate) education in India under British rule.
2. What was the immediate impact of the Calcutta University Commission in the expansion of collegiate education in British India?
3. Why were the early universities in the early twentieth century of 'affiliating type' accept?—Explain in brief.

EDO-01
Fundamentals of Education and Research (Open Course)
Block-2
Psychology of Learning and Teaching

CONTENT STRUCTURE

Introduction

Objectives

2.1 : Introduction to Learning

2.1.1 : Concept & Nature of Learning

2.1.2 : Types of Learning

2.1.3 : Influencing Factors of Learning

2.1.3.1 : Attention

2.1.3.2 : Maturation

2.1.3.3 : Motivation

2.1.3.4 : Remembering

2.1.3.5 : Forgetting

2.2 : Theories and implication

2.2.1 : Classical Conditioning,

2.2.2 : Operant Conditioning,

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2.2.4 : Constructivism.

2.3 : Teaching

2.3.1 : Meaning and nature of teaching

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2.3.3 : Stages of teaching.

2.4 : Educational Technology

2.4.1 : Meaning and Nature,

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Let Us Sum Up

Assignments

Suggested Readings

INTRODUCTION

Learning occupies a very important place in our life. Most of what we do or do not do is influenced by what we learn and how we learn it. Learning, therefore, provides a key to the structure of our personality and behaviour. It is a vital part of education.

In this block, we shall discuss the concept, nature and various types of learning. You will learn different influencing factors of learning like attention, interest, maturation, motivation, remembering, forgetting etc. and their characteristics. You will also understand basic concepts about teaching and educational technology..

OBJECTIVES

After going through this unit you will be able to :

- estimate the concept of learning.
- write in own words the nature and types of learning.
- illustrate the conditions influencing learning.
- Describe various theories of learning.
- Understand the basic concepts of teaching and educational technology.

Block-2

Unit-1

Introduction to Learning

2.1.1 : CONCEPT & NATURE OF LEARNING

What is learning? How do we learn? These are some of the questions, which should be answered by each one of us. The answers to the questions provide us a sound basis for understanding the concept and nature of learning.

Now let us try to understand the concept of learning. Learning is a life-long process and universal in nature. It is not confined to human being only. In fact, all living creatures learn. Animals can learn simple acts whereas man is capable of learning very complex acts. Man is endowed with intelligence, reason and other higher mental processes and so learns the most. All living beings learn in their own ways. They learn by interaction with environment. As the human child comes in contact with the environment he starts reacting and in this process of interaction of the individual with the environment he starts reacting and in this process of interaction of the individual with the environment the foundations of learning are laid down. Throughout the life one learns something either formally or informally.

According to the psychologists' point of view it is a form of growth or change in an organism (human or nonhuman), which is manifested as new modes or patterns of behaviour. This change or modification especially in human being, shows itself as a skill, a habit, an attitude, an understanding, or as knowledge or an appreciation. Experience, direct or indirect as found to play a dominant role in moulding and shaping the behaviour of the organism from the very beginning. At any rate, an organism is not the same as it was before the learning. This kind of change or modification is termed as 'learning'. This change can be intentional, deliberate and controlled, or may take place without intention, in an uncontrolled haphazard manner. Thus, the psychologists look for evidence of learning in the changes that occur in organism's behaviours as a result of experience. But not all changes in behaviour are examples of learning. Behavioural changes that are the temporary results of things like fatigue or drugs don't illustrate learning. Similarly, changes that are mainly biologically determined, like physical growth or sexual maturation, or that result from injury or disease (especially of the brain and other parts of the nervous system), are not examples of learning.

Psychologists' Views on Learning

Many attempts have been made to define learning, yet a definition acceptable to all has not been evolved. The *behaviouristic psychologists* defined learning as a relatively permanent change in

potential for behaviour of an organism (human or nonhuman) that results from experience but is not due to fatigue, maturation, drugs, injury or disease. On the other hand, the *cognitive psychologists* explained learning as a process of change in the cognitive structure of the learner. Again the *constructivistic psychologists* declared that people learn best when they actively construct their own understanding.

However, various definitions given by different thinkers and psychologists help us in visualizing from different angles what takes place during learning. According to *Hilgard*, “Learning is the process by which behaviour is originated or changed through practice and training.”

Learning

According to behaviouristic psychologists, learning is the relatively permanent change in potential for behaviour of an organism (human or nonhuman) that results from experience and training but is not due to fatigue, maturation, drugs, injury or disease. For cognitive psychologists. It is the process of change in the cognitive structure of the learner.

For *Brook*, “Learning is a process of acquiring the ability to do something which the learner never did before.” *Munn* has also given a flexible definition that “Learning is more or less permanent incremental modification of behaviour which results from activity, special training or observation.” According to *Boaz*, “Learning is a process by which the individual acquires various habits, knowledge and attitudes that are necessary to meet the demand of life in general.” Again *Kimble* defined, “Learning is a relatively permanent change in behavioural potentiality that occurs as a result of reinforced practice.” *Commins* and *Fagin* have described learning as a sequence of mental events or conditions leading to changes in the learner.

On analyzing the above similar other explanations and definitions of learning, we can easily infer that :

- a. there are some general characteristics of learning; and
- b. there are various effective factors that influence learning.

Nature

If we analyse the definitions and interpretations of learning we can form some idea about the nature of learning. Thus, learning has the following nature and characteristics :

1. Learning is a life-long process.
2. Learning is growth through experience.
3. Learning is an relatively enduring change of behaviour, cognitive structure or knowledge.

Nature of Learning

Learning involves new ways of doing things, and it operates in an organism's attempts to overcome obstacles or to adjust to new situations. It represents progressive changes in behaviour to meet environmental requirements and enables the learner to satisfy interests to attain goals.

4. Learning is new/novel.
5. Learning is rather a process than a product.
6. Learning is based on readiness, interest, incentives, motivation etc.
7. Learning is not the changes as results of maturation, though learning cannot take place until maturation reaches respective stages.
8. Learning is both individual and social as well as formal and informal. It is the product of the environment.
9. It is organization of experience.
10. Learning in academic parlance is generally verbal in nature.
11. Learning is always goal-directed and purposive. Hence it is a planned and systematic process.
12. Learning affects the conduct of the learner. There is a change in the mental structure of the learner after every experience.
13. Learning is active & creative.
14. Learning is the outcome of the interaction of the individual with the total situation.
15. Learning is transferable.

From the overall point of view, we can say that learning is a process of self-activity, self-direction and self-realisation of man's highest potentialities. However, the nature of 'learning' as a construct seems complicated. Hence it is explained differently by different theories of learning.

Question :

Let Us Check Our Progress

Note : Verify your answer with those materials stated earlier of this Unit.

Define the term 'learning' with the help of definitions given by renowned psychologists.
Mention at least five chief characteristics of learning.

2.1.2 : TYPES OF LEARNING

We have discussed the nature of learning and defined learning as a process of bringing about the relatively permanent changes in the behaviour of an organism, which may be classified into a number of categories depending upon :

- (a) the domain or specific area of behaviour in which changes are introduced, or
- (b) in terms of the methods that are employed for the introduction of the behavioural changes.

If we follow *the former criterion*, learning can be classified as :

1. Cognitive learning (learning of concepts, principles, problem solving etc.)
2. Affective learning (learning of habits, interest, attitudes, appreciation etc.)
3. Learning of motor skills (eg. walking, dancing, swimming, typing etc.)

According to the *latter criterion*, we may categorize learning as :

- (a) Trial & error learning
- (b) Learning through classical conditioning
- (c) Learning through operant conditioning
- (d) Chain learning
- (e) Shaping
- (f) Learning through generalization
- (g) Learning through discrimination
- (h) Serial learning
- (i) Associate learning
- (j) Learning by imitation
- (k) Insightful learning and so on.

Right from birth through out our life-time, we learn many skills and with the passing away of time gradually we learn more complex skills to acquire the ability of various types of problems. Thus there is a gradual change from the simpler form of learning to the complex ones, like problem solving. There is no single way of acquiring all types of learning. If we understand how much each mode operates, we should be able to design our classroom teaching more effectively.

By taking into consideration a specific hierarchical order, Gagne (1970) has classified learning into the following types :

- (i) Signal learning
- (ii) Stimulus-Response learning
- (iii) Chain learning
- (iv) Verbal association learning
- (v) Multiple discrimination
- (vi) Learning of concepts
- (vii) Learning of rules/principles learning and
- (viii) Problem solving learning

Various types of such learning will be discussed in Unit-2 of this Module in proper context.

However, we are discussing here a few types of learning.

1. Verbal learning

Learning of this type helps in the acquisition of verbal behaviour. The languages we speak, the communication devices we use, are the result of such learning. Signs, pictures, symbols, words, figures, sounds and voices are employed by the individual as essential instruments for engaging in the process of verbal learning.

2. Motor learning

The learning of all types of motor skills may be included in this type of learning. Learning of swimming, riding a horse, driving a car, playing the piano, hitting a moving target, handling various instruments, drawing a geometrical design etc. are examples of such learning.

3. Trial & error learning

In many situations we learn by random trial and error. Here we make a number of attempts for a particular task or problem and find some attempts rewarding. The satisfying feeling of rewards strengthens particular stimulus-response connections while the unsuccessful attempts are stamped out through practice. This type of learning is based on Thorndike's theory of connectionism. In such a learning, the learner has to give a precise response to a discriminated stimulus. Eg. a dog leans to shake hands in response to a vocal stimulus provided by its master or by another friendly person.

4. Learning through classical conditioning

The basic phenomenon of this type of learning is simple one. A great variety of responses are classically conditionable in our daily life situations. Learning through classical conditioning may be defined as a process in which a neutral stimulus, by pairing with a natural stimulus acquires all

the characteristics of natural stimulus. Eg. A car horn blasts. A man jumps widely. The same man sees another car-a quiet one. He jumps widely again.

5. *Concept learning*

A concept in the form of a mental image denotes a generalized idea about things, persons or events. For example: our concept of 'tree' is a mental image that throws up the similarities or common properties of all the different trees we know. We will call a thing 'tree' when it has some specific characteristics, the image of which we have already acquired in our mind on account of our previous experience, perception or exercise of imagination. The formation of such concepts on account of our previous experience, training or cognitive processes is called concept learning. Concept learning proves very useful in recognizing, naming and identifying things.

6. *Problem solving learning*

Problem solving learning denotes a higher type of learning. This learning requires the use of the cognitive abilities like reasoning, thinking, power of observation, discrimination, generalization, imagination, the ability to infer, draw conclusions, experimenting, try out novel ways etc. Based on earlier experiences, coaching, training, formal or informal learning, acquisition of knowledge, habits, attitudes, interests etc., an individual may be motivated to reach an unknown target or to unfold the mystery of an unresolved problem.

7. *Serial learning*

Serial learning is a learning situation in which the learner is presented with learning material, which exhibits some sequential or serial order. Children encounter it often in school where they are expected to master lists of material such as the alphabet, multiplication tables, the names of all the states in their country or the names of the presidents in order etc.

8. *Paired-associate learning*

In this type of learning, learning tasks are presented in such a way that they may be learned by reason of their associations. The name of a place like *Krishnanagar* is remembered on account of its association with the name of Lord Krishna, Tista, a girl's name may become easy to remember in a paired association with the river Tista.

9. *Learning by imitation*

Living beings can learn a great deal by observing but they should also try to copy others for perfecting their performances and learning. Like observation, imitation is also an innate tendency of the individual to repeat the observed actions of others. In the beginning the child learns his movements, actions and gestures by imitation. Modeling includes imitation of special personalities such as a student imitates the activities immediately of the well-known cricketer Sachin Tendulkar.

10. Learning by Observation

Observation is a basic requisite for all kinds of learning. In the process of observation we not only take the help of our eyes alone (as for 'seeing') but we also use all our sense organs. We often use 'observation' in order to foster learning in our students. We may evoke interest in children by presenting concrete objects, illustrations, pictures, models etc., in class and may relate the topic to them.

11. Insightful learning

Most of the learning in human beings takes place not only through observation or imitation, but also by solving problems, which they come across in their day to day life. While solving a problem if an individual reaches the solution all of a sudden, we say that he has learned by insight. In fact, the person reaches the solution by understanding the relation between different elements of the problem situation. Insightful learning emphasized that human learning is always purposeful and goal-directed and is essentially based on one's cognitive powers. On the basis of different learning experiments, the cognitive psychologists concluded that

(i) a learner always perceives the situation in its totality or as a whole, (ii) analyses & evaluates all the relationships among various factors involved in the situation, and (iii) then, arrives at an insightful solution.

From the above discussion, we understand that learning can be classified into various categories. Psychologists differ in opinion regarding the types of learning process. To understand as to how human beings learn in different situations is, therefore, important for attaining competence in teaching.

Question :

Let Us Check Our Progress

Note : Verify your answer with those materials stated earlier of this Unit.

1. Name the different types of learning?
2. Give examples of the various modes of learning from classroom situations.
3. Define the term 'concept learning'.
4. Give an example of Trial & error learning.

2.1.3 : INFLUENCING FACTORS OF LEARNING

Learning, as you have studied, can be defined as a process of bringing relatively permanent changes in the behaviour of the learner through experience, activity or practice. An assessment of this definition may reveal that learning process is centered mainly on three elements :

- (a) The learner whose behaviour is to be changed or modified.
- (b) The type of experience or training required for modification in the learner's behaviour.
- (c) The men and material resources needed for providing desired experiences and training.

Therefore, the success or failure in the task of learning in terms of introducing desired modification in the behaviour of a learner would automatically depend upon the quality as well as control and management of the factors associated with the above- cited main elements. Learner is the key figure in any learning task. He has to learn or bring desired modification in his behaviour. How he will learn or what he will achieve, through a particular learning act depends heavily upon his own characteristics and ways of learning. Such factors associated with this can be described as follows :

- A. Physiological Factors**—Physical health, Nutrition, Age, Gender-difference, Defects in senseorgans, Handicappedness, Fatigue, Disease, Excited Physical condition etc.
- B. Psychological Factors**—Motivation, Maturation, Intelligence, Attention, Interest, Aptitude, Attitude, Readiness, Tension or Anxiety, Memorization, Imagination, Emotion, Mental Health, Conflict, Sentiment etc.
- C. Methodology of Instruction**—Use of Activity-centric or dynamic methods, Revision & Practice, Supply of properly planned sufficient learning materials, Feedback & Reinforcement, Utilization of maximum senses (sight, hearing, taste, smell, touch) etc.
- D. Environmental Factors**—Atmospheric Environmental Conditions like high or low temperature, nature of sunlight, noise etc., Social Environmental factors like competition, cooperation, imitation, praise & blame etc., and Educational & Economic status of the Family or Home.
- E. Genetic or Hereditary Factors**—Every child is born with certain potentialities or characteristics which are inherited from his parents at the moment of conception. Some children are very rich in hereditary endowment while others are very poor. Genetic or hereditary factors play an effective role in influencing the learning of an individual.

The process of learning is influenced by a variety of personal factors, a thorough knowledge of which will prove very helpful for teachers and parents in understanding and guiding their children's learning. Some of the personal factors that influence learning may be classified as internal (learner's physiological, psychological and genetic factors) and external (environmental factors & methodology of instruction).

From the above discussion, we may conclude that learning is affected by the total situation, which depends upon a number of factors. Some are external while some are internal. Among these

factors to the classroom situation, we may mention two important factors of *heredity* and *environment* (particularly home environment) of the learner. A classroom teacher can never change these factors. Our ability to learn and the rate of learning are conditioned by our *heredity*. *Home conditions* like bad ventilation, unhygienic living, overcrowding etc. affect the rate of learning and the general response of the learner. Physiological conditions also matter. *Physical conditions* like bodily weakness, chronic illness, malnutrition, fatigue, bad health etc. are a great hindrance in learning.

We are now discussing some of the important internal factors of the learner which influence learning effectively.

2.1.3.1 : Attention

We use the word ‘attention’ frequently in our day-to-day conversation. At a railway station or the other public places, announcements start with ‘your attention please’ before informing the passengers or other people about the schedules of the trains or some other matter of public interest. Thus attention is taken as a power, capacity or faculty of our mind, which can be turned on or off at will or something in kind or form that can be lent or given to this or that situation. Attention is closely related to the processes and products of learning. It refers to a deliberate and conscious effort on the part of an individual to select one out of the various stimuli present in his environment and bring it to the center of his consciousness in order to perceive it clearly to achieve a desired result. It is concerned with thought, feeling and action alike. When the mental energy is focussed on a particular object, one becomes vividly aware of it, which is called attention.

Some definitions provided by eminent authorities :

Valentine : “Attention is not a faculty of mind. It rather describes an attitude or activity of the mind.”

Ross : “Attention is the process of getting an object of thought clearly before the mind.”

Dumville : “Attention is the concentration of consciousness upon one subject rather than upon another.”

McDougall : “Attention is merely conation or striving, considered from the point of view of its effect on cognitive process.”

According to Ross (1951), attention may be classified in two categories:

- (i) **Involuntary attention**—This type of attention is aroused without the will coming into play and we attend to an object or an idea without any conscious effort on our part. Example : a mother’s attention to her crying child.
- (ii) **Voluntary attention**—Attention is voluntary when it calls forth the exercise of the will. Example : attention paid at the time of solving an assigned problem of mathematics.

Factors or Determinants of Attention

A. External Factors :

- (i) *Nature of Stimulus*—The most effective stimulus always capture our attention. A coloured picture attracts more attention than black & white ones. Among pictures of human beings, those of great personalities as also of beautiful women or handsome men attract more attention. Thus, the most effective stimulus should always be chosen by the teacher for capturing attention of his students.
- (ii) *Intensity & Size of Stimulus*—The stronger stimulus, in comparison to the weaker ones always attracts more attention. Our attention becomes more easily directed to a loud sound, a bright light, a strong smell or a large object.
- (iii) *Contrast, Change & Variety*—Change, variety and contrast attract attention more easily than sameness or regular routine. During teaching, the use of maps, charts or models by the teacher suddenly attracts the attention of the students. Again, for example, if all the LETTERS on this page were printed in capitals, the capitalized word in this sentence would have no greater attention-getting value than any other word. Contrast or change makes it more forceful. Novelty also attracts more attention.
- (iv) *Repetition of Stimulus*—We may ignore a stimulus the first time, but when it is repeated several times, it captures our attention. In a classroom, the particular point on which the teacher tries to draw the attention of the students is raised again and again. But too much repetition of a stimulus may bring diminishing returns.
- (v) *Movement of Stimulus*—A moving stimulus catches our attention more quickly than one, which is still.

B. Internal Factors :

- (i) *Interest*—Interest is very helpful factor in securing attention. A boy interested in cricket, will be more interested in watching a cricket match than football match being played at the same time. A wise teacher is able to draw the attention of his students by making his lesson interesting.
- (ii) *Motives*—Thirst, hunger, curiosity, sex, fear etc. are some of the important motives of an individual that exercise a definite influence upon attention. So motives or basic drives of an individual are very important in securing his attention.
- (iii) *Mind set*—Mind set means the tendency or bent of the whole mind. A person always attends to those objects towards his mind has set. On the day of an examination the slightest thing concerning the examination easily attracts the attention of the students.

Attention is a necessary condition for any mental task in the classroom and outside. In fact, it is the 'hub' of the entire teaching-learning process. Teacher has to do his best to make the students learn as to how attention could be secured. At the same time he has to create such conditions in the classroom, which enable him to make students attentive to learning.

2.1.3.2 : Maturation

Learning and maturation are closely interrelated and interdependent. Some psychologists defined the term 'maturation' in terms of behaviour change. Learning is directly dependent upon age and maturation. Mental age increases with the chronological age and ceases at about the age of sixteen years. Increase in age means intellectual maturation which helps in solving difficult problems. No learning can take place unless the individual is matured enough to learn. Some children can learn better at earlier age while others take more time to learn the same content.

Some eminent psychologists endorse the meaning of 'maturation' in following words :

McGoeth : "Maturation includes any change with age in the conditions of learning, which depends primarily upon organic growth factors rather than upon prior practice or experience."

Biggie & Hunt : "Maturation is a development process within which a person from time-to-time manifests different traits, the blueprints, which have been carried in his cells from the time of conception."

Thompson : "Maturation is a name for the growth process during which a structure or a function is more and more becoming adult that is, mature."

Critical Discussion :

From the above noted definitions, given by various psychologists, we may say that maturation involves changes that are associated with normal growth. It is relatively independent of activity, experience and practice. Learning, on the other hand, is a change in the individual that is not on account of genetic inheritance. It is a process, which takes place as a result of 'stimuli' from 'without'. Activity, experience and training lead to changes in behaviour in the process of learning. But sometimes it becomes difficult to determine definitely as to which of the behavioural change is the result of learning and which of the consequence of maturation. The most simple example is that of a child. The child learns to talk only when he reaches a certain stage or age in maturation. It is also equally true that he does not learn the language just because he attains the age. The language is taught to him. The language, which he learns is that which he hears. It is very clear that two processes-maturation and learning are closely related to each other. Maturation assists in the process of learning. Learning takes place only if the stage for that type of learning has been achieved through a process of maturation.

A teacher would be effective if he understands the complexity of the changes that take place as a result of both processes and the interaction between the two. The reverse would be harmful. For instance: the normal development of speech in the child would be disrupted if a child is forced to learn certain speech pattern before a certain maturation has occurred. On the other hand, failure to provide specific training in speech at the appropriate time may be a great educational error. Thus the principle of maturation warns us about the learning of specific contents or subjects on a child in his appropriate maturation stage.

Children learn best when they are mature enough and ready to learn; when they are motivated, attentive and interested in learning. Apart from these the learning of the children is also influenced by their memory system, which helps in acquiring, storing and reproducing information.

2.1.3.3 : Motivation

We see an athlete to rise quite early in the morning and regularly visit the track or field for continued practice irrespective of the odds of the seasons. Similarly a student may be seen to burn the midnight oil as the examination approaches. Now question arises what makes the athlete or the student behave in a particular manner? The answer to such questions on the why and how of behaviour lies in the key word ‘motivation’. They behave as they do because they are motivated to do so. *Motivation, thus may be regarded as something, which prompts, compels and energizes an individual to act or behave in a particular manner at a particular time for attaining some specific goal or purpose.* Motivation is the heart of learning process. Adequate motivation not only engages the student in an activity, which results in learning but also sustains and directs it. *G. M. Blair* stated that : “motivation is a process in which the learner’s internal energies or needs are directed towards various goal objects in his environment” and *T. W. Atkinson* said that : “the term ‘motivation’ refers to the arousal of tendency to act to produce one or more effects.” But questions arise : what exactly is responsible for the motivation of an individual? What are the real activating forces that pull and push an individual to move or act for achieving a specific goal?

Tremendous research has been conducted on motivation in the last six decades and a number of definitions and theories have been given to explain motivation. Some important theories of motivation and their educational implications will be discussed.

2.1.3.4 : Remembering or Memorization

Let us consider the case of Prof. Bhatia, a renowned mathematician who has the capacity to tell correctly, within seconds, the date & day of any year and any month, without any device or even the

paper and pencil. Though it is a rare capacity, still we are curious about what it is that helps him respond so promptly. The only answer scientists can attribute to this is his excellent mental imagery with a well-designed retrieval plan. All of us have the capacity to recall our past, remember a person, situation or place, act the way we have learned, and guide our future behaviour on the basis of what has been useful and purposeful to us in the past. It is possible only because we have *memory*. In psychological terms, the faculty of mind to store the past experiences or learning and to reproduce them for use when required at a later time is known as 'memory'. Memorization or remembering is the function of the mind by virtue of which it records, retains and produces ideas gained by its own activity. However the term 'memory' or 'memorization', cannot be viewed merely in terms of reproduction or retrieval of past experiences or learning. It is quite a complex process, which involves factors like learning, retention, recognition and recall. The process of memorization (or remembering), thus, begins with learning or experiencing something and ends with its revival and reproduction. Therefore, memorization is said to involve four major stages like : learning (acquisition), retention, recognition and recall.

Ryburn :

“The power that we have to ‘store’ our experiences, and to bring them into the field of our consciousness some time after the experiences have occurred, is termed as memory.”

Drever : “Memory is that characteristic which underlines all learning, the essential feature of which is reflection. In a narrow sense, it covers recall and recognition.”

Woodworth & Marquis : “Memory is a mental power which consists of learning, retaining and remembering what has previously been learnt.”

Kinds of Memory

Psychologists have tried to classify memory into certain types according to its nature and the purpose it serves, which are as follows :

Sensory or immediate memory is the memory that helps an individual to recall something immediately after it is perceived. In this type of memory, the retention time is extremely brief-generally from a fraction of a second to several seconds.

Short-term memory is also temporary, though not nearly as short-lived as immediate memory. This type of memory is the phase of information processing during which information from the sensory register is stored, and held for as long as 30 seconds (Shiffrin & Atkinson, 1969).

Long-term memory is the relatively permanent memory store in which we hold information even when we are no longer attending to it. It has a seemingly limitless capacity to store information, undergoes little or no decay, and requires little or no rehearsal.

Episodic memory is connected with the specific episodes and events. Events that are personally experienced, e.g., our first day of flying or seeing a battle are stored in the episodic memory. The meaning of words, rules for using them in thinking and communication (language), etc., are stored in the Semantic memory.

Photographic memory stands for a kind of memory possessed by an individual who can remember a scene in photographic detail.

When we prepare to write something, we retrieve a programme for writing from the **Motoric memory** (Singer, 1978) that guides our writing movements. As we see someone we know, we retrieve some kind of feeling towards the person from the **Affective memory** (Zajone, 1980).

2.1.3.5 : Forgetting

We frequently hear the expression: “I’m sorry, I have forgotten”. The power of long retention and rapid reproduction (recall & recognition) makes for a good memory. It counts towards the success of an individual in the task of learning or remembering. Forgetting on the other hand, contributes towards failure. “I have forgotten” implies that I have failed to retain or have been unable to recall what was learned or experienced by me earlier. In this way, forgetting is just the opposite of remembering and is essentially a failure in the ability to reproduce experienced or studied material.

Let us see how the eminent writers scientifically define ‘forgetting’.

Some definitions provided by eminent authorities :

Drever : “Forgetting means failure at any time to recall an experience, when attempting to do so, or to perform an action previously learned.”

Munn, et al : Forgetting is “failing to retain or able to recall what has been acquired.”

Morgan, et al : “Forgetting from long-term memory refers to the apparent loss of information that has already been stored.”

Types of Forgetting

Forgetting may be broadly classified as *natural & morbid forgetting*. In *natural forgetting*, forgetting occurs with the lapse of time in a quite normal way without any intention of forgetting on the part of the individual, while in *morbid or abnormal forgetting*, one deliberately tries to forget something.

According to another view, forgetting may be categorized as *general & specific*. In *general forgetting*, one suffers a total loss in one’s recall of some previous learning, while in *specific forgetting*, the individual forgets only one or other specific parts of his earlier learning.

According to other view related to the cause of its occurrence, forgetting may be classified as *physical* or *psychological*. When a person loses his memory on account of his physical factors

likeage, disease, biological malfunctioning of brain or nervous system etc. it is termed as *physical forgetting*; while loss of memory occurs on account of psychological factors like anxiety, stresses, conflicts etc. the resulting forgetfulness is termed as *psychological*.

Munn and his associates advance five different views of forgetting, such as : the absence of adequate stimulation, the mere passage of time, interference, obliteration of the memory trace and repressive forgetting.

Causes of Forgetting

Natural forgetting can be properly explained through the theory of *trace decay*, which holds that we forget on account of decay of the memory traces with the lapse of time. The *repression theory* is held to be more applicable to explaining morbid forgetting. According to this theory, we forget the things we do not want to remember by burying them in our unconscious. According to the *theory of interference*, we forget things because of the interference of other things. *Proactive* inhibition occurs when earlier learning interferes with the later learning. *Retroactive* inhibition is the result of later learning coming in the way of earlier learning.

Question :

Let Us Check Our Progress

Note : Verify your answer with those materials stated earlier of this Unit.

1. Mention any four factors, which influence learning.
2. Give an example of interrelation between learning and maturation.
3. What are the internal factors of attention?
4. Mention the various types of forgetting and name at least three causes of forgetfulness.

LET US SUM UP

To sum up we can say that learning is a process that brings relatively permanent changes in behaviour of a learner through activity, experience or practice. It can be classified into specific categories like trial & error, conditioning, insightful learning, chain learning, concept learning, verbal learning etc. As its outcomes it helps in bringing desirable modifications in behaviour, attaining teaching-learning objectives, achieving proper growth and development, seeking balanced development of personality and proper adjustment and realizing the goals in life. Understanding of the nature of learning process helps us in solving the problems related to the educational processes.

Learning is affected by so many factors that may be broadly classified as those associated with learner, the type of learning experiences provided to the learner, and the men and material resources

available for learning. Actually learning is influenced by the individual's psychological and physiological states, his environment and methods of learning.

ASSIGNMENTS

1. Write an essay on the nature and concept of learning.
2. Discuss briefly the psychological factors of a learner influencing learning. Which factors are the most important?—Give reasons.
3. What do you mean by 'problem solving learning' and 'learning by insight'?
4. "Attention and Interests are said to be inter-related." Explain this statement and bring out the meaning of both.
5. Analyse memory. State the different types of memory. Can it be improved?
6. In what ways is human information processing both similar to, and different from, computer information processing?—Discuss.
7. Illustrate the processes involved in each phase of information processing.

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Block-2

Unit-2

Learning Theories and implications

2.2.1 : Classical Conditioning

Classical conditioning is most associated with Ivan Pavlov (1849-1939), a Nobel Prize (1904) winning Russian physiologist. As learning science lore would have it, Pavlov was working with dogs on a series of digestion experiments when he noticed peculiar patterns to the dog's salivation. The digestion experiments would begin with a research assistant presenting meat or meat powder to the dog, resulting in salivation (which was then collected in vials and measured). Eventually, however, during the experiment the dog began to salivate as the result of the mere presence of the research assistant, in the absence of the any meat or meat powder. This observation led to Pavlov's creation of the classical conditioning model of learning. Pavlov discovered that he could condition the dog to salivate to any of a number of stimuli, such as a bell or tuning fork, by associating the bell or tuning fork stimuli with the meat or meat powder. This discovery was important in that it demonstrated that a simple reflex could be controlled. The generalization was that if a simple reflex or behavior could be controlled, then perhaps a more complex behavior could also be controlled. Also, Pavlov's work revealed the potential benefit of using laboratory experiments in the pursuit of the understanding of learning and behavior.

The essence of Pavlov's classical conditioning is the association of a neutral stimulus with a previously conditioned or naturally conditioned stimulus and response. Specifically, imagine that you are working and your schedule has been very busy. You have missed lunch and are now leaving work at 4:30. As you are leaving the building you smell someone else's dinner as they microwave it. What happens? You begin to salivate and your hunger increases.

It is important to note that not all smells would elicit the salivation response, only those that you associate with food, and those smells that you associate with foods that you like generally will elicit the greatest response. For Pavlov, the important associate to make is between the smelling and eating, since the salivation follows as a natural response.

2.2.1.1 : Educational Implications of Pavlov's Classical Conditioning

Classical conditioning is often overlooked in education, yet it can explain and provide the rationale for some very powerful behaviors. Teachers are always looking for ways of modifying student behavior and increasing desirable actions, and classical conditioning can help.

1. Students should be active, behavioral participants, in learning situations. If an instructor's goal is for students to exhibit certain behaviors (e.g., case analysis) then the teacher should have the students actively involved in those and similar behaviors. Nothing begets behavior, like behavior; to learn to write, one must write.

2. Student practice of learning tasks is essential. The strength and usefulness of practice cannot be understated. We will see throughout the various learning theories that practice is paramount in the learning of a behavior. For classical conditioning, practice strengthens the CS-US bond, which is the essence of learning.

3. Teachers should be consistent. Consistency is the most important variable in associative learning. The more consistent an instructor is in running his or her classroom and dealing with his or her students, the quicker and the stronger the CS-US association occurs.

4. Teachers should assist students in being successful. Success is a powerful US. Instructors should be cognizant of making associations with success. It should be noted, however, that instructors should strive to create challenging and meaningful successes for their students, not easy and meaningless successes.

5. The classroom should be a safe (i.e, non-judgmental, risk-taking) environment. A safe environment serves as a large scale US. If the environment is safe, and students feel good about the environment (UR), then those activities (CS) that get associated with the environment are more likely to be liked.

6. Students should practice anxiety-producing situations (e.g., presentations, public speaking). When students practice anxiety-producing situations in a safe environment, the students are more likely to begin associating the anxiety-production situations with positive feelings. These positive associations will then facilitate future performance.

7. Instructors need to pay attention to what events are being paired with what learning tasks in their classrooms.

2.2.2 : SKINNER'S OPERANT CONDITIONING THEORY OF LEARNING

The theory of B.F. Skinner (1903-1991) is based upon the idea that changes in behaviour are the result of an organism's response to events (stimuli) that occur in the environment. A response produces a consequence (event that follow an action) such as pressing a key or button, defining a word, hitting a ball, or solving a math problem. When a particular Stimulus-Response (S-R) pattern is reinforced or rewarded, the organism is conditioned to respond. For example : when a dog is taught a trick, it is usually rewarded by food or by patting after it makes the appropriate behaviour.

The distinctive characteristic of Skinner's System relative to previous forms of behaviorism (e.g., Thorndike, Pavlov, Hull) is that the organism can emit responses instead of only eliciting response due to an external stimulus. The organisms actively 'operate' on their environment to produce different kinds of consequences. These deliberate actions are called 'operants'. An operant is an act, which constitutes an organism's doing something, e.g., raising the head, walking about, pushing a lever etc. The learning process involved in operant behaviour is called operant conditioning because we learn to behave in certain ways as we operate on the environment. Conceptually, we may think of a behaviour as sandwiched between two sets of environmental influences : those that precede it (its antecedents) and those that follow it (its consequences) (Skinner, 1950). Research in operant conditioning shows that operant behaviour can be altered by changes in the antecedents, the consequences or both.

Concept of Reinforcement and Reinforcer

A reinforcer is the stimulus the presentation or removal of which increases the probability of a response being repeated. In this type of conditioning, reward or reinforcement is not possible unless the response is emitted. Skinner recognizes two kinds of reinforcers—positive and negative. A positive reinforcer is any stimulus such as food, water, sexual contact etc. the introduction or presentation of which increases the likelihood of a particular behaviour. In the educational context, praise, grades, medals or other prizes awarded to students are examples of positive reinforcers. A negative reinforcer is any stimulus such as electric shock, loud noise etc. the removal or withdrawal of which increases the likelihood of a particular behaviour. In the educational context, one example may be a teacher's saying to the students that whoever does drill work properly in the class would be exempted from homework. Negative reinforcement is often confused with punishment. The process of reinforcement (positive or negative) always involves strengthening the behaviour. But punishment, on the other hand, involves decreasing or suppressing behaviour.

Skinner proposes two types of responses and hence learning : Type-S and Type-R

The voluntary (and generally goal-directed) behaviour, emitted by a person or an animal is called operant behaviour and the process of learning that plays a part in learning such behaviour is termed as operant conditioning. In operant conditioning, voluntary behaviour is strengthened or weakened by consequences (events that follow an action) or antecedents (events that precede an action) and a reinforcer is anything that strengthens the occurrence of such desired behaviour or response.

Schedules of Reinforcement

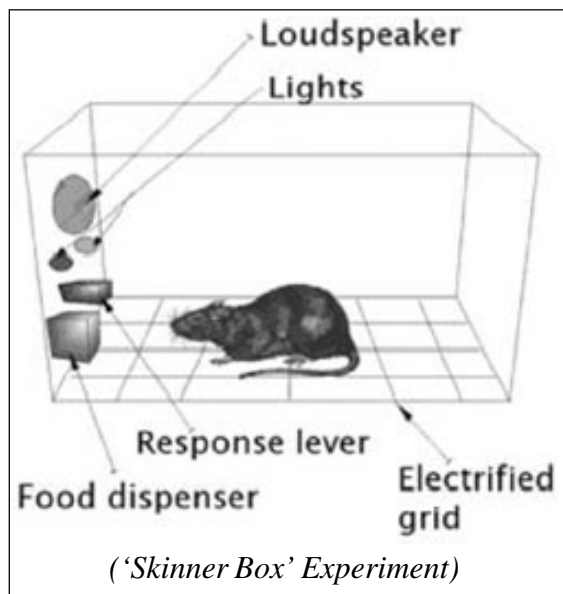
Skinner put forward the idea of planning of schedules of reinforcement for conditioning the operant behaviour of the organism. Some important schedules are :

- ❖ **Continuous Reinforcement Schedule**—it is an arrangement of providing reinforcement after every correct response.
- ❖ **Fixed Interval Reinforcement Schedule**—in this schedule the organism is rewarded for a response made only after a set interval of time, e.g., every 3 minutes or every 5 minutes.
- ❖ **Fixed Ratio Reinforcement Schedule**—in this schedule the reinforcement is given after a fixed number of responses.
- ❖ **Variable Reinforcement Schedule**—when reinforcement is given at varying intervals of time or after a varying number of responses, it is called a variable reinforcement schedule. In this case, reinforcement is irregular.

The concept of schedules of reinforcement and their applications in the educational schemes are regarded as the platform for Educational Technology.

Skinner's Experiments on Operant Conditioning

To demonstrate his theory of learning, in one of his earlier experiments, Skinner placed a hungry rat in a 'box' (known as 'Skinner Box'). The darkened soundproof box has a grid floor, a system of light or sound produced at the time of delivery of a pellet of food in the food cup, a lever and a food cup. It is arranged so that when a hungry rat presses the lever, the feeder mechanism is activated, a light or a special sound is produced and a small pellet of food is released into the food cup. For recording the observations of the experiment, the lever is connected to a recording system, which produces a graphical plotting of the number of lever presses against the length of time the rat is in the box. In this experiment, pressure on the bar in a certain way by the rat could result in the production of a click and



emergence of a food pellet. The click sound acted as a cue or signal to the rat that if it were to respond by going to the food cup, it would be rewarded. The lever pressing responses having been rewarded, the rat repeated it and was again rewarded, which further increased the probability of the repetition of the lever pressing response and so it continued.

Skinner used pigeons also as subjects where the operant investigation was pecking at a spot that acted as a key to trigger the reinforcement (food grains).

Based on the findings of his experiments, Skinner concluded that “*behaviour is shaped and maintained by its consequences. It is operated by the organism and maintained by its results.*”

Entire Programmed Learning is based on Skinner’s learning theory.

Mechanism of Operant Conditioning

Several processes are involved in the process of operant conditioning. Some of the important operations are :

- ❖ **Shaping** : Shaping refers to the judicious use of selective reinforcement to bring certain desirable changes in the behaviour of the organism. The basic process in shaping is successive approximation to the desired behaviour.
- ❖ **Chaining** : ‘Chaining’ refers to a process in the shaping of behaviour and the learning of a task where the required behaviour or task is broken down into small steps for its effective learning and subsequent reinforcement.
- ❖ **Discrimination and Cueing** : Discrimination, in Skinner’s theory may be defined as a process of using cues, signals or information to determine when behaviour is likely to be reinforced and/or punished.
- ❖ **Generalization** : ‘Generalization’ refers to the ability of an organism dealing with the perception of, and response to, similar stimuli.

Educational Implications

1. Learning objectives should be defined very specifically in terms of behaviours.
2. Objectives should be arranged in order of simple to complex.
3. The learning or training process and environment should be so designed as to create the minimum frustration and the maximum satisfaction in a learner to provide him with proper reinforcement for the desired training or learning.
4. The principle of operant conditioning may be successfully applied in behaviour modification.
5. For developing motivation in the students for classroom work, reinforcers like praise, blames, grades etc. should be used.
6. In the classroom, the principle of immediacy of reinforcement is beneficial.
7. Proper use of positive and negative gestures also serves as reinforcers to work.
8. Great care should be taken for the proper planning of the schedules of reinforcement so that the possibility of extinction of the desired behaviour is resisted.

9. Operant conditioning experiments suggested appropriate alternatives to punishment, in the form of rewarding appropriate behaviour and ignoring inappropriate behaviour, for its gradual extinction.
10. In its most effective application, the theory of operant conditioning has contributed a lot to the development of teaching machines and programmed learning.

Discussion : The principles originating from operant conditioning have revolutionized the training and learning programmes. As a result, mechanical learning in the form of teaching machines and computer-assisted instructions have taken root in place of usual classroom instruction. Some limitations in the Skinnerian model related to learning-performance distinction, observational learning, and linguistic outlooks proposed by Chomsky.

Question :

Check Your Progress 2

1. How Hull's concept of reinforcement is different from that of Skinner?
2. List any four educational contributions of Hull's theory of learning.
3. Mention the various schedules of reinforcement.
4. Indicate the main principles of Skinner's theory of learning.

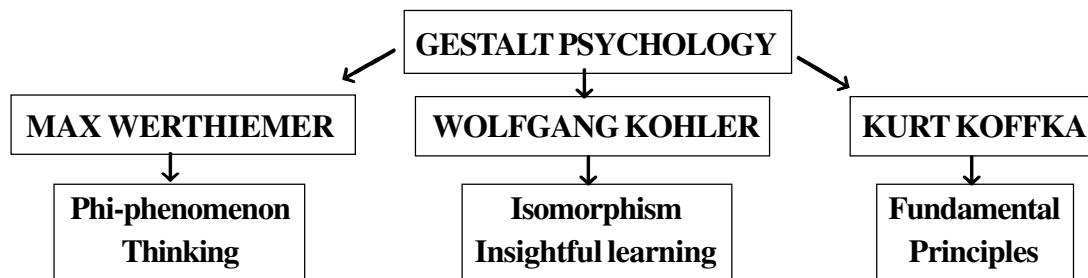
2.2.3 : GESTALT THEORY

“Gestalt” is a common German word, meaning “shape” or “form.” Often “pattern” conveys the idea. For psychological use, “configuration” has been suggested as an English equivalent, and the Gestalt psychologists are sometimes called the “configurationists.”

This School of thought was founded about 1912 by Max Wertheimer, a German psychologist. Wertheimer was highly influenced by the views of great philosopher Immanuel Kant on how we perceive the world, Wertheimer started experiments on apparent motion known as ‘phi-phenomenon’. During the 1930's, Wertheimer and two colleagues, Kurt Koffka and Wolfgang Kohler, took the Gestalt movement to the United States. Gestalt psychologists believed that human beings and other animals perceive the external world as an organized pattern, not as individual sensations. For example, a film consists of thousands of individual still pictures, but we see what looks like smooth, continuous movement. The German word Gestalt means pattern, form, or shape. It technically signifies “unified whole” or “configuration”. Unlike the behaviourists, the Gestaltists believed that behaviour should be studied as an organized pattern rather than as separate incidents of stimulus and response. The familiar saying that “The whole is greater than the sum of its parts” expresses an important principle

of the Gestalt movement. In the later years, they conducted so many experiments in order to explain the nature of perceptual field of human beings. Consequently, a good number of laws and principles had been generated with such scientific values that had the potentials to pave the solid ground of a new stream of psychology called cognitive psychology.

Have a look on the Gestalt psychology and its contributors —



Max Wertheimer as a founder of Gestalt psychology started a series of experiments on phi-phenomenon. Later, with Koffka and Kohler, it gradually extended its research in the broader field of cognition like perception, thinking and learning. The essential point of gestalt is that in perception the whole is different from the sum of its parts.

2.2.3.1 : Gestalt Theories By Fundamental Psychologists

These psychologists were the most important representatives of Gestalt Theory. Their ideas continue to be revised and inspire new theories today.

Sl. No.	Psychologists	Contributions
1.	Wolfgang Köhler	Founded this movement with Koffka and Wertheimer. His main contribution was learning by discovery and maintains that this process is active and dynamic. He showed that chimpanzees try to solve problems by trial and error. After several failures in tasks such as reaching for food, the primates with whom he experimented seemed to reflect on the solution until they found it. In fact, they were then able to extrapolate it to similar new situations.
2.	Max Wertheimer	The phenomena phi or apparent movement is its most revolutionary discovery. It consists in the perceiving movement from the succession of

Sl. No.	Psychologists	Contributions
3.	Kurt Koffka	different fragmented images. For example, it happens when we perceive the succession of film frames as if it were a real movement. His contributions were elementary in several fields. He studied memory, learning, perception and also applied Gestalt to fields such as child psychology. It emphasized the need to consider mental processes from a holistic point of view. He also helped Wertheimer in his research on the apparent movement by becoming involved as a subject.
4.	Kurt Lewin	He was not one of the founders of Gestalt Theory. However, he was a prominent social psychologist who brought the ideas of Gestalt to this area. His study was more focused on motivation and psychosocial intervention using Gestalt.

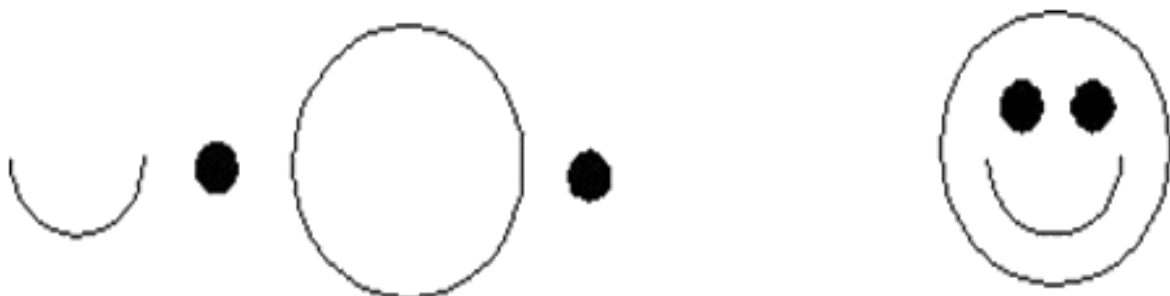
2.2.3.2 : Basic Tenants Of Gestalt Psychology :

This psychological view broke with the orthodox psychology of its time. It rebelled specifically against Wundt, and more generally against associationism, that system of psychology which had come down from the seventeenth and eighteenth centuries and which largely, though by no means completely, dominated psychological theory in the nineteenth century. The basic assumptions of this school are being discussed below :

i) Gestalt Psychology Stresses Organized Wholes :

The Gestalt psychologist approaches this matter with the idea that the face must be taken as a whole. Of course, to get any results, he has to consider something besides the mere totality of the face; he has to consider parts in a way; but he considers them in relation to the total.

If you follow the figure drawn below you will understand how *the whole is different from the sum of the parts*—



Accordingly, Gestalt psychology is based itself on the following two theoretical principles—

- Principle of totality-the conscious experience must be considered globally because the nature of mind demands that each component be considered as part of a system of dynamic relationships.
- Principle of psychophysical isomorphism-a correlation exists between conscious experience and cerebral activity.

ii) Gestalt Studies of Sense Perception :

The Gestalt psychologists have gone on to the view that much of our experience which had been regarded as built upon sensation by higher mental processes is really included in sensation. Consider the apparent size of seen objects.

For example, if a man moves away from you from a distance of ten feet to a distance of twenty feet, his optical image upon the retina diminishes to half its first dimensions, yet he looks about as large as before.

iii) Against the stimulus-response conception :

Gestalt psychology dislikes the stimulus-response conception. It objects, first of all, to the idea that behaviour can properly be analysed into stimulus-response units. This objection is in accordance with its general objection to atomism in psychology.

iv) Insight is the essential part of Learning :

According to Gestalt Psychology, Insight is the very Essential in Learning. Gestalt psychologists fully as eager to scrap the older—though not really old—descriptions of behaviour as to leave behind the older way of describing conscious experience. Nowhere are they more radically at issue with previously accepted doctrines than on the theory of learning.

2.2.3.3 : SOME IMPORTANT IDEAS OF GESTALT SCHOOL

Based on the above principles, the following methodological ideas are defined :

Phi-Phenomenon Thinking :

The discovery of the phi phenomenon is attributed to **Max Wertheimer**. The **phi phenomenon** is a perceptual illusion in which a disembodied perception of motion is produced by a succession of still images. The phi-phenomenon is when we see a row of lights flash in sequence, like on a theatre marquis, and instead of seeing a static light going on and off we perceive the light as moving.

Near about 100 years ago, Wertheimer published his paper on phi motion—perception of pure motion, without object motion—which many consider to be the beginning of Gestalt psychology as an important school of thought.

- **Isomorphism Insightful Learning :**

The term Isomorphism literally means sameness (iso) of form (morphism). In Gestalt psychology, Isomorphism is the idea that perception and the underlying physiological representation are similar because of related Gestalt qualities.

One aspect of Gestalt is *phenomenology*, which is the study of how people organize learning by looking at their lived experiences and consciousness. Learning happens best when the instruction is related to their real life experiences. The human brain has the ability to make a map of the stimuli caused by these life experiences. This process of mapping is called “isomorphism.”

- **Gestalt Laws of Perception**

Gestalt psychology, in the early years, was primarily concerned with the study of perception. Wertheimer ‘s discovery of the Phi Phenomenon established certain principles related to perception. With the toy stroboscope, Wertheimer noted “... That two slits in a screen lighted up a fraction of a second apart, produced the illusion of movement. “ This is the same principle upon which the motion pictures of today are produced. A series of still pictures are flashed in rapid succession, at a constant rate of speed upon a screen. Of course, no movement takes place, only the illusion of motion is given. Watson explains the difference between the PHI Phenomenon theory and the existing theories of perception that were popular in Wertheimer ‘s day :

Wertheimer argued that the apparent movement generated in his experiment had no counterpart in the sensory elements. Local sensory stimulation cannot be responsible for the actually perceived phenomenon. Hence, a general re-evaluation of the-basic nature of perception seemed necessary to him.

Gestalt basic grouping principles

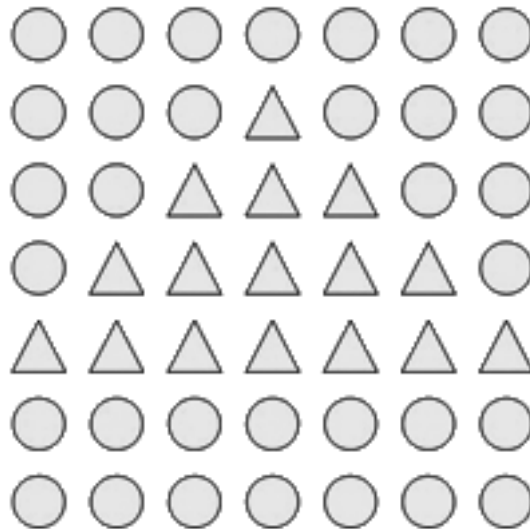
Gestalt theory starts with the assumption of active grouping laws in visual perception. These groups are identifiable with subsets of the retina. We shall talk in the following of points or groups of points which we identify with spatial parts of the planar rough percept. In image analysis we shall identify them as well with the points of the digital image. Whenever points (or previously formed groups) have one or several characteristics in common, they get grouped and form a new larger visual object, a gestalt. Gestalt psychologists developed five laws that govern human perception :

- **Law of Proximity**-Spatial or temporal proximity of elements may induce the mind to perceive a collective or totality. Elements that are closer together will be perceived as a coherent object.

In the pictures left ones appears to be three horizontal rows, while on the right, the grouping appears to be columns.

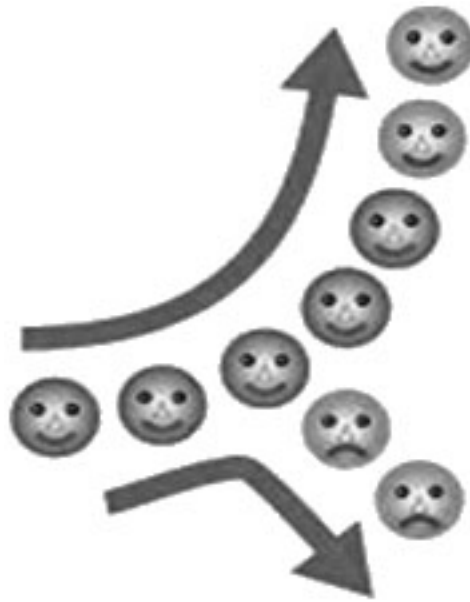


- **Law of Similarity**-According to Fisher and Smith-Gratto (1998-99) similar objects will be counted as the same group and this technique can be used to draw a viewer's attention. The principle of similarity states that elements with similar properties (e.g., brightness, contrast, colour, texture) are more likely to group than elements that differ on these dimensions.

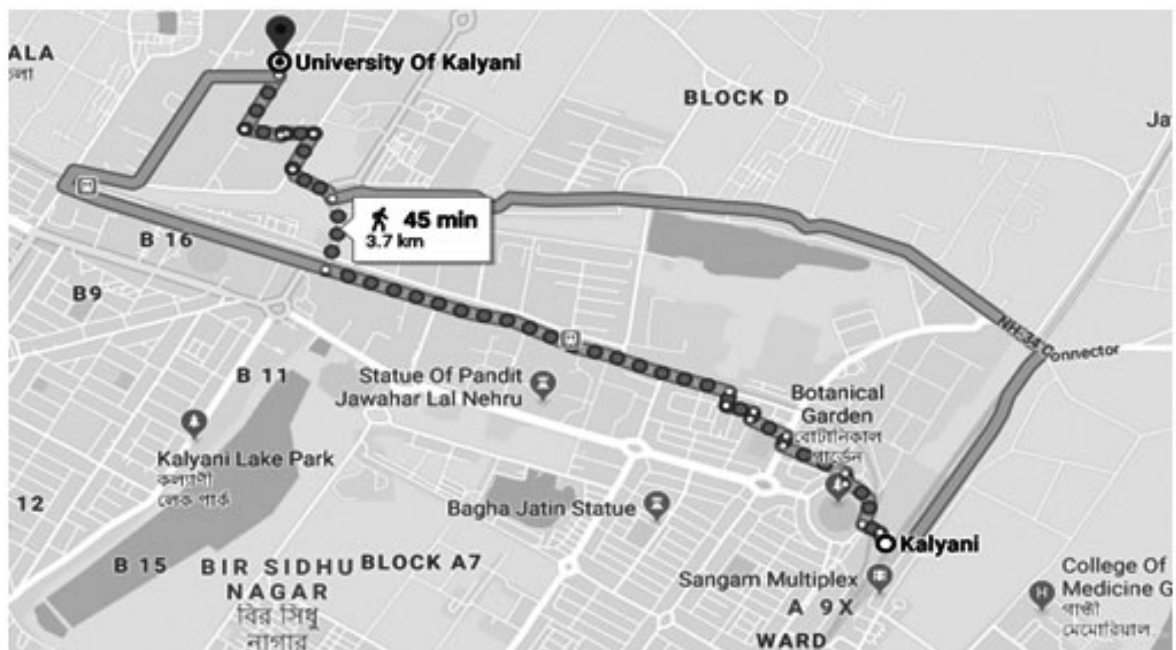


The human eye tends to build a relationship between similar elements within a design. There seems to be a triangle in the square. It states that the law of similarity is the tendency to perceptually group similar items and objects together. Gestalt psychology focuses on how we perceive individual items as a whole.

- **Law of Good Continuation**-A third Gestalt principle is good continuity : We prefer to see contours based on smooth continuity instead of abrupt changes of direction. humans tend to perceive things in good form. We prefer to ignore the abrupt changes in an image we are seeing. Generally speaking, we pay more attention to the characteristics of a stimulus that allow us to perceive a smooth continuity.



For better understanding, here is a screenshot of Google Maps walking directions. Rather than a series of blue dots, we perceive this as a single line.



We also understand we are to physically walk in the direction of this “line”. Nothing in the interface explicitly tells us that the dotted line indicates direction. A small icon of a person walking and the blue dots create the idea of momentum and direction. People tend to draw a good continuous

line. Continuation is the eye's instinctive action to follow a direction derived from the visual field (Fultz 1999).

- Law of Closure-humans tend to enclose a space by completing a contour and ignoring gaps in the figure



We tend to see complete figures even when part of the information is missing. Our minds react to patterns that are familiar, even though we often receive incomplete information. This is a survival instinct, allowing us to complete the form of a predator even with incomplete information.

- **Law of Prägnanz**-The fundamental core of gestalt perception is the law of prägnanz (German for pithiness) which says that we tend to order our experience in a manner that is regular, orderly, symmetric and simple. In attempts to discover refinements of the law of prägnanz, a stimulus will be organized into as good a figure as possible. Here, good means symmetrical, simple, and regular. This is the most basic rule of Gestalt.



Fultz (1999) defined prägnanz (good form) thus : “A stimulus will be organized into as good a figure as possible.” The above figure appears to the eye as a square overlapping triangle, not a combination of several complicated shapes.

- **Law of Figure/Ground**-a stimulus will be perceived as separate from its ground. Figure–ground organization is a type of perceptual grouping which is a vital necessity for recognizing objects through vision. In Gestalt psychology it is known as identifying a *figure* from the *background*.

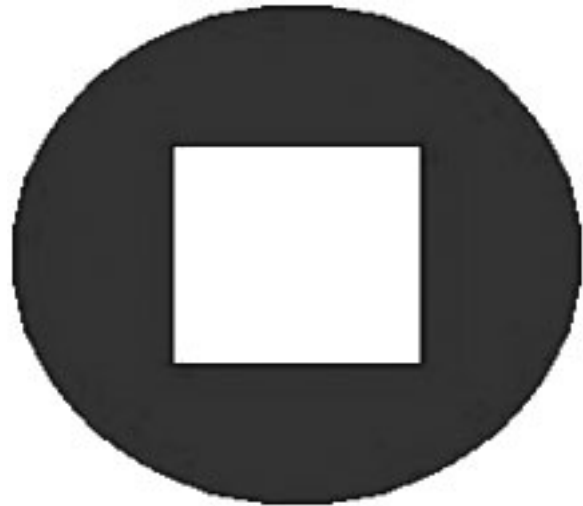
The above figure appears to the eye as a square inside a circle, or as a donut shaped circle with a square hole.

(all figures are collected from various websites)

Above discussed laws not only apply to images, but to thought processes, memories, and our understanding of time.

Regarding thinking and learning, Gestalt psychology considered two concepts—

- **Productive thinking** - Productive thinking is insight-based reasoning. Wertheimer argued that only insightful reasoning could bring true understanding of conceptual problems and relationships. when a problem is solved through insight. Productive thinking involves producing a new organization of a problem’s elements, as in the insight solutions of Koehler’s chimpanzees.
- **Reproductive thinking**-Reproductive thinking applies past solutions to new problems. Reproductive thinking is associated with repetition, conditioning, habits or familiar intellectual territory.



Gestalt psychology is an attempt to understand the laws behind the ability to acquire and maintain meaningful perceptions in an apparently chaotic world. The central principle of gestalt psychology is that the mind forms a global whole with self-organizing tendencies.

2.2.3.4 : CRITICISM OF GESTALT THEORY

Their ideas are still successful, but they are not spared from critics. Some experts consider their perceptual organizational approaches to be vague and ambiguous. In addition, other professionals claim that their experiments were not scientific enough.

On the other hand, Gestalt therapy is blamed for its individualism. They propose that each person finds his or her own path in isolation rather than deepening his or her social side. This can lead to selfish behaviour. However, its followers claim that we need to discover ourselves first in order to connect with others afterward.

There are different approaches to psychology and we cannot determine who is right. Even so, it is possible to combine different perspectives in order to elaborate more complete and integrative explanations.

2.2.3.5 : EDUCATIONAL IMPLICATIONS OF GESTALT THEORY

According to gestalt psychology, an individual has insight into a learning situation to the extent that he is able to understand the situation as a whole. A solution to a problem is an example of insight that results from integration of all the mental processes. All the higher learning takes place by this method. The concept of gestalt psychology has contributed in education from various aspects, some of those are as follows :

1. ***From Whole to Parts*** : Insightful learning actually advocates comprehensive learning. Without understanding higher type of learning is not possible, and understanding is only possible if the learner seeks out the organized whole pattern among several relations of the parts. The teacher should present the subject matter as a whole to facilitate insight learning.
2. ***Integrated Approach*** : According to Gestalts, the most general principle of learning is 'Pragnanz' or the goal-directed tendency to restore the equilibrium. Similarly, all principles of perception are active in learning. While planning curriculum, gestalt principles should be given due consideration. A particular subject should not be treated as the mere collection of isolated facts. It should be closely integrated into a whole.
3. ***Importance of Motivation*** : In Gestalt learning, motivation and goal are synonymous. To develop insight and thereby to reach the goal, the learner needs one thing, i.e., intrinsic motivation. For higher mental activities like problem-solving, intrinsic motivation is the essential condition. Hence, the teacher should arouse the child's curiosity, interest and motivation. He should gain full attention of the whole class before teaching.
4. ***Emphasis on Understanding*** : It has made learning an intelligent task requiring mental abilities than a stimulus-response association. So the learner must be given opportunities for using his mental abilities.
5. ***Problem Solving Approach*** : This theory emphasizes that as the learner is able to solve problems by his insight, meaningful learning, learning by understanding, reasoning, etc. must be encouraged in the school.

6. **Checking of Previous Experiences** : As insight depends upon the previous experiences of the learner, the teacher must check the previous experiences of the child and relate them with the new learning situation.

7. **Goal Orientation** : As learning is a purposeful and goal oriented task, the learner has to be well acquainted with these objectives. He should be fully familiar with the goals and purposes of every task.

Above discussion reveals the fact that Gestalt psychology contributes to the nature and conditions of **effective learning and productive thinking**. Complex problems require higher learning and solutions are reached only by application of insight. All new ideas and concepts, inventions and discoveries are the result of insightful learning.

Gestalt learning means that learning is concerned with the whole individual and arises from the interaction of an individual with his situations or environment. Through this interaction emerge new forms of perception, imagination and ideas which altogether constitute insight. The school has made Effective contributions to the study of learning, nature of thinking, and in the field of perception.

Questions :

Let us review the topic by self questioning—

Let Us Check Our Progress

1. Who are the Gestalt psychologists?
2. What do you mean by the term 'Gestalt'?
3. What is isomorphism?
4. What is Figure-ground?
5. What is Pragnanz?
6. Point out the main areas of education where the Gestalt psychology has contributed to.
7. Explain the term 'perception' according to Gestalt view.

2.2.4 : CONSTRUCTIVISM

Concept of Constructivist Approach to Learning

The constructivists believe that “learners construct their own reality or at least interpret it based upon their perceptions of experiences, so one’s knowledge is a function of one’s prior experiences, mental structures, and beliefs that are used to interpret objects and events.” (Jonasson, 1991).

The *constructivist approach* to teaching and learning is based on a combination of a subset of research within cognitive psychology and a subset of research within social psychology. The Constructivist school of thought attempts to link learning with situational variables such as, emotions, environment, social status and anticipated consequences. The idea is that designers and teachers cannot teach anyone, they can only present information and then the learner creates his or her own meanings or constructs.

Major Principles of Learning derived from Constructivism

Constructivism is a theory about learning, not a description of teaching. Learners construct knowledge for themselves. Each learner individually constructs meaning as he or she learns. There are nine general principles of learning that are derived from constructivism. These principles are :

- ❖ *Learning is an active process in which the learner uses sensory input and constructs meaning of it.*
- ❖ *People learn to learn as they learn.*
- ❖ *Physical actions and hands on experience may be necessary for learning, especially for children; but if not sufficient; we need to provide activities, which engage the mind as well as the hand. Dewey called this reflective activity.*
- ❖ *Learning involves language.*
- ❖ *Learning is a social activity.*
- ❖ *Learning is contextual.*
- ❖ *One needs knowledge to learn.*
- ❖ *Learning is not instantaneous, rather activity driven.*
- ❖ *The key component to learning is motivation.*

How Constructivism Influences Education

- ❖ *Curriculum* : Constructivism calls for the elimination of a standardized curriculum. Instead, it promotes using curricula customized to the students' prior knowledge. Also, it emphasizes hands-on problem solving.
- ❖ *Instruction* : Under the theory of constructivism, educators focus on making connections between facts and fostering new understanding in students. Instructors tailor their teaching strategies to student responses and encourage students to analyze, interpret, and predict information.
- ❖ *Assessment* : Constructivism calls for the elimination of grades and standardized testing. Instead, assessment becomes part of the learning process so that students play a larger role in judging their own progress. It calls for continuous assessment tools.

Types of Constructivism

We have already discussed in the first part of this Unit that there are, however, two major strands of the constructivist perspective. These two strands, ***cognitive constructivism*** and ***social constructivism*** are different in emphasis, but they also share many common perspectives about teaching and learning.

In the next section we shall discuss only Piaget's cognitive constructivist and Vygotsky's social constructivist theories of learning.

2.2.4.1 : PIAGET'S COGNITIVE CONSTRUCTIVIST THEORY

An Outline/Overview

Jean Piaget (1896-1980) was one of the cognitive psychologists who had a great influence on the theory of constructivism. Piaget's fundamental insight was that individuals construct their own understanding; learning is a constructive process. According to Piaget, at every level of cognitive development, the students are actively engaged in the learning process. You have already learned that the four developmental stages suggested by Piaget are : (i) *sensori-motor stage* (from birth to about 2 years), (ii) *pre-operational stage* (from 2-7 years), (iii) *concrete operational stage* (from 7-11 years), and (iv) *formal operation stage* (about 12-15 years). Piaget's constructivism was based on his view of the psychological development of children. In his words : "Knowledge is not a copy of reality. To know an object, to know an event, is not simply to look at it and make a mental copy or image of it. To know an object is to act on it. To know is to modify, to transform the object, and to understand the process of this transformation, and as a consequence to understand the way the object is constructed." (Piaget, 1964).

"The focus of Piaget's theory is the various reconstructions that an individual's thinking goes through the development to logical reasoning" (Green & Gredler, 2002).

Piaget's theory has two major parts : an "ages and stages", which predicts what children can and cannot understand at different ages, and a "theory of development" that describes how children develop cognitive abilities (Chambliss, 1996). Piaget's theory of cognitive development suggests that humans cannot be "given" information that they automatically understand and use; they must "construct" their own knowledge through experience. Experience influences thinking and thinking influences knowledge. Experiences allow them to create mental images in their head. Cognitive constructivist theories focus on both what students learn and the process by which they do so (Fosnot, 1996).

Main Ideas/Themes

1. *People cannot know an objective reality.* Rather they construct their own subjective understanding of their experiences, interpreting everything in light of what has already been experienced and learned.

2. *Knowledge is subjective.* No two people have the same experiences, physiologies or environments; therefore, no two people will construct the same knowledge.

3. *The knowledge of two people can be said to be “taken-as-shared”* to the extent that their constructions seem to function in the same way in given situations.

4. *Knowledge is constructed through the process of adapting to the events and ideas one experiences.* A major influence on the cognitive constructions we build is experiencing conflict. Piaget stated that *cognitive conflict* leads to *cognitive disequilibrium*. People want to resolve the conflicts, and in doing so, engage in reflective abstraction about the conflict. As a result, existing knowledge structures are reconstructed and new knowledge structures are constructed.

5. *“Readiness to learn” has a different meaning for cognitive constructivists.* For cognitive constructivists, individuals are ready to learn about a concept when their cognitive constructions are able to incorporate some aspects of the concept.

These five central tenets describe the general idea of Piaget’s cognitive constructivism. Let us now discuss Piaget’s theory of constructivism in a nutshell.

To formalize the theory of cognitive constructivism, Jean Piaget articulated mechanisms by which knowledge is internalized by learners and he suggested that through processes of *assimilation* (incorporating or fitting new information into existing *schemas* and *schemas* are mental systems or categories of perception and experience) and *accommodation* (altering or modifying existing schemas or creating new ones in response to new information), individuals construct new knowledge from their experiences. When individuals assimilate, they incorporate the new experience into an already existing framework without changing that framework. This may occur when individuals’ experiences are aligned with their internal representations of the world, but may also occur as a failure to change a faulty understanding. According to this theory, accommodation is the process of reframing one’s mental representation of the external world to fit new experiences.

As shown in the following figure, *cognitive conflict* leads to cognitive disequilibrium (the ‘out-of- balance’ state that occurs when a person realizes that his/her current ways of thinking are not working to solve a problem or understand a situation). Humans seek to resolve the conflicts, and in doing so, engage in reflective abstraction about the conflict. In other words, they think about things they don’t understand. As a result, existing knowledge structures are reorganized i.e., reconstructed and new knowledge structures are constructed. *Adaptation* is essentially this process of moving

from a state of *disequilibrium* to a state of *equilibrium*. In sum, assimilation & accommodation account for developmental change in schemas. A third possibility is that students respond to the cognitive conflict with *avoidance*, frustration, and abandonment of the effort to think. And since no two people have exactly the same experiences, no two cognitive constructions are the same (though they may be similar enough to be taken-as-shared for a specific situation).

Cognitive constructivism is based on two different senses of “construction.” Firstly, on the idea that people learn by actively constructing new knowledge, not by having information poured into their heads. Secondly, constructivism asserts that people learn with particular effectiveness when they are engaged in “constructing” personally meaningful artifacts (e.g. computer programmes, animations).

Applicability of Cognitive Constructivism in Classroom

The following guidelines were developed by Brooks & Brooks (1993), which are useful for the teachers in thinking about how to adopt a constructivist approach in their classroom :

Teacher should :

- (i) pose problems of emerging relevance to students.
- (ii) structure learning activities around primary concepts.
- (iii) seek and value students’ point of view.
- (iv) adapt curriculum to address students’ current understandings.
- (v) assess student learning in the context of teaching.

Additional Suggestions of Piaget

1. The role of the teacher and the classroom environment are important parts of Piaget’s theory. The role of the teacher is to provide a classroom full of interesting things to encourage the child to construct their own knowledge and to have the ability to explore.

2. Piaget promoted discovery-based learning. He advised the teachers to promote discovery learning, and for this teachers need to provide classroom environments that are rich in stimulation, complexity, and objects like interesting books, animals or pets, puzzles, musical instruments, etc. and students should be engaged in different **hand-on activities**.

3. According to Piaget, children differ in their rates of cognitive development and for this reason; all the children are not intellectually ready to learn the same lesson at the same time. To be sensitive to differences in students’ readiness to learn, teacher should plan learning activities for individual student or for small group of students rather than for the whole class.

4. Piaget suggested that all **students need to interact with teachers and peers** in order to test their thinking, to be challenged, to receive feedback, and to watch how others work out problems.

Discussion : We see from cognitive constructivism that internal processes such as Piaget's organization (ongoing process of arranging information and experience into mental systems), assimilation and accommodation direct knowledge construction. New knowledge is abstracted from old knowledge. Knowledge is not a mirror of reality, but rather an abstraction that grows and develops with cognitive activity. Exploration and discovery are more important than teaching.

2.2.4.2 : VYGOTSKY'S SOCIAL CONSTRUCTIVIST THEORY

An Outline/Overview

In recent decades, constructivist theorists have extended the traditional focus on individual learning to address collaborative and social dimensions of learning.

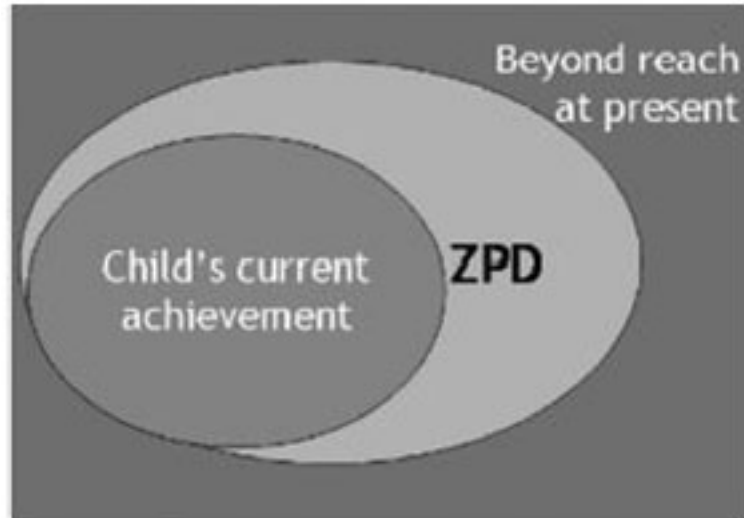
Social constructivism is a theory developed by psychologist Lev Vygotsky (1896-1934). Vygotsky's theory is very similar to Piaget's assumptions about how children learn, but Vygotsky places more emphasis on the social context of learning. Also, in Piaget's theory, the teacher plays a limited role where as in Vygotsky's theory the teacher plays a very important role in learning. We call Vygotsky's brand of constructivism social constructivism because he emphasized the critical importance of culture as well as language development and the importance of the social context for socio-cultural development. Vygotsky's theory emphasizes the role in development of cooperative dialogues between children and more knowledgeable members of society. Children learn the culture (ways of behaving & thinking) of their community through these interactions. Social constructivism argues that students can, with help from teachers or adults or children who are more advanced, master concepts and ideas that they cannot understand on their own.

Let us analyze and assess the main themes of Vygotsky's theory of constructivism.

Basic Themes & Principles Propagated by Vygotsky

6. *Social Interaction* : The major theme of Vygotsky's theoretical frame work is that social interaction plays a fundamental role in the development of cognition. Vygotsky (1978) states : "Every function in the child's cultural development appears twice : first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological)." In other words, higher mental processes appear first between people as they are co-constructed [a social process in which people interact and negotiate (usually verbally) to create an understanding or to solve a problem] during shared activities. Then the processes are internalized by the child.

7. *Zone of Proximal Development (ZPD)* : Vygotsky introduced the “zone of proximal development” (ZPD), which he defined as the area where the child cannot solve a problem alone but can be successful under adult guidance or in collaboration with a more advanced peer. This is the area where instruction can succeed, because real learning is possible. Full development of the ZPD depends upon full social interaction.



8. *Assisted learning and Scaffolding* : Vygotsky’s theory suggests that *assisted learning* or guided participation in the classroom requires *scaffolding*—giving information, prompts, reminders, and encouragement at the right time and in right amounts, and then gradually allowing the students to do more and more on their own. *Scaffolding* means support for learning and problem solving. The support could be clues, reminders, breaking the problem down into steps, providing an example, allowing revisions, asking questions, giving detailed feedback or anything else that allows the student to grow in independence as a learner. Scaffolding not only produces immediate results, but also instills skills necessary for independent problem solving in future.

9. *Language Development* : Vygotsky thought that language is a primary form of interaction through which adults transmit to the child the rich body of knowledge that exists in the culture.

Social constructivism suggests that students construct their knowledge through interacting with their peers, teachers, adults, and their contextual setting. When the child is presented with a preformed concept from the adult world, they will only memorize what the adult says about the idea. The child then works out their own ideas from the generalization that they have already introduced to. Vygotsky felt that the students need to be guided by adults, but he also thought that it was very important for the student to be influenced by their peers as well as discover things on their own.

These major themes describe the general idea of Vygotsky’s social constructivism. Let us now discuss Vygotsky’s theory of constructivism in brief.

According to Vygotsky, knowledge reflects the outside world as filtered through and influenced by culture, language, beliefs, interactions with others, guided discovery, direct teaching, models and coaching as well as the individual's prior knowledge. Because his theory relies heavily on social interactions and the cultural context to explain learning, most psychologists classify Vygotsky as a social constructivist. But during analyzing his theory, we see that he was primarily interested in the cognitive development within the individual. We observe that Vygotsky's concept of the zone of proximal development—the area where a child can solve a problem with the help (scaffolding) of an adult or a more adult peer—has been called a place where culture and cognition create each other (Cole, 1985). Culture creates cognition when the adult uses tools and practices from the culture (language, maps, computers, looms, or music) to steer the child toward goals the culture values (reading, writing, weaving, dance). Again cognition creates culture as the adult and child together generate new practices and problem solutions to add to the cultural group's repertoire (Serpell, 1993).

Vygotsky's Ideas about A Constructivist Classroom and a constructivist Teacher

All classrooms in which instructional strategies compatible with Vygotsky's social constructivist approach are used don't necessarily look alike. The activities and the format can vary considerably. However, four principles are applied in any **Vygotskian classroom** :

1. Learning and development is a *social, collaborative activity*.
2. *The Zone of Proximal Development* can serve as a guide for curricular and lesson planning.
3. School learning should occur in a *meaningful context* and not be separated from learning and knowledge children develop in the "real world".
4. *Out-of-school experiences* should be related to the child's school experience.

Creating a constructivist classroom requires that the classroom teacher must be in position to :

1. influence or create motivating conditions for students,
2. take responsibility for creating problem situations,
3. foster acquisition and retrieval of prior knowledge, and
4. create a social environment that emphasizes that attitude of learning to learn.

A constructivist teacher has to guide and not tell and he should create a context for learning in which students can become engaged in interacting activities that encourages and facilitates learning. The teacher does not simply stand by, however, and watch children explore and discover. Instead, the teacher may often guide students as they approach problems, may encourage them to work in groups to think about issues and questions, and support them with encouragement and advice as they tackle problems, adventures, and challenges that are rooted in real life situations that are both interesting to the students and satisfying in terms of the result of their work.

Additional Vygotsky Suggestions :

- 1. Curriculum**–The curricula should be designed to emphasize interaction between learners and learning tasks.
- 2. Instruction**–Scaffolding–where the adult continually adjusts the level of his or her help in response to the child’s level of performance–is an effective form of teaching.
- 3. Assessment**–Assessment methods must take into account the zone of proximal development. Assessment methods must target both the level of actual development and the level of potential development.

Remarks : A social constructivist learning intervention is thus an intervention where contextualised activities (tasks) are used to provide learners with an opportunity to discover and collaboratively construct meaning as the intervention unfolds. Learners are respected as unique individuals, and instructors act as facilitators rather than as teachers.

Types of Instruction of Social Constructivism through Uses of Technology

Below are a few examples of the way information technology can support social constructivist teaching and learning :

- ☐ Telecommunication tools such as e-mail and the Internet provide a means for social interaction through which students can talk with other students, teachers, and professionals in communities far from their classroom.
- ☐ Networked writing program provides a unique platform for collaborative writing.
- ☐ Simulations can make learning meaningful by situating something to be learned in the context of a “real world” activity such as running a nuclear power plant, writing up “breaking” stories for a newspaper, or dealing with the pollution problems of local waterways.

Discussion : We feel that the social constructivist theory developed by Lev Vygotsky, is relatively more effective way for the child to learn. Social constructivism promotes increased social interaction and discussion in the classroom, both between teachers and students and between students. As we have seen in this theory that knowledge is constructed through the interaction of internal (cognitive) and external (environmental and social) factors. However, to the teachers and school managers, this theory poses much challenges.

Comparative Analysis between the Two Theories of Constructivism

There is a great deal of overlap between Piaget’s cognitive constructivism and Vygotsky’s social constructivist theory but there is also a great deal that is different. Vygotsky saw knowledge as being imparted by experienced adults or teachers who would inform or teach the inexperienced. In this way the young child was seen as an apprentice. This is in contrast to Piaget’s view where the young

child was seen as a little scientist, inventing knowledge for him-self or her, unaided. You are also supposed to think of comparison of these two systems to a greater extent.

Question :

Check Your Progress 5

1. Mention at least four general principles of learning, which are derived from constructivism.
2. What is the basic difference between the two types of constructivism?

Block-2

Unit-3

Teaching

INTRODUCTION

Teaching refers to a system of acts performed by a teacher. The main aim of teaching is to facilitate learning. There are different modes of teaching. This Unit shall try to familiarize you first about the meaning of teaching. Then it will discuss different modes of teaching-conditioning, training, and teaching. These terms are somehow related to each other. Here we will discuss the meaning of each term and their relationships. The nature of subject matters varies. Each matter does not demand same level of teaching. There are different stages of teaching. This Unit will highlight different levels of teaching. It also highlights the three stages of teaching. Go through the Unit systematically and compare each level or stage with another for better understanding.

OBJECTIVES

By the end of this Unit you will be able to :

- define and explain the meaning of teaching
- explain the meaning of levels of teaching
- discuss the nature, effective strategies, merits and limitations of each level of teaching
- correlate different levels of teaching
- explain the meaning of stages of teaching
- describe the activities of each stage of teaching
- correlate different stages of teaching

2.3.1 : MEANING OF TEACHING

Before you start this Unit, ask yourself “what is teaching?” Stop, think now read the following : The term ‘teaching’ is not so easy to define. If you consider a layman’s point of view, the probable meaning is like that : an occupation or profession of a community called teachers, or an activity or activities undertaken to help an individual to learn something. One of the interesting accounts of teaching is provided by Paul Hirst (1973) : A teaching activity is characterized by its intention not by its overtly observable features. The intention of all teaching activities is that of bringing about learning.

The concept of teaching is totally unintelligible without the concept of learning. There is no such thing as teaching without the intention to bring about learning. Burton in this context has said “Teaching is the simulation, guidance, direction and encouragement of learning.” Some other definitions are given below :

N. L. Gage : Teaching is a form of interpersonal influence aimed at changing the behaviour potential of another person.

B.O. Smith puts : “Teaching is a system of action involving an agent, an end in view and a situation including two sets of factors—those over which the agent has no control (class size, size of classroom, physical characteristics of pupils, etc.) and those which he can modify (ways of asking questions about instruction and ways of structuring information or ideas gleaned”.

Thus, we may find three elements in this definition of teaching. : (1) Teaching is a system of action; (2) Teaching is directed at a goal; and (3) Teaching occurs in situation comprising the controllable and uncontrollable sets of factors. Consequently, the skill in teaching behavior is exhibited in terms of the extent to which a person called ‘teacher’ is fluent in manipulating the factors such as presenting of information, asking of questions, and providing of reinforcement or feed-back. Smith asserts that the above definition of teaching is merely ‘descriptive’ not ‘normative’.

Teaching as a concept poses difficulty in understanding its nature and periphery of human actions what a person called ‘teacher’ does. T.H. Green asserts that “we can not understand teaching if we study it simply as species of human action. It must be viewed as a species of human action; that is, not simply as behavior confronting to some laws or generalizations of action. In short, it is not simply norm-conforming; it is a norm obeying”. Thus, he concludes, “Teaching is an instance of human action aimed at enhancing the human capacity for action” He also advises us to think of teaching as continuum which comprises training, indoctrinating, conditioning, and instructing, which, according to him are modalities of teaching. [You will get this idea later in this Unit]

If we make a close study of numerous definitions coined by various experts we may bring out the following qualities in the concept of ‘teaching’

1. Teaching is a system of acts or actions.
2. Teaching is aimed at changing others or causes learning in others.
3. The core of teaching act is interaction between teacher, pupils and a piece of subject matter.
4. Teaching involves an influence orientation.
5. Teaching does not just occur, rather it is planned and an implementation set of activities in an inter-action setting.

6. The verbal action—use of language at various levels—constitutes the predominant feature of teaching act.
7. The critical attribute of teaching act involves ‘reasoning’ and an enlightened analysis of facts.
8. Teaching constitutes different modes.
9. Teaching, sometimes is conceived as a rational process driven by some planned activities.
10. Teaching occur at different phases or stages, though teaching is a continuum
11. Teaching generally linked with learning some kinds.

Let Us Check Our Progress

1. Identify and list factors associated with teaching.
2. Develop and write down your own definition of teaching.
3. Teaching enhances the human capacity for action.-Explain with suitable examples.

2.3.2 : LEVELS OF TEACHING

Teaching-learning situations are of diverse nature. Teaching may be done at different levels depending on the characteristics of the content. The teaching situations may be put along a continuum ranging from thoughtless to ‘thoughtful’ level. According to different psychologists (like Bigge, Hunt), the levels of teaching can be divided into three categories :

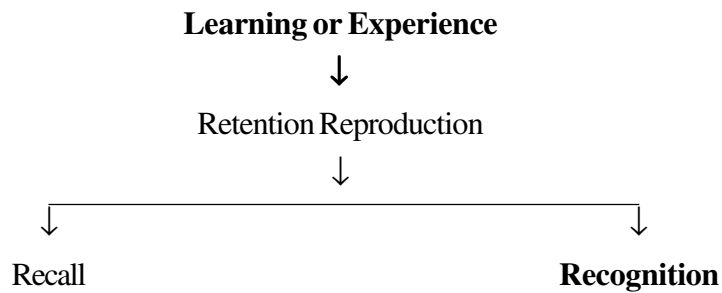
- I. Teaching at Memory level
- II. Teaching at Understanding level
- III. Teaching at Reflective level.

In the above classification, memory level is the most thoughtless and reflective level is the most thoughtful. The understanding level falls in between. It requires thoughtful behaviour in a moderate reasonable amount.

Let us understand about each level of teaching in detail.

2.3.2.1 : Memory Level of Teaching

Memory is a measure of the individual’s ability to recall or recognize and associate previously learned materials. Memory level involves the following phases—



If we examine our traditional teaching as it is carried out we find that in majority of the cases it operates at memory level. M.L. Bigge has defined this level as that type of teaching “which supposedly embraces committing factual materials to memory and nothing else.” This is the lowest level of teaching. It emphasizes on memorization of factual information. Here, the teacher gives factual material which the learner memorizes it without understanding the inner meaning of the content. This type of teaching seems to be based on either mental discipline theory which emphasizes the importance of vigorous exercise for the development of mental faculties or S-R conditioning theory of learning in which bondage is formed between the stimuli and response without involving any purpose.

Teacher’s Role—Here, teacher is more active and authoritarian. Teacher controls each and every aspect of teaching learning process. This level is too much teacher centered.

Student’s Role—Here, students are merely a receiver of knowledge. They have no freedom or opportunity to gain learning experiences by their own initiative. They get little scope to interact with teacher in this level of teaching. Students have a passive role in this level. Maturation of the learner at this level is purely extrinsic.

Suggestions for effective memory-level teaching :

Teaching should be presented from whole

to part. Spaced revisions should be made

All parts of the content should be well integrated and sequenced.

Frequent recall of the content should be demanded.

Rhythmic repetition is very useful.

Fatigue should be avoided.

Sufficient drill and practice should be there for retention.

Merits :

1. This level is suitable for small children
2. It is quite helpful in teaching learning activities related to understanding and reflective level.
3. Teacher gets full freedom for realizing and achieving the goal.

Demerits :

1. It provides no scope for higher cognitive abilities.
2. Teacher-student relationship is not developed properly due lack of interaction.
3. It creates a problem of class control and securing attention of students.
4. Total responsibility of the teaching-learning falls on the shoulder of teacher.
5. Students face difficulties in selecting the information as they can not understand or apply the knowledge.

2.3.2.2 : Understanding Level of Teaching

This level of teaching represents relatively a high level as compared to memory level of teaching. M.L. Bigge and M.P. Hunt have mentioned two aspects of understanding level :

Seeing the relationship between a generalization and particular between principles and solitary facts.

When a person sees what something is for, he understands it.

It may be said that when the students are able to find out the whole relationship between the items or when the students have been able to make out a sense from given material, understanding has taken place. This level demands students thought processes and cognitive activities. Teacher at this level, develops competency among students to recognize and explain principles and provides opportunities to develop intellectual behaviour among them.

H.C. Morrison has developed a detailed procedure for teaching at understanding level. According to him, understanding means seeing relationship and reaching certain generalization and their uses in life situations, and comprehension means mastery of the subject matter. He suggested that each subject should be divided into units. Each unit should present specific understanding with such thoroughness that mastery is achieved by most students. A unit is never completed until almost all students thoroughly understand it. Each unit should be developed according to the following sequences—

Exploration—teacher should explore what the students already know about the context by testing, questioning or discussion. This helps the teacher and learner to arrange the content in psychological order. This step helps teacher to direct the teaching learning situation.

Presentation—Then teacher should present a new material briefly. Unit II all students have fully understood the material no new material is not presented.

Assimilation—Here the learners make thorough study of the topic. The activity is highly individualized work in classroom, library, laboratory or field trip under the supervision of the teacher. At the end of each unit, the learner is tested by a mastery test to show how far he has grasped the meaning of the content.

Organization—In this step, students are asked to reproduce the essentials or the basic concepts of the unit in writing without taking any external help.

Recitation—Here, each student presents a summary, gist or condensed version of the understanding by oral presentation to his/her class fellows or teacher. This can also be in the form of a written paper.

Teachers' Role : At this level teacher should be a democratic leader and should be cautious enough to see that she does not drift into becoming an authoritarian teacher. Flexibility, dynamism, human touch, understanding, patience and faith in the learners are the qualities absolutely necessary for a teacher to teach at understanding level of teaching.

Students' Role : Students' role is not passive as in the case of memory level of teaching.

Students remain active in this level and constantly developing new knowledge. The source of motivation is not only extrinsic but also intrinsic. The students have to interact with the framework set up by the teacher. However, the main human factor involved in this level is the teacher, who is the key of this level.

Suggestions for effective understanding level teaching :

1. Content should be presented in small unit.
2. Unit should be presented in proper sequence.
3. After each unit proper test should be done to measure the level of understanding before entering into next unit.
4. Teacher should provide proper guidance for self learning.
5. Teacher should motivate the learners from time to time.

Merits :

1. This level helps students in understanding the meaning of the content.
2. This level helps students to solve problematic situation in and outside the teaching learning process.
3. It helps in developing intellectual behaviour.
4. Students get proper opportunities to develop different types of cognitive abilities.
5. It helps in teaching at higher level.
6. Students are trained to remain active in teaching learning process.

Limitations :

1. This level is more or less teacher-centered and subject centered rather than learner-centred.
2. The freedom of the learners are not too much.

3. The motivation is largely extrinsic.
4. The result is judged by fixed and specific learning objectives.

2.3.2.3 : Reflective Level of Teaching

This is the highest and most thoughtful level of teaching. This level is problem-centred in nature in which the learner is engaged in original, imaginative and critical approach to the subject and involved in deep and serious kind of thinking. The learner examines facts and generalization and seeks out new ones. This level enhances maximum level of cognitive abilities. Students develop curiosity, interest, inquiry and persistence by which they reach a scientifically determined conclusion or solve a problem. This level involves careful and critical examination of an idea or problem in the light of empirical evidences. Here the subject matter is not presented in highly structured form as done at the previous two levels. It is almost open in the form of a problem. After arising the problem student tries to solve the problem by their self effort.

Reflective level teaching involves the process of problem solving. The following steps have been suggested for problem-solving approach.

Recognition and definition of problem : Teacher should help the learners to feel and recognize the problem. Problem should be selected by the learners themselves. It should not be imposed by the teacher. But the teacher helps them to select an appropriate problem so that it can be solved by them. After selection, the problem must be defined in operational term.

Formulation of hypothesis : ‘Hypothesis’ means tentative solution of a problem. Teacher should encourage the learner to formulate as many hypotheses as possible. Here learner should collect relevant information from different sources.

Testing the hypothesis : Here, teacher encourages the learner to examine test the hypotheses one by one to reach a solution of the problem with the help of all available data.

Conclusion : Students with the help of teacher identify and reach possible conclusion.

Teacher’s Role—At this level, teacher does not play an authoritarian role. She/he may be in the background, but she/he has to play a very active role in the teaching learning process. She/he helps students in selecting a problem, formulating hypothesis, listing them and in reaching conclusion. Therefore she/he must be insightful, tactful, reflective and creative and flexible.

Student’s Role—Here, learner remains very active throughout the teaching learning process. She/he has to make use of the cognitive abilities and take all initiative. The motivation involved at this level is intrinsic in nature. Unless the learner develops the sense of oneness with the problem, no reflection is possible. The main source at this level should not be the teacher, but the learner himself.

Suggestions for effective reflective level teaching :

Time schedule should not be rigid.

Teacher should provide an atmosphere of mutual cooperativeness.

Teacher should try to motivate the learner to involve in the process intrinsically. The group should be small.

Teacher should not follow any fixed or rigid pathways. Teacher should give indirect guidance to the learner.

Merits :

It is learner-centred approach.

It is more thoughtful level than other.

It helps learner to solve the problem by self-effort. It develops the higher level cognitive abilities.

It helps learner to face his/her problem outside the classroom. Students enjoy greater freedom.

According to Bigge “reflective teaching leads to the development of a classroom atmosphere which is more alive and exciting, more critical and penetrating and more open to fresh and original thinking.”

Limitations :

This level of teaching is not suitable for all subject matter. It is suitable where problem solving and discovery approach can be better employed.

If there is any lack of understanding level, this level of teaching does not work properly.

It demands teachers' expertise and more effort.

Let Us Check Our Progress

- (i) Rote learning is preferred in _____ level of teaching.
- (ii) Problem solving learning is developed in _____ level of teaching.
- (iii) Teacher plays a very dominant and authoritarian role in _____ level of teaching.
- (iv) Name and symbols in chemistry can be taught through _____ level of teaching.

2.3.3 : STAGES OF TEACHING

Teaching involves different activities. It implies a rationally designed process. It refers to a flow of acts, from the beginning to the end. It is supposed that this flow refers to some kind of dynamicity. To make teaching effective teacher has to do different action or play specific roles during the process.

If we observe very accurately we can divide the teaching activities into three different stages or phases. They are as follows—

- **Pre-active stage of teaching,**
- **Interactive stage of teaching, and**
- **Post active stage of teaching.**

Preactive stage of teaching is the stage of planning. The activities of a teacher before entering the classroom is covered in the stage. Interactive stage of teaching includes all those behaviours or activities done between the time when the teacher enters in classroom and when the subject content has been delivered by him/her. Postactive stage is in fact evaluative stage, that begins after the second stage.

The each stage in discussed separately below—

2.3.3.1 : Pre-active Stage of Teaching

It is preparatory or planning stage of teaching. According to P.W. Jackson, inpreactive stage the teacher “selects objectives, plans the curricula, arranges the classroom and studies the readiness of the pupils”. This stage consists of the following operations or sub-stages—

Furmulating instructional objectives—The teacher determines as to what should be the specific instructional objectives in term of clearly defined terminal behaviour. For formulating instructional objectives the teacher considers the entry-level behaviour of the learner, time period, needs of the society and school.

Deciding the subject content—Then the teacher takes decision about the amount of content to be imparted and the specific structures she/he will try to develop in classroom.

Teacher takes the decision comidering the following—demands of the carriculum needs of the learner.

entry level behaviour of the learner teacher’s own preferences

Arranging or sequencing the content for presentation—Teacher then tries to dicide as what shall be the style(s) at different stages of development of the lesson.

Deciding the strategy—Teacher makes decision regarding the proper strategy (method as well as technique) she/he will employ in teaching. Teaching considers the nature of the content and entry level behaviour of the learner.

At this stage the teacher does other thinking, planning, decision-making with regard to designing instruction and preparing lesson plan along with development of criterion tests.

2.3.3.2 : Interactive Stage of Teaching

This stage of teaching is concerned with the implementation and carrying out what has been planned at the preactive stage of teaching. The activities of teacher right from entering the classroom till the presentation of the content are included in the stage of teaching. According to P.W. Jackson “the teacher provides pupils verbal stimulation of various kinds makes explanation, asks question, listens to students responses and provides guidance” at the stage of teaching. This is the execution stage. This stage includes the following activities—

Sizing up the class—Teacher’s first activity in this stage is concerned with the perception of classroom climate. She/he keeps him/her eyes around the faces of the learners to locate which area in or may be troublesome area, which faces are or may be discouraging, encouraging or apathetic. In this way, teacher tries to size up or understand the whole socio-emotional climate of the classroom. Similarly, the students also perceive the personality of the teacher within a few initial seconds.

Diagnosing the learner—After perceiving the classroom climate, teacher tries to diagnose the levels of students achievement in three levels—

activities

interest and attitudes academic backgrounds.

After diagnosing the students achievement level the teacher starts the interaction sessions. **Action and Reaction**—The following activities are taken in this sub-stage—

Selection of stimuli—In classroom situation stimuli may be in the verbal form or non-verbal form (like systems expression etc.) A good teacher should know which stimuli are relevant and which are not for a particular content. A stimulus (verbal or non-verbal) which is relevant for KG level may not be suitable for secondary or higher level of teaching. A teacher of secondary level may select properly the relevant stimuli for his/her class and not be able to select proper stimuli for primary or lower level.

Presentation of stimuli—After selecting the appropriate stimuli, the teacher presents the stimuli before the learner. Teacher should consider the following to present the stimuli—

What types of stimuli should be presented.

When the stimuli should be presented, and

How or in what sequence the stimuli should be

Feedback/Reinforcement—Reinforcement means the application or removal of a stimulus to increase the strength of a specific behaviour. There are two types of reinforcement.

Positive reinforcement—here the frequency of a response increases because it is followed by a rewarding stimulus, as in the example in which the teacher’s positive comment, praise, appreciation etc. increased the student’s behaviour.

Negative reinforcement—the frequency of a response increases because it is followed by the removal of an aversive or unpleasant stimulus.

Therefore, with the help of reinforcement the teacher tries to strengthen or change students’ behaviour.

Deployment of Strategies—Teacher continues all the strategies considered at this interactive stage when she/he is actually teaching in the classroom. Remember that the learners also remain active in the stage. They also do a lot of activities like—Select stimuli, provide feedback, etc.

2.3.3.1 : Post-active Stage of Teaching

This third and final stage is concerned with evaluative activities. Here the teacher evaluates students’ performance on the basis of terminal behaviour. Teacher also assesses the effectiveness of the teaching-learning process as occurred in the interactive stage. The substages of this stage of teaching are as follows—

Selecting appropriate testing devices—Teacher selects appropriate tools or techniques for measuring different dimensions of behaviour as expressed in terminal behaviour. The test may be of written, oral or practical.

Testing the actual behaviour—with the help of testing devices the teacher measures or evaluates the performance of the learners.

Defining the changes of behaviour—the teacher compares the expected and actual behavioural changes of the learner.

Changing the strategies of teaching—the results found in the previous stage help the teacher to understand the strength and weakness of the teaching-learning process. Accordingly the teacher modifies or changes his/her teaching strategy for better result.

Let Us Check Our Progress

1. List down teacher’s activities in preactive stage/phase of teaching.
2. Explain importance of postactive stage of teaching.
3. ‘Teaching is a continuous process in a certain classroom Teaching’.— Explain with suitable examples.

SUMMING UP

Teaching help the learner to learn to require knowledge, skills etc. There are some related term with teaching like—conditioning, training, instruction etc. Conditioning is the lowest mode of teaching which helps learner to learn to do something without understanding the content. Generally habits are formed by conditioning. Training is higher mode of teaching than conditioning. It helps learner to act following some particular rule or regular pattern. It is not necessary that learner understands the underlying principles or rules or concepts. Instruction is that type of teaching which helps learner to understand the concepts theories or principles. There are three levels of teaching—memory, understanding, and reflective level. Memory level is the lowest level and it is thoughtless. Teachers remain very active, play a dominant role in this level. Next higher level of teaching is understanding level. The highest level is reflective level and this is more thoughtful than the other two levels learners remain very active and can solve problems at this level.

Finally, teaching has been explained as a process or flow of rational and goal-oriented acts whose structure may be categorized to have three phases or stages—preactive, interactive and post active. Therefore, proper understanding of teaching warrants understanding deeply all the three stages with an integrative outlook.

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Chauhan, S. S., **Innovations in Teaching-Learning Process**. Vikas Publishing House Pvt. Ltd. (1994)

Dahiya, S. S., **Educational Technology Towards Better Teacher Performance**. Shipra Publication. Delhi (2008)

Mangal, S.K. & U. Mangal **Essentials of Education Technology**, Prentice Hall of India Pvt. Ltd. New Delhi (2009)

ASSIGNMENTS

1. What is teaching ? Discuss its relationship with conditioning, training and instruction.
2. What do you mean by levels of teaching ? Why it is necessary in teaching- learning process?

3. Explain the meaning of memory level teaching. Discuss the strategies which are helpful for the level.
4. What do you mean by understanding level of teaching ? How can the teaching task can be organized at this level?
5. Describe the nature of reflective level of teaching. Suggest some guidelines for affective reflective level teaching.
6. Give a comparative study on memory, understanding and reflecture level of teaching.
7. Discuss the merits and demerits of each level of teaching.
8. What do you mean by stages of teaching?
9. Describe the operation involved at each stage of teaching.
10. Discuss the role of teacher at each stage of teaching.

ANSWERS TO CHECK YOUR PROGRESS

- I. (i) conditioning
(ii) pattern
(iii) instruction
- II. (i) memory
(ii) reflective
(iii) memory
(iv) memory

Block-2

Unit-4

Educational Technology

INTRODUCTION

In the first part of the 20th Century there was a sudden and tremendous change in the thinking pattern of man. This is partly due to the discovery of Quantum Theory by Max Planck (1901) and Special Theory of Relativity by Albert Einstein (1905) and partly due to the increased application of science and technology in everyday life. Improvement of wireless systems and space craft technologies has improved radio and telecommunication hardware and software systems also. Development of low cost T. V.s and computers have widened the imagination of the world of human being. Now-a-days most modern information technologies have changed the distance of the world. This world has now become a 'Global Village'.

This unit will give you some basic ideas of Educational Technology.

OBJECTIVES

After going through the Unit, you will be able to :

- Give the Meaning, Nature and Scope of Educational Technology (ET)
- Understand various approaches of educational technology

2.4.1 : MEANING OF EDUCATIONAL TECHNOLOGY

Education always undergoes multi-dimensional changes.

According to Erie Ashby (1967) there were four major revolutions in EDUCATION :

1. The first revolution was the change of adult role in the society and shifting responsibility of education from parents to teachers and family to school.
2. The second revolution was the adoption of written word instead of oral instruction in education and the development of classroom concept.
3. The third revolution was the invention of printing and wide spread of printed books and
4. The fourth revolution is the advancement of electronics; the use of radio, T. V., computer, tape-recorder etc.

The behavioural scientists have joined in this fourth revolution. We are now in the midst of a fifth revolution. It is the revolution of 'Information Technology'. "Any technology", says Ashby, "which increase the fate of learning, would enable the teacher to teachless and the learner to learn more."

The perceptions of what constitute Educational Technology have evolved over a period of 30 years. [Elton, et. al., 1993]

The term technology refers to the combination of both techniques and technical innovations. In fact techniques are related to software and equipments are hardware of technology. The hardware component is the physical device and methodologies are the soft component components.

As the term technology is distinctly connected with education, it has some special connotation for use and explanation in education.

Some time it was thought that Educational technology is the combination of Technology of education and Technology in education. But now-a-days it is thought that E. T. is more than the combination of these two terms. Technology in education is the hardware part of the education system and the technology of education is the software part and it includes techniques and methodologies of the teaching-learning process.

Before going further, let us define some of the definitions of ET. According to the National Council for Educational Technology (NCET) UK (1971) :

"Educational Technology is the development, application and evaluation of systems, techniques and aids to improve the process of human learning."

Educational Technology is the development, application and evaluation of systems, techniques and aids to improve the process of human learning.

This is a precise but stimulating definition of E. T. But a more elaborate definition of E. T. was given in the International Seminar on Alternative Strategies for Introduction of ET in Budapest (1976) and it was also accepted by UNESCO and UNDP. The definition is as follows :

"ET may be defined as a separate field in the theory of Education dealing with development and application of the use of educational resources. In detail it implies the following principles :

1. Clear educational objectives;
2. The logical order of the elements of content;
3. The structure of the teaching learning process;
4. The development of models leading to the acquisition of knowledge;
5. The introduction of feed-back with the teaching learning process;

6. Media selection and criteria of media selection, also media evaluation and optimization;
7. The development of equipment to meet educational, economic, aesthetic and technical demands;
8. The study of the effectiveness of hardware and software in practical situations;
9. The various approaches to effectiveness in educational systems.”

Another definition given by the Commission of Instructional Technology (USA) is as follows :

“Education technology is a systematic way of designing, implementing and evaluating the total process of learning and teaching in terms of specific objectives, based in research on human learning and communication and employing a combination of human and non human resources to bring about more effective instruction.”

So from the above definitions it is very clear that the primary objective of ET is improving the efficiency of the process of learning. It uses modern technology and technicalities for the development of teaching and learning systems.

In a practical learning situation, conventional or distance education, a learner acquires knowledge through different instructional modes. These modes of instructions may be in form of oral communication or pictures, films, discussions, laboratory work, home assignment, etc. ET has its application in all the cases. It helps to chose effective media for different circumstances of instruction according to the characteristics of the pupil, their attitudes towards the subject matter, instructional objectives, class size, etc.

2.4.2 : NATURE OF EDUCATIONAL TECHNOLOGY

We have briefly discussed the forms of ET. This has given us a synoptic view of the development of ET in the passing of the age. We can now try to explain the nature of ET on the basis of the above discussion. Different persons may consider the nature of ET in different angles, because it covers a vast area in the field of education. Some have considered the nature of ET from the following stand points :

1. Evolution of the concept of ET.
2. Existing position and concept of ET
3. Distinction of ET from other related concepts.

Earliest concept of ET was linked with the use of audio visual aids like charts, models, maps etc. In this sense the term ET was used as a synonym to audio-visual aids. But with the development of science and technology and consequently the development of electronic devices, ET got a new

boost. At this stage sophisticated hardware and soft ware like projectors, tape recorder, radio and TV were used.

The development of mass media has further increased the capability of ET. In this age the use of radio, TV, tele-text, CAI, etc. has increased the reach of ET in formal and non-formal education. Again with the development of sophisticated programmed instruction concept helped to develop self learning and self instruction process. Thus use of teaching machine and computers came in to the field of teaching and instruction in a big way for preparation, design and development of self learning modules and self learning materials. With this development, there is a change in the in the approaches and applications of ET. New theories of teaching along with the new theories learning were applied in the area of teaching, learning and instruction. Thus micro teaching, behaviour analysis of learners and teachers, systems approach came in to existence.

Thus we can now differentiate among different terms like Educational technology and Instructional technology; Educational technology and Teaching technology; Technology in education and Technology of education, etc.

Thus the nature of ET can be summarised as follows :

- i) ET is the application of scientific principles to education.
- ii) ET stresses on the development of methods and techniques for effective teaching and learning.
- iii) It stresses the organisation of learning situations for the effective realisation of goals.
- iv) It gives importance of designing and measuring instrument for testing educational outcomes.
- v) It can control outcomes of education by controlling media, methods and environment.
- vi) It involves input, process and output aspects of education. Thus ET also involves in system approach in education.
- vii) It also helps communication in education.

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- d. It gives importance of designing and measuring instrument for testing educational outcomes.
- e. It can control outcomes of education by controlling media, methods and environment.
- f. It involves input, process and output aspects of education. Thus ET also involves in system approach in education.
- g. It also helps communication in education.

2.4.2 : SCOPE OF EDUCATIONAL TECHNOLOGY

An oft going proverb says like this :

I hear, I forgot;

I see, I remember; I do, I understand.

The traditional teachers depend too much on verbal exposition. Without proper and pragmatic visualization the pupil can not remember and understand them. But due to binocular vision of human being, they can minutely see matters and differentiate them accurately. So one can remember what one can see. Again practical activities involve most of the organs of the body and proper understanding develops through the use of sense organs.

It has been experimentally found that We learn-

1% through TASTE

1.5% through TOUCH

3.5% through SMELL

According to Henry Elton (1993) the scope of ET has been expanding after the World War II. Elton said that the scope of ET has expanded from mass Communication to Individualised learning and then Group learning by the use of Research, Development and Use.

Again we remember-% through HEARING

83.0% through SIGHT

20% of what we HEAR

30% of what we SEE

50% of what we SEE & HEAR

80% of what we SAY

90% of what we SAY & DO

So one can certainly say that E. T. has tremendous scope in the educational field because ET uses scientific and technological methods and concepts developed in psychology, sociology, communication, linguistics and also uses the management principles of cost effectiveness and efficiently use and deploy available resources in men and materials.

According to Elton each stage has three sub stages. The initial stage is research stage where basic concepts and techniques are developed, then it had progressed in to the developmental phase where these basic techniques and concepts are transferred in to practical teaching and learning techniques with their supporting materials and then the last phase has developed in which it moves further and further with the use of these newly developed teaching and learning techniques and materials.

The initial stage is mass communication stage and it has expanded the scope of ET by the use of radio, TV and CCTV for mass instruction. It was considered that more and more people can be brought under education system by the use of these technologies.

Scope of ET expanded further by the development of programmed instruction. This development enhances the scope of individual learning. Skinnerian psychology has been applied to produce books and text materials based on programmed instructions. Application of computer in education has improved individualised learning at a faster rate than our previous assumptions.

Group learning technique has begun to expand its areas in the early 60's by the development of humanistic psychology by Carl Rogers. Simulation, role play, case studies are some of the group learning techniques developed in this period.

Thus scope of ET is expanding day to day with the advancement of research and development in the field of education.

The scope of ET may be summarised as follows :

- i) E. T. helps to solve educational problems through systems approach. Because educational problems are multivariate in nature.

- ii) E. T. can be applied in developing instructional objectives and techniques. In this case it takes the help of psychological researches.
- iii) By the use of multimedia approach in teaching and learning ET can develop higher cognition among children and adults.
- iv) By the application of information and communication technology ET has developed multi-sensory approach in education. This approach increases the retention time in learning process. Thus it increases the scope of research and development in education in this field.
- v) Development of programmed instruction by ET, individualised learning has placed its foot firmly. Thus it has extended its scope in other fields of personalised learning, viz., self learning modules, multimedia learning packages, etc.
- vi) It uses the modern electronic gadgets, viz. projectors, audio & video equipments, C. C. TV, VCR, TV monitors, radio, computers, etc. Thus it relieves, to some extent, teachers on the one hand and encourages learners on the other hand. These hardware and software technologies also expand the area of research, development and use in different field of education.
- vii) E.T. can now expand and change teachers' skills, attitudes and behaviours.
- viii) ET has tremendous scope in setting goals, development and reform curriculum, try out of new methods and materials in a particular situation.

According to Spaulding, S. (1971), "Although education has shared in the creation of technological age, education itself has not learned how to use the fruits of technology to improve the efficiency and the quality of its own institutions." [Advanced Educational Technologies, Prospects in Education, UNESCO, 1971]

Let Us Check Our Progress :

1. State four characteristics of Educational Technology.
2. What are the five approaches to Educational Technology?

2.4.3 : A APPROACHES OF EDUCATIONAL TECHNOLOGY

Educational Technology (ET) has wide range of scope and has different forms. The different forms of ET depend on the nature of its applications. In a broader sense, ET uses the principles and techniques of science and technology along with psychology and pedagogy in the activities of teaching and learning process. Thus it can help teaching and learning in both formal and informal education. In this way ET, with its broad concept, is applicable in a wide variety of areas and fields.

Long time ago Lumbsdaine (1964) has suggested three types of ET. These are :

- (a) Educational Technology or Hardware Approach,
- (b) Educational Technology or Software approach, and
- (c) Educational Technology or Instructional Designs or Systems Approach

But now-a-days it is classified in the following way :

- i) Teaching technology
- ii) Instructional technology

Lumbsdaine (1964) has suggested three types of ET : (a) Educational Technology or Harware Approach, (b) Educational Technology or Software approace, and (c) Educational Technology or Instructional Designs or Systems Approach.

- iii) Behavioural technology
- iv) Instructional design technology

In short *Teaching technology* is the application of philosophical, sociological and scientific knowledge to teaching for achieving some specific learning objectives.

On the other hand, Instructional technology means a network of techniques or devices employed to accomplish certain defined set of learning objectives.

Behavioural technology has a much wider field than the above two. It covers the area of military sectors, industry, health, commerce, communication, administration, training, education, teaching and instruction and many more.

Lastly, the *Instructional design technology* covers three major concepts : Training Psychology, Cybernetic Psychology and Systems analysis.

Different experts have classified ET according to their approaches in dealing ET in different fields of knowledge. Thus Mackenzie and others (1980) have classified ET on the basis of information resources. These authors have classified it as follows :

- (i) TV, language laboratories and other audio visual resources.
- (ii) Feedback devices including teaching machines.
- (iii) Reprographic equipments like computers and programmed learning materials.

On the other hand, Ellington and Percival (1988) have classified ET in the following way :

- (i) Mass instructional techniques.
- (ii) Individualised instructional techniques.

From the above discussion, it may now be concluded that ET is a multifaceted concept. So it has some specific types of approaches. Some authors have classified it into five approaches :

- (i) Educational Technology I—Use of psychological principles
- (ii) Educational Technology II—Production and design of instructional materials, and communication means
- (iii) Educational Technology III—Management aspects are considered
- (iv) Educational Technology IV—Covers Educational Systems Engineering
- (v) Educational Technology V—Covers Educational Planning (economic and financial aspects)

Let Us Check Our Progress

1. Define Education Technology
2. What are the five approaches of Educational Technology?

EDO-01
Fundamentals of Education and Research (Open Course)
Block-3
Curriculum Development and Evaluation

CONTENT STRUCTURE

Introduction

Objectives

3.1 : Concept, Nature, functions and Types of Curriculum

3.1.1 : Meaning and Concept of Curriculum

3.1.2 : Characteristics of Curriculum

3.1.3 : Functions of Curriculum

3.1.4 : Types of Curriculum

3.2 : Foundation of Curriculum and Curriculum framework

3.2.1 : Philosophical Foundation of Curriculum

3.2.2 : Sociocultural Foundation of Curriculum

3.2.3 : Psychological Foundation of Curriculum

Let Us Sum up

Suggested Reading

Assignment

INTRODUCTION

The organization of schooling and further education has long been associated with the idea of a curriculum. But what actually is curriculum, and how might it be conceptualized? This question is a matter of long-term research in the field of education. Commonly, we believe that the teaching-learning process is instrumental in the larger process of education. In order to carry it out, certain arrangements are created, providing a context within which teaching-learning can occur more

meaningfully. School is such a context created wherein formal arrangements are made for the purpose. Within such context, each and every learner is exposed to a variety of experiences leading to some sort of learning—not only academic learning in the classroom but also that of outside classroom as well as sociocultural learning. All these learning experiences have crucial impact in a cumulative way on the development of a child. For a given stage of education and class, these learning experiences are consciously selected and organized. Further in a sequenced and scheduled programme of studies, these are provided to the students as a set of interconnected learning experiences. Technically, the sum total of ‘learning experiences’ for a given class thus provided in the system of formal education is called ‘curriculum’. In other words, the term curriculum came to be used to denote all experiences provided with the intention of aiding student development within and beyond the instructional situations in any formal educational setup.

OBJECTIVES

After going through this unit, you will be able

- ❖ To define curriculum
- ❖ To understand the modern nature of curriculum
- ❖ To understand various types of curriculum
- ❖ To study different foundations of curriculum.

Block-3

Unit-1

Introduction to curriculum

3.1 : CONCEPT, NATURE, FUNCTIONS AND TYPES OF CURRICULUM

3.1.1 : Meaning and Concept of Curriculum

The idea of curriculum is hardly new-but the way we understand and the orize it has altered over the years. It has its origins in the running/chariot tracks of Greece. In Latin, curriculum was a racing chariot; currere was to run. It was, literally, a course. As an idea, curriculum stems from the Latin word for race course, referring to the course of deeds and experiences through which children grow and mature in becoming adults. In formal education, a curriculum is the set of courses, and their content, offered at a school or any educational organization. At this point curriculum should be differentiated from syllabus as it is a common mistake to presume both as synonyms. “Syllabus” refers to the content or subject matter of an individual subject, where as “curriculum” refers to the totality of content to be taught and aims to be realized within one school or educational system”. Thus, a curriculum subsumes a syllabus.

John Kerr (quoted in Kelly 1983, 1999) defines curriculum as, “All the learning which is planned and guided by the school, whether it is carried on in groups or individually, inside or outside the school”. The key feature in this definition that ‘learning is planned and guided’ is important here to consider because a curriculum developer has to specify in advance what he is seeking to achieve and how he is to go about it. These are the actual tasks of ‘curriculum planning and designing’.

Educators define curriculum in different ways, in part because they bring to that task different perceptions of what curriculum should be. The following are some of the more well-known definitions which provide some clarity to its understanding that you might consider.

- ☐ Curriculum is all experiences children have under the guidance of teachers (Campbell, 1930).
- ☐ By “curriculum” we mean the planned experiences offered to the learner under the guidance of the school (D.K. Wheeler, 1967).

- Curriculum refers to the learning experiences of students, in so far as they are expressed or anticipated in educational goals and objectives, plans and designs for learning and the implementation of these plans and designs in school environments (Skibeck, 1984).
- Curriculum is a programme (the school) offers to its students. It consists of a 'preplanned series of educational hurdles' and an entire range of experiences, a child has within the school (Eisner, 1985).
- The curriculum is the plans made for guiding learning in schools, usually represented in retrievable documents of several levels of generality, and the implementation of those plans in the classrooms, as experienced by the learners and as recorded by an observer; those experiences that take place in a learning environment that also influences what is learned (Glatthorn, 1987).
- Curriculum can, however, be defined broadly-as dealing with the experiences of the learner. This view considers almost anything in the school, even outside school (as long as it is planned) as part of the curriculum (Ornstein and Hunkins, 1988).
- Curriculum can be viewed as the subject based experiences or the course of study (Ornstein and Hunkins, 1988).
- The curriculum is a goal or set of values, which are activated through a development process culminating in classroom experiences for students. The degree to which those experiences are a true representation of the envisioned goal or goals is a direct function of the effectiveness of the curriculum development efforts (J. Wiles & J. Bondi, 1989).

In Indian context we should consider the following views :—

- “Curriculum may be regarded as the sum total of all the deliberately planned set of educational experiences provided to the child by the school” (NCERT, Curriculum for the ten year school, 1975).

What our Secondary Education commission emphatically explained about school curriculum is worth mentioning.

- “It must be clearly understood that according to the best educational thought curriculum does mean only the academic subjects traditionally taught in schools, but it includes the totality of experiences that a pupil receives through the manifold activities that go on in the school, in the classroom, library, laboratory, workshop, playground and in the numerous informal contacts between teachers and pupils. In this sense, the whole life of the school becomes the curriculum which can touch the life of the students at all points and help in the evolution of balanced personality”.

A curriculum consists of (a) planned learning experiences; (b) offered within an educational institution/programme; (c) represented as a document; and (d) includes experiences resulting from implementing that document. This conceptualisation of the term goes beyond the notion of simply preparing a planned document to be adopted later. When a curriculum document is implemented in an institution with an educational programme, interaction takes place between the document, learners and instructors such that modification occurs and a ‘curriculum’ emerges.

So far the expert views are concerned, *curriculum is defined as all the planned learning opportunities offered to learners by the educational institution and the experiences learners encounter when the curriculum is implemented.* This includes those activities that educators have devised for learners which are invariably represented in the form of a written document and the process where by teachers make decisions to implement those activities given interaction with context variables such as learners, resources, teachers and the learning environment.

3.1.2 : CHARACTERISTICS OF CURRICULUM

William Schubert (1986) refers to many different images or characterizations of curriculum. He prefers these terms to that of ‘definition’ because “—— they denote a broader conceptualization than the label for a thing”. However, an image or characterization can also mean a way of perceiving or viewing the concept concerned and hence facilitating understanding. A selection of these characterizations includes :

- ***Curriculum as subject matter*** : this is **the most traditional image** of curriculum which depicts it as the combining of subject matter to form a body of content to be taught. Such content is the product of accumulated wisdom, particularly acquired through the traditional academic disciplines. As a result of this content, one can predetermine the curriculum for learners.
- ***Curriculum as experience*** : a **more recent image** sees curriculum as the set of experiences learners encounter in educational contexts. Most of these experiences have been purposively planned by means of the written curriculum but many more experiences are encountered by learners in educational contexts. Through experiencing the hidden curriculum learners acquire many forms of learning that were not planned yet which are usually highly significant.

Experience is also seen from the perspective argued by John Dewey (1916), namely that in experiencing a curriculum one also reflects upon that experience and one consequently

strives to monitor one's thoughts and actions in that curriculum context. In this characterization of curriculum, the teacher acts more as a facilitator to enhance the learner's personal growth.

- ***Curriculum as intention : early efforts*** to address curriculum planning saw educators make use of intentional strategies through the vehicles of aims, goals and objectives. This characterization of curriculum argues that a comprehensive planning of learning experiences for students, predetermined before they commence the curriculum, is the best way to address the learner needs.
- ***Curriculum as cultural reproduction : some experts view*** that curriculum should reflect the culture of a society. The curriculum, particularly through the selection of learning experiences, provides a vehicle to pass on the salient knowledge and values used by one generation to the succeeding generation.

However, there is by no means consensus as to what knowledge and values are indeed worthwhile to be passed on from one generation to the next. Uncritical cultural reproduction has not occurred in our society and consequently this characterization remains contentious.

In the process of conceptualising curriculum these characterisations will help you to understand its nature.

3.1.3 : FUNCTIONS OF CURRICULUM

A school's/institution's curriculum consists of everything that promotes learners' intellectual, personal, social and physical development. As well as lessons and cocurricular activities, it includes approaches to teaching, learning and assessment, the quality of relationships within school/institution, and the values embodied in the way the school/institution operates.

A well-designed curriculum is built on a clear vision of what it is trying to achieve. It :

- has clear aims that reflect the national aims for education and learners' needs as individuals and citizens,
- promotes the intellectual, personal, social and physical development of all learners,
- establishes high expectations for all, extending horizons and raising aspirations,
- identifies outcomes relating to knowledge, skills, and personal attitudes and attributes,
- is underpinned by clear values.

At the same time a well-designed curriculum is organised to achieve its aims. Thus, **functions** of curriculum are nothing but helping to achieve its aims through providing a coherent and relevant set of learning experiences, and by meeting the statutory requirements which include the dynamic interplay between content, pedagogy and assessment.

Consequently, it performs the following in-built system functions. It

- helps every learner to make progress, building on their experiences both within and outside of school
- provides for the full range of capabilities and aspirations
- provides opportunities for learners to experience the benefits of different learning approaches, including learning through subject disciplines, thematic approaches, areas of study of their own choice, and problem identification
- includes global, national, local and personal dimensions
- reflects and makes use of current technology
- provides proper feedback for evaluating the path of progress.

As a whole, a curriculum if systematically planned and well designed is capable to guide the future need of the society towards its fulfillment, and technically to direct what is to be taught and learned, and in what ways.

Let Us Check Our Progress

1. What is curriculum?
2. What is the modern view of curriculum?
3. What is the main function of curriculum?

3.1.4 : TYPES OF CURRICULUM

Conceptualising the nature and meaning of curriculum will be incomplete if you do not get acquainted with a number of types of curriculum. Technically, curriculum is one but how it is implemented generates the concept of types. **Popularly**, curriculum types are as follows :

1. ***Overt, explicit or written curriculum*** is simply that which is written as part of formal instruction of the schooling experience. It may refer to a curriculum document, texts, films, and supportive teaching materials that are overtly chosen to support the intentional instructional agenda of a school. Thus, the overt curriculum is usually confined to those written understandings and directions formally designated and reviewed by administrators, curriculum directors and teachers, often collectively.
2. ***Societal curriculum*** : Cortes (1981) defines societal curricula as: ...[the] massive, ongoing, informal curriculum of family, peer groups, neighborhoods, churches organizations, occupations, mass, media and other socializing forces that “educate” all of us throughout our lives.

3. ***Hidden or covert curriculum*** : That which is implied by the very structure and nature of schools, much of what revolves around daily or established routines. Longstreet and Shane (1993) offer a commonly accepted definition for this term....the “hidden curriculum,” which refers to the kinds of learning children derive from the very nature and organizational design of the public school, as well as from the behaviors and attitudes of teachers and administrators....
4. ***Null curriculum*** : That which we do not teach, thus giving students the message that these elements are not important in their educational experiences or in our society. Eisner offers some major points as he concludes his discussion of the null curriculum.
5. ***Phantom curriculum*** : The messages prevalent in and through exposure to media.
6. ***Concomitant curriculum*** : What is taught, or emphasized at home, or those experiences that are part of a family’s experiences, or related experiences sanctioned by the family. (This type of curriculum may be received at religious organisation, in the context of religious expression, lessons on values, ethics or morals, molded behaviors, or social experiences based on family’s preferences.)
7. ***Rhetorical curriculum*** : Elements from the rhetorical curriculum are comprised from ideas offered by policymakers, school officials, administrators, or politicians. This curriculum may also come from those professionals involved in concept formation and content changes; or from those educational initiatives resulting from decisions based on national and state reports, public speeches, or from texts critiquing outdated educational practices. The rhetorical curriculum may also come from the publicized works offering updates in pedagogical knowledge.
8. ***Curriculum-in-use*** : The formal curriculum (written or overt) comprises those things in textbooks, and content and concepts in the curriculum guides published by the authorized organisation. However, those “formal” elements are frequently not taught. The curriculum-in-use is the actual curriculum that is delivered and presented by each teacher.
9. ***Received curriculum*** : Those things that students actually take out of classroom; those concepts and content that are truly learned and remembered.

But the most common perceptions of curriculum, expanded substantially from the **types** suggested by **Glatthorn (1987)**, may be described as :

- ***The ideal or recommended curriculum*** : What is proposed by scholars as a solution to meet a need and consequently perceived as the most appropriate curriculum for learners.
- ***The entitlement curriculum*** : What society believes learners should expect to be exposed to as part of their learning to become effective members of that society.

- *The intended or written curriculum* : What organizations develop for their learners in their educational systems and what should be taught by the teachers in that system. This is often referred to as the syllabus by such organizations and systems.
- *The available or supported curriculum* : That curriculum which can be taught in schools through the provision of appropriate resources, both human and material.
- *The implemented curriculum* : What is actually taught by teachers in their classrooms as they and their students interact with the intended and available curricula.
- *The achieved curriculum* : What students actually learnt as a result of their interaction with the implemented curriculum.
- *The attained curriculum* : The measurement of student learning (usually through a testing process) which reveals those learnings acquired by students. Measurement is usually based upon the intended curriculum, particularly at systematic levels, though it may be based on the implemented curriculum at classroom level.

Whatever may be the type, the **essential features** common to curricula, however, are that all forms of curricula incorporate the following :

1. A formalized course of study designed for learners.
2. Conscious planning that attempts to determine learning outcomes.
3. Some form of structure to facilitate that learning.

3.2 : FOUNDATION OF CURRICULUM AND CURRICULUM FRAMEWORK

3.2.1 : PHILOSOPHICAL FOUNDATION OF CURRICULUM

Structurally curriculum is based on four foundations namely philosophical, sociological, psychological and technological foundations. Here we are first concentrating our attention how different schools of philosophy may be sourced to develop curriculum.

Philosophy is a continuous source of knowledge being implemented for knowledge itself and helping the way to be implemented. Therefore, in curriculum foundation epistemologically knowledge and its structural presentation are very much significant. It provides the guideline for its framework and also shifting its trends for fulfilling objectives of education and for the betterment of transactional phase of curriculum. Surely, human knowledge stored in various schools of thought as expected to underpin various epistemological issues and axiological questions to be dealt in the theoretical

foundations of curriculum. Not only these, the practical ramifications of these must have bearing in curriculum planning and development, and transaction.

Curriculum planning is an understanding of the structure of knowledge and its logical categories. The central concern of curriculum, is the transmission of knowledge. What aspects of the vast fund of knowledge that mankind has accumulated is to be selected for transmission and on what criteria and how is the same to be organized? The central questions of curriculum planning, cannot be decided except on the basis of the stand we take in regard to the composition of knowledge and its distinct forms.

Idealism and the Curriculum

As to an idealist, the ideas i.e. essence is more important than the materialistic, i.e. changing state/order, non-permanent, at least a liberal curriculum is suggestive.

The basic questions which we consider for inculcating philosophical application in curriculum may be mentioned below :

1. What knowledge aspect may assist pupils to think critically and creatively for mental development?
2. Which may reflect vital subject-matter that has endured in nature?
3. Which may emphasize learning acquired for development of inner potentiality?
4. Which may reflect universal content in relating one human being to another involving human development?
5. Which content is emphasize individual pupils moving away from being finite to increasingly becoming infinite human beings through development of values?

Existentialism and the Curriculum

Existentialism in curriculum development contributes the individualized pattern of instruction and trying to explain the natural world where existence precedes essence as this philosophical notion emphase on rugged individualism. It also strongly believes in freedom of each individual.

For applying the concepts of existentialism following instructions may be suggestive :

1. Pupils need to be guided to choose what to learn (objectives), as well as learning activities to achieve the desired ends. Learning centers may emphasize, in degrees, existentialist thinking. Here, pupils may choose the center and task sequentially to work on. Individualized reading might also harmonize well with existentialist thinking. The individual pupil may then sequentially choose which books to read.

2. These needs to be much pupil/teacher planning in the school/class setting. True input, not manipulation of the learner, needs to be in evidence. The involved pupils must, increasingly, be free to select their own destiny and value system. A teacher-determined curriculum would definitely not harmonize with existentialist thinking.
3. Learners need to study and analyze the human dilemma. Units of study in history and literature, in particular, can offer pupils valuable insight into situations where right and wrong solutions to problems were definitely in evidence. Individuals and groups in literature and history made decisions in which numerous alternative solutions were possible. Learners need to look at the outcomes of these solutions. Were the outcomes rational, irrational, or in between?
4. Pupils with teacher guidance need to notice absurd, ridiculous situations in life. How can moral decisions be made within the framework of these irrational settings? A major objective of the existentialist teacher is to have pupils accept the inconsistencies in society and still attempt to operate morally in the environment, choices and commitments by each pupil. Committed individuals, who have personal conscience, reflect the thinking of existentialists.
5. The teacher needs to stress continuously the importance of making personal choices and commitment.
6. Discovering self-responsibility is the cornerstone of such curriculum.

(B) Experimentalism and the Curriculum

Experimentalists believe in building up experience which according to them, represents ultimate reality, may not be stable for over. They also assert that knowledge is modifiable through continuous testing or verification.

Experiments and reality are keenly involved in development of curriculum according to this type of philosophy. The basic contributing factors are mentioned below :

1. Problem solving objectives being highly significant;
2. Data gathering from a variety of resources to solve problems;
3. Developing hypotheses in answering the identified problems;
4. Testing and revising hypotheses, if evidence warrants;
5. Working effectively in committee settings; i.e. through group cooperation and discussion.
6. Accepting the consequences of acts/deeds performed
7. Change should be continuously in evidence in the curriculum of life.
8. Contents must be linked to real experiences of life.

Realism and Curriculum

1. Pupils should experience, in particular, a quality science and mathematics curriculum. Precise, measurably stated objectives can be emphasized in teaching learning situations. The content of science and mathematics is accurate and verifiable.
2. Other curriculum areas also need to receive adequate emphasis in the school or class setting. Accurate facts, concepts, and generalizations need to be emphasized which adhere to scientific methods in acquiring content. Opinions might receive relatively little emphasis in teaching and learning. Hypotheses need developing which can be tested.
3. Pupils should be guided to receive exact content as it truly is in the natural/social environment. Replicas of what exists in the environment should be experienced by learners.
4. Learners need to realize that much of what occurs in the natural environment, in particular, is relatively stable and not subject to continuous change. The natural environment, of course, changes in degrees, but changes occur slowly. Objective values which have stood the test of time may also become relevant for pupils to attain.

Discussion :

Depending upon the philosophy of education being emphasized, a selected set of consistent objectives may be chosen for pupils to achieve. Each philosophical school of thought has unique objectives for learners to acquire. Existentialists emphasize that the individual make moral choices and decisions in a relatively absurd environment. Idealists believe that universal ideas which have stood the test of time be achieved by learners, whereas experimentalists adhere to continual changes occurring in society in which problems need identification and solutions. Realists believe in a relatively stable natural/social environment which learners can know as it truly is.

Let Us Check Our Progress

1. Distinguish between the existentialist and pragmatist in the matter of curricular knowledge content.
2. Why is 'structure of knowledge' important in curriculum planning ?—Explain.

3.2.1 : SOCIOLOGICAL FOUNDATION OF CURRICULUM

Education, from sociological perspective, is a process of transmission of culture. Culture refers to the total way of life of a society, its knowledge, beliefs, attitudes, values, skills and behavior patterns—and not just to what is best or most important in that way of life, or to art, music or

literature. Culture, to the sociologist, includes everything that is learned and manmade. Schools are formal institutions specially set up for the preservation and transmission of culture by the society. Schools seek to discharge this function through the curriculum, which is nothing but the sum total of learning experiences provided under its auspices. However, it is neither possible nor desirable to transmit the whole of culture to the successive generations through educational institutions. It is not possible because the schools do not have the required resources and time to do that in view of the vast amount of knowledge, values and skills involved. It is not desirable because the society does not want everything preserved and transmitted, but only those aspects of its culture, which it considers valuable and important. Certain ways of life, certain kinds of knowledge, attitudes, values and beliefs are evaluated and considered so important by the society that their preservation and transmission cannot be left to chance or to informal modes. On the contrary, it has to be done systematically through professional teachers and inspecially set up institutions, the schools. Some kind of a selection and processing of culture, is thus necessary to determine what aspects of culture should (and what aspects should not) be transmitted and in what form. It is these selected segments of culture then, that constitute the school-curriculum. Curriculum-planning is about the way these elements are selected and structured. “On what criteria is one to decide what is valuable and worthy of transmission in culture?” “How is one to decide on the priorities?” “And how is one to put them into practice?” are questions that are central to curriculum-planning.

Curriculum-planning a very complicated task. It is the hard fact that no society in the modern world, with the exception of simple, pre-industrial societies, can lay claim to an all-pervading homogeneous culture. On the contrary, the culture of most societies can be described as an intermixing of several different regional or ethnic sub-cultures, which fuse to some extent but, at the same time, also retain their distinctiveness and individuality. India presents an excellent example of this social phenomenon. It is a vast country inhabited by people belonging to diverse social stocks, cultures, languages, religions and customs. The Indian society is stratified not only on the basis of caste but also on economic class, educational achievement, occupation and sex. The force with which these loyalties draw people to different sub-cultures is great. The problem before the country is how to forge a genuine national sentiment among all its people and bring about emotional and national integration through a national system of education without, in any way, diminishing its cultural variety and richness. In other-words, the task before national education is to promote unity in diversity. Cultural pluralism must be achieved.

It has been said earlier that a curriculum without its explicit and implicit cultural roots has no meaning and pedagogical significance. The two-way traffic in—between school and community is praxis, though the nature and quality of this communication varies from community to community. and also the nature, quality and priorities of changes of such relationship vary over time within a

single community. This implies that a community or society has organic growth and it is in changing order what has been known as social change, coined by the sociologists. Sometimes new technology comes into forefront and produces heavy impact on the normal flow of a society.

Similarly, culture is conceived to reside in the repository of a group or a community or a society. Hilda Taba maintains that “Scientific understanding of culture and of the personality in culture should be part of the equipment of all those deal with curriculum development. There is an obvious need for a rapprochement between the disciplines studying the culture and those studying education, for the real issues that plague schools today are not exclusively rooted in education itself—they spring from the dynamics of the human and social environment. “Moreover,” An understanding of what that environment is, what it contains, by what dynamic it operates, and what problems and possibilities it holds should shed light on what education can and must do if it is to play its legitimate role.” Not only has this, social anthropology which deals with culture and personality, made a unique contribution to education. Kluckholm suggests, the interest of education and anthropology converge because both deal with humanity created techniques of living, with norms and values attached to these techniques, and with their transmission to younger generation. Most anthropologists agree that a degree of conformity to social norms is essential in any kind of social order if that to continue. But on the contrary this conformity may be bar to freedom of thinking, creativity, imitativeness or even those culture norms and values may be defined and control by some groups only. Such norms may be imposed in any mass cultural groups by various ways one of which may be curriculum. This danger has been analyzed and expressed by Prof. Apple in various languages.

Counts, Bramhield and Giroux, etc. have been vocal against the Eurocentric conceptions of knowledge and culture which get entry through hidden curriculum of school. Faced with the crisis of society, they devise a vision of a new, better society and advocate that education should take place for social reconstruction. Hence, a new curriculum should think of knowledge which is characterized by many new defining points what have been discussed earlier. Finally, schools must be seen as places where culture, power, and knowledge come together to produce a vision of future that is supposed to determine what knowledge we consider to be true, ethical, emancipatory and worthwhile. That is there will remain the struggle over the production and creation of knowledge.

Therefore, the curriculum developers must understand that ‘struggle’ and they must contest with the differing wings of cultural and also ideological conflicts so that the curriculum may ponder over issues and concern about—the school as countervailing socializing agent, education for values and feelings, autonomy, individuality and creativity, voice of the people/masses, the danger of ethnocentricity, importance pluralism, right to education for all, etc. It should be kept in mind that touching upon all those sociological issues and concern while developing a curriculum is not easy. Obviously necessary conditions are to be integrated in the length and breadth of the curriculum. Educators

need also to consider way which to integrate learning from socializing process with learning that occurs as a result of its curriculum without any confusion.

To keep abreast of the fast-moving social events and rapidly growing knowledge about society and culture, a new role needs to be created among those responsible for setting a pattern for the curriculum. This is the role of a team of interdisciplinary research group, taking cues and information from the neighboring disciplines.

The story of sociological foundations of curriculum, in brief, may be delineated with the following headings—

1. Society and education—curriculum while reflecting contemporary social forces should also be able to respond to the dynamics of changes-local, national and global—and put emphasis on local and global knowledge praxis of the day.
2. Social change and the curriculum-must take cues from growth of technology and its impact on the learners in all corners of their lives, changing order of structure of family and other basic institutions, cultural diversity and cultural pluralism, etc.
3. Changing order of meaning of learning and its relationship with the community living—learning to live together, life long, learning, building social capital, empowerment, etc.

Let Us Check Our Progress

1. Explain the need for sociological foundation of a curriculum.
2. A curriculum has cultural roots—Explain with suitable examples.

3.2.1 : SOCIOLOGICAL FOUNDATION OF CURRICULUM

Grounded by some fundamental assumptions about human behavior, Educational Psychology, an applied branch of psychology, is a strong pillar upon which curriculum is erected systematically. The main area of psychological movement in education is understanding learning and teaching and deepening our understanding of human potential to learn and also individual variations-both inter and intra. A curriculum without in-built in psychological principle, is a void and meaningless. There are several are as in which the psychological principles and theories come and help as the psychological foundation of education as well as of curriculum.

Hilda Taba in Curriculum Development : Theory and Practice puts : “Sound suggestions for curriculum development can be derived only from a sound psychology of learning. In setting issues of curriculum and methods one must take in to account all that is known about the nature of man and the nature of the learning process. Historically, there has always been a relationship between education

and knowledge of or assumptions about the nature of learning.” This relationship is not that education is borrowing knowledge about psychology of learning, the relationship is not uni-directional, about psychology of learning (say Educational Psychology) is also getting or sensing problems or anomalies in the actual practice of education in the learning sites and as a matter of instinctual curiosity as well as disciplinary responsibility psychology of learning is becoming both active and proactive in expanding its horizon of knowledge. That is the relationship is two-way communicative or complementary.

Further, issues relating to interrelationship among areas of development—cognitive, affective, moral, motor, and meta-cognitive—are also the concern for curriculum developers as the social—philosophical goal of education are distribution of equity and ensuring human rights to education for all. The concepts of readiness and pacing, developmental tasks, intelligence, stage of cognitive development, limitation in intellectual potential, other native potential, motivation, problems of heterogeneity in learners, dilemma of receptive and creative thinking, problem of underdevelopment, besides all aspects of learning are also some of the multitude determining factors and issues for the curriculum developers and they take account of these as the basic materials for building curriculum superstructure. More over issues and concerns relating to instruction, instructional design and assessment of learning outcomes or even curriculum evaluation are also getting theoretical and practical supports for psychology.

Learning Theories and Curriculum

Knowledge about the learner and learning is relevant to making a host of curriculum decisions. Some of the very important decisions, according to Taba, are : selection and arrangements of content, the choice of the learning experiences by which this content is to be manipulated and by which the objectives not achievable through content alone can be attained, and plans for optimum conditions for learning.

These decisions cannot be made adequately without understanding a good deal about learners and learning process which is eventually not explained by a well-agreed definition. Learning is complex and there are many different kinds : mastering motor skills, memorizing information, learning feelings, concepts, and intellectual skills, such as generalizing, scientific inquiry and problem solving. Theorization about all kinds of learning in a super theory of learning is not achieved so far. Various theories of learning are also contesting each others. For example, behaviorist associationist theories which dominate the field, overlook ideational learning; field theories stress the learning of ideas and insight, while the dynamics of learning, such as motivational patterns, are the chief concerns of psychoanalytic theories. Further, learning occurs in a social setting and also through personal experiences. Consequently, learning is central in the educative process, it is difficult to determine just what it is, under what conditions it occurs, or how to manipulate the conditions, how to maximize it

under school conditions. Moreover, psychological investigations are not generally concerned with the nature of learning as it occurs in school. Some argue that there is even a sign of rift between the science of learning and educational methods. The above phenomena present a baffling experiences and difficulties to the curriculum developers and hence they are to move toward a broader periphery of learning theories while panning curriculum.

All theories of learning rest on a concept of man and his capacities and their intricate natures as well as the interplaying operating variables assumed by a particular theoretician. Historically, the first concept of man produced a theory of learning often called the theory of mental discipline or faculty psychology. In this view, motivation does not matter and individual differences are irrelevant, learning connotes training of mind; special merit is found in such 'hard' subject like mathematics and Latin and practice and drills are most important. Science of learning has advanced now a lot but many current critics of educational practices seem to make similar assumptions when they advocate toughness and hardness of study perse.

Now from training of mind to shaping or modifying behaviors of all kinds is the main issues of theories of learning and consequently the curriculum developer like to take cues form these modern theories. For the sake of convenience we may classify the whole family of learning theories into three categories.

1. Behaviorist theories which deal with various aspects of stimulus—response and reinforcement scheme.
2. Cognitivist theories which view the learner in relationship with the total environment, and
3. Phenomenology which emphasizes the affective domain of learning and also personal meaning making about the environmental in puts or happening.
4. Increasing interest in Constructivism and curriculum

1. Behaviorism and Curriculum

The behaviorist school is rooted in a corresponding philosophical speculation about the nature of learning. It has dominated particularly the first-half of the 20th century psychology. After a few years of wilderness it has recently gained currency once again with the advent of individualized education. Essentially, here learning is considered as habit formation and teaching is regarded as arranging learning experiences in such as way as to promote desirable behavior. It also takes notes of retention and transfer of learning for economizing pupil learnig encounter.

Broadly, behaviorists advocate that —

- behaviour is likely to be influenced by the condition under which learning takes place.

- attitudes to and abilities of learning can change or improve over time through proper stimuli,
- learning experiences can be designed and controlled to create desires for learning,
- selective reinforcement is essential,
- rote learning and memorization of knowledge are unnecessary.

A curriculum, according to behaviorists should be based on the following concerns :

1. remediation, skills acquisition, considerations of basic or advanced learning
2. well defined, short-term and long-term objectives
3. appropriate instructional materials and media to suit the learner's abilities shaping behavior through prescribed tasks, phase by phase activities, close supervision of activities and positive reinforcement
5. diagnosing, assessing and reassessing the learner's needs, objectives, tasks and instruction with a view to improving the curriculum
6. curriculum planning, sequencing contents, writing materials, illustrating materials, etc are some aspects which are shaped and directed by this school of thinking.

We can see manifestation of these guidelines in theories, principles or trends related to—

- individualized education both in face-to-face and distance learning contexts
- instructional design and systematic design models
- teacher-training techniques such as simulation, microteaching competency performance based teacher education
- educational technology including programmed instruction.

2. Cognitivism and Curriculum

Cognitivism focuses on learning as change in cognitive structure, a hypothetical construct reasoned out by a community of psychologists, popularly known as cognitivists. Cognitive theory of learning refers to any theory of learning that postulates intervening variables of a cognitive nature in order to explain learning. Learning is considered as a growth-cognitive growth, essentially through the process of education. Educator's task is to facilitate pupil's cognitive growth. Consequently, curriculum aims at so. Most cognitivists believe that growth and development occur in progressive stages. Jean Piaget is a pioneer in this direction and his theorization about growth of intelligence in the *Psychology of Intelligence* (1950) has made significant change in curriculum development, especially in sciences. Bruner's formulation of concept attainment model has also a renowned venture in employing strategies in concept attainment. Their works have given much knowledge how to present learning when building learning materials as well as during instruction.

Most curriculum specialists tend to draw greater adherence to cognitive than to behaviorism today. It might be because cognitive approach leads to logical methods and interpreting learning, and cognitive approach is rooted in the tradition of teaching based on the subject matter which is supposed to have embedded structure of knowledge and it sometimes may be explained with the aid of a map-cognitive map.

The curriculum specialists take note of encouraging pupils to ask questions and solve problems. Students should be encouraged to take up cognitive risk and seek for alternative strategies to come to a solution. Classroom should be a place for discovering the truth by formulating hypotheses and testing them appropriately. This, cognitivism regards classroom a site for experimentation and naturally a place of greater freedom for exploration.

3. Phenomenology and Curriculum

Phenomenologists point out that the way we look at ourselves is crucial for understanding our behaviors and that we respond to an organization or pattern of stimuli and not to an isolated one. That is like to understand the total, not a part of anything... It emphasizes learning must be explained in terms of the “wholeness” of the problem. It differs from cognitivism in this way that phenomenology stresses the affective and the cognitivism gives emphasis on cognitive aspect. Because each individual has specific needs and interests related to his/her self-fulfillment and self-realization. This implies that in this case curriculum must be humanistic. Here subjective experience is given importance in comparison to objectivity.

Some writers tend to be cognition-oriented. However, one proposal should be that behaviorist components are needed for planning and developing a sound curriculum. Further, humanistic components of teaching-learning must be incorporated into the curriculum.

4. Increasing Interest in Constructivist Curriculum

Constructivism is a theory about the nature of knowledge. While there are different interpretations of constructivism, their common denominator seems to be a belief that knowledge is created by people and influenced by their values and culture. It is more popular with its two views—cognitive view exemplified by Piaget and the social view exemplified by Vygotsky. The former posits that people develop universal forms or structures of knowledge that enable them to experience reality; knowledge is individually constructed and is based on the knower's intellectual development as one experiences reality during physical and social activity. Here the teacher's role as facilitator is to pose problems that challenge children's conception of reality. On the other hand, social constructivism posits that knowledge is co-constructed through social and cultural contexts, rendering reality non-

objective. Knowledge, socially constructed as reality is created during physical and social activity. The teacher's role is to be a collaborator who participates with the children in constructing reality by engaging in open-ended inquiry that elicits and addresses student misconceptions.

Thus, constructivism is a theory of learning based on the principle that learners construct meaning from what they experience; thus, learning is an active, meaning-making process. Curriculum development from the constructivist point of view generally follows fourtenets.

1. Human mind has the ability to represent through symbols; language is one of the major symbol systems having a primary relationship to thinking and learning; meaning is also created and expressed through other symbol systems;
2. Individual is the active constructor of meaning rather than passive recipient of knowledge;
3. Learning is complex process involving the interaction of past experience, personal intentions and new experience;
4. Social context is recognized as a crucial element in meaning making process.

Brooks and Brooks (1993) maintain that there are principles of constructivist pedagogy which include posing problem, structuring learning around the primary concepts, seeking and valuing children's point of view adapting curriculum to address student suppositions and assessing children's learning in the context of teaching.

Although constructivism seems to have made its strongest impact on science and mathematics curricula, leaders in other fields are attempting to embody in curriculum units the following principles :

- Units should be problem-focused, requiring the student to solve open-ended contextualized problems.
- Units should enable the students to have access to research and other knowledge in solving problems (generative knowledge).
- Learning strategies (such as the use of matrices and web diagrams) should be taught in the context of solving problems.
- The teacher should provide the necessary scaffolding of structure throughout units.
- Because learning is a social process, teachers should ensure that students spend at least part of their time in group formalism such as cooperative learning.
- Units should conclude by requiring the student to demonstrate learning in some authentic manner.

The recent brain research provides some physiological basis for much of constructivist views of knowledge and the role of the knower in constructing that knowledge. Thus, we need radical change in the design and implementation of educational studies and curriculum. Such curriculum change

would include at its core the recognition and celebration of multiple realities and multiple ways to create express and represent those realities.

To sum up, the above ideas about learning have influenced the shaping of curriculum. The curriculum organization, therefore, parallels the theories of learning. The real thing is that the curriculum developers have choices about selecting and integrating theory of learning. Possibly, they may not have open choice grounded by reasons and conscious decision of the psychological one, rather those decisions are some function of other sources and influences emerged from philosophy and sociology.

Let Us Check Our Progress

1. Give one example each from your MA/MSc in Education Curriculum indicating
(a) behaviorist and (b) cognitivist theories of learning content materials.

LET US SUM UP

Curriculum is an area of vital importance in the field of education. A curriculum means the total situation (or all situations) selected and organized by the institution, and made available to the teacher to operate, and to translate the ultimate aims and goals of education into reality. Our secondary education commission points out that a curriculum does not mean only the academic subjects traditionally taught in the school, but it includes the totality of experiences that a learner receives through manifold activities that go on in the school, in the classroom, library, laboratory, workshop, playgrounds, and in the numerous informal contacts between teachers and pupils.

Foundation of curriculum is always a very important for shaping curriculum design and its construction. In this Unit we have discussed four dimensions of foundations namely philosophical, psychological, sociological and technological foundations. Philosophical foundation gives a rationale of selecting objectives in curriculum. Psychological foundations mostly relates to specially transactional phase. To make the curriculum socially productive and useful cultural involvement, it is very much important to consider curriculum as a process. Finally technological foundation seems to be important as without technology we are not professionally competent to formulate models or draw design of curriculum, the main wheel of the whole educational enterprise.

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ASSIGNMENTS

1. Explain curriculum highlighting its modern nature.
1. Explain the ultimate and specific functions of curriculum.
2. Give your acquaintances with the different types of curriculum.
3. Discuss philosophical foundations of curriculum.
4. How sociological foundations of curriculum may help to construct a cuturally un-biased Curriculum ?—Discuss..
5. Write a note on hidden curriculum from sociological perspective of curriculum development.
6. Critically discuss the needs for philosopical, psychological and sociological foundations of Curriculum.
7. Write notes on : (a) Existentialism and Curriculum, (b) Constructivism and Curriculum.

EDO-01
Fundamentals of Education and Research (Open Course)
Block-4
Measurement and Evaluation

CONTENT STRUCTURE

Introduction

Objectives

4.1 Basic concepts of Measurement and Evaluation

4.1.1 : Concept and Factors of Measurement

4.1.2 : Concept and Factors of Evaluation

4.1.3 : Formative and Summative evaluation

4.1.4 : Continuous and Comprehensive evaluation (CCE)

Let Us Sum up

Suggested Reading

Assignment

INTRODUCTION

In the present age, measurement has influenced the progress in education and psychology too. Today, the age of theoretical education is over, and effort is being made to make education and psychology more and more practical. Under education and psychology are studied different human behaviours and problems. For this, it becomes necessary to measure human behaviours.

Educational measurement is not a new concept. The teacher has been testing students since times immemorial in order to know their progress in studies, and to see what type of behavioural changes have occurred in students, if they are optimal and what direction these behavioural changes have taken. A teacher wants to know the shortcomings of the method of teaching he uses, for which these tests have been found to be very important.

The introduction of evaluation in the educational world is comparatively new. In fact, it was introduced in this field in order to get rid of the serious shortcomings of measurement. From the

beginning of the twentieth century, three types of important progresses were noted down in the field of educational measurement, they were testing, measurement and evaluation.

OBJECTIVES

After going through this unit you will be able to,-

1. Understand the concept and nature of measurement and evaluation
2. Know the concept of Formative and Summative evaluation
3. Understand the Continuous and Comprehensive evaluation (CCE)

Block-4

Unit-1

Basic concepts of Measurement and Evaluation

4.1.1 : CONCEPT AND FACTORS OF MEASUREMENT

Concept of Measurement Generally, to measure and show the weight, length and volume of an object in definite units is called measurement; for example, to show the weight of a person in kilograms, length of cloth in metres and volume of milk in litres. But the field of measurement is very wide. It includes to define any characteristic of any object or person or activity in words, symbols or units.

As far as explaining the qualities of objects, persons and activities is concerned, it has been in vogue from very ancient times, of course, without any definite base of measurement. In the present times, the bases of most of the qualities of objects, persons and activities have been defined; their standards and units have been specified; measuring tools and methods have been devised and methods to demonstrate the results of measurement in brief have been decided. Now, a characteristic of an object, person or activity is described in definite words, symbols and units in brief. Many scholars have attempted to delimit the definition of this process. Most scholars are in agreement with the definition given by **James M. Bradefield**. In his words :

Measurement is the process of assigning symbols to the dimension of phenomenon in order to characterise in order to characterise the status of phenomenon as precisely as possible.

— **James M. Bradefield**

In this definition of measurement only the measurement of qualities of objects and activities has been included, and not the measurement of qualities of persons. Though the persons are included in the objects of the universe; however, the objects are meant to include only concrete materials, so it is necessary to show the measurement of qualities of the persons separately. This definition of Bradefield does not point to any such basis of measurement. We are of the opinion that it should also be necessarily included in it and in that case measurement should be defined as :

Measurement is the process by which a characteristic of an object, person or activity is perceived and understood on specific standards and is described in standard words, symbols or definite units.

Factors of Measurement

The above definition of measurement shows that there are four factors of measurement :

- (1) The object, person or activity any of which characteristic has to be measured.

- (2) The characteristic of that object, person or activity which has to be measured.
- (3) The tools and devices of measuring such characteristic.
- (4) The person who measures it

4.1.2 : Concept and Factors of Evaluation

We are aware that measurement is used to express a trait of an object, person or activity in standard words, symbols or units. In evaluation, these results are analysed and this analysis is done on the basis of certain social, cultural or scientific standards (Norms) and by this analysis, the relative condition of the trait of the object, person or activity is clarified. **James M. Bradefield** has defined this process of evaluation in the following words :

Evaluation is the assignment of symbols to phenomenon in order to characterise the worth or value of the phenomenon usually with reference to some social, cultural and scientific standards.
—James M. Bradefield

If we want to further clarify this definition in simple terms, we can do it in the following words :

Evaluation is the process in which the analysis of the result obtained from measurement of a trait of an object, person or activity is done on the basis of certain social, cultural or scientific standards (Norms), and the relative position of the object, person or activity is determined as relative to that trait.

Factors of Evaluation

Two processes have to be undertaken in evaluation—first, the measurement and the second, analysis of the information or data obtained from measurement. And we are aware that there are the following four factors of measurement :

- (1) The object, person or activity any of which characteristics has to be measured.
- (2) The characteristic of the object, person or process which has to be measured.
- (3) The tools and devices of measuring such characteristic.
- (4) And the person who measures it. There are two factors of analysis of the data or result received from the measurement, and we can assign them serial numbers 5 and 6 respectively, which are :
- (5) Those standards (Norms) on the basis of which the results of measurement are analysed.
- (6) Those devices (logical, mathematical or statistical) with the use of which such analysis is carried out.

4.1.3 : FORMATIVE AND SUMMATIVE EVALUATION

Formative evaluation

Formative evaluation seeks to strengthen or improve a programme or intervention by examining, amongst other things, the delivery of the programme, the quality of its implementation and the organisational context, personnel, structures and procedures. As a change oriented evaluation approach, it is especially attuned to assessing in an ongoing way, any discrepancies between the expected direction and outputs of the programme and what is happening in reality, to analysing strengths and weaknesses, to uncovering obstacles, barriers or unexpected opportunities, and to generating understandings about how the programme could be implemented better.

Formative evaluation is responsive to the dynamic context of a programme. Formative evaluation pays special attention to the delivery and intervention system, but not exclusively. In formative evaluation, the evaluator also has to analyse the intervention logic, the outcomes, the results and impacts.

Evaluators conducting a formative evaluation ask many different kinds of questions and use a variety of methods to address them. Questions are commonly open-ended and exploratory, aimed at uncovering the processes by which the programme takes shape, establishing how things have changed from the original design and why, or assessing soft organisational factors such as the extent of 'buy in' by practitioner staff to the programme's goals and intended outcomes.

Formative evaluation questions also investigate the relationship between inputs and outcomes, which can involve the formulation and measurement of early or short-term outcome measures. These often have a process flavour and serve as interim markers of more tangible longer term outcomes.

Summative evaluation

Summative evaluation looks at the impact of an intervention on the target group. This type of evaluation is arguably what is considered most often as 'evaluation' by project staff and funding bodies- that is, finding out what the project achieved.

Summative evaluation can take place during the project implementation, but is most often undertaken at the end of a project. As such, summative evaluation can also be referred to as *ex post* evaluation (meaning after the event). Summative evaluation is often associated with more objective, quantitative methods of data collection.

Summative evaluation is linked to the evaluation drivers of accountability. It is recommended to use a balance of both quantitative and qualitative methods in order to get a better understanding of

what your project has achieved, and how or why this has occurred. Using qualitative methods of data collection can also provide a good insight into unintended consequences and lessons for improvement

4.1.4 : CONTINUOUS AND COMPREHENSIVE EVALUATION (CCE)

Continuous and Comprehensive Evaluation (CCE) refers to a system of school-based evaluation of students that covers all aspects of students' development. It is a developmental process of assessment which emphasizes on two fold objectives. These objectives are continuity in evaluation and assessment of broad based learning and behavioural outcomes on the other.

In this scheme the term 'continuous' is meant to emphasise that evaluation of identified aspects of students' 'growth and development' is a continuous process rather than an event, built into the total teaching-learning process and spread over the entire span of academic session. It means regularity of assessment, frequency of unit testing, diagnosis of learning gaps, use of corrective measures, retesting and for their self evaluation.

The second term 'comprehensive' means that the scheme attempts to cover both the scholastic and the co-scholastic aspects of students' growth and development

Note :

Continuous and Comprehensive Evaluation, commonly known as 'CCE' is introduced as school based system of evaluation as per Right of Children to Free and Compulsory Education Act, 2009 (RTE Act, 2009), implemented since April 2010. The Act requires that Continuous and Comprehensive Evaluation be implemented for children till the completion of elementary schooling. In view the mandatory requirement under RTE Act, which prohibits any public examination up to Class VIII, it is all the more important for all stakeholders in school education especially teachers understand and use CCE meaningfully to enable each child learn and progress.

LET US SUM UP

Measurement is the process by which a characteristic of an object, person or activity is perceived and understood on specific standards and is described in standard words, symbols or definite units.

Evaluation is the process in which the analysis of the result obtained from measurement of a trait of an object, person or activity is done on the basis of certain social, cultural or scientific standards (Norms), and the relative position of the object, person or activity is determined as relative to that trait.

Formative evaluation seeks to strengthen or improve a programme or intervention by examining, amongst other things, the delivery of the programme, the quality of its implementation and the organisational context, personnel, structures and procedures.

Summative evaluation looks at the impact of an intervention on the target group. This type of evaluation is arguably what is considered most often as ‘evaluation’ by project staff and funding bodies- that is, finding out what the project achieved.

Continuous and Comprehensive Evaluation (CCE) refers to a system of school-based evaluation of students that covers all aspects of students’ development. It is a developmental process of assessment which emphasizes on two fold objectives. These objectives are continuity in evaluation and assessment of broad based learning and behavioural outcomes on the other.

SUGGESTED READINGS

- *J. P. Singhal (1 June 2010). Academic Continuous and Comprehensive Evaluation in Social Science X. Laxmi Publications Pvt Limited. ISBN 978-93-80644-19-6.*
- *Dr. N. K. Sharma (1 June 2010). Academic Continuous and Comprehensive Evaluation in Science X. Laxmi Publications Pvt Limited. ISBN 978-93-80644-18-9.*
- *Poonam Banga (1 August 2010). Solutions to Academic Continuous and Comprehensive Evaluation in Hindi X B. Laxmi Publications Pvt Limited. ISBN 978-93-80644-27-1.*
- *J. B. Dixit (1 February 2010). Comprehensive Mathematics Activities and Projects X. Laxmi Publications. pp. 4-. ISBN 978-81-318-0806-1.*

ASSIGNMENTS

1. What do understand by evaluation ? What is the difference between formative and Summative evaluation ?
2. What is the difference between measurement and evaluation ?
3. What do you mean by CCE?

EDO-01
Fundamentals of Education and Research (Open Course)
Block-5
Research in Education

CONTENT STRUCTURE

Introduction

Objectives

5.1 : Basic concepts in Research

- 5.1.1 : Meaning and nature of research
- 5.1.2 : Concept of educational research
- 5.1.3 : Different types of research in Social Science
 - 5.1.3.1 : Basic, Applied, and Action
 - 5.1.3.2 : Qualitative, Quantitative, and Mixed
 - 5.1.3.3 : Historical, Descriptive, and Experimental

5.2 : Review and Hypothesis

- 5.2.1 : Review of Related Literature- meaning and importance
- 5.2.2 : Hypothesis and Research question

5.3 : Population and Sample

- 5.3.1 : Population and Sample
- 5.3.2 : Sampling techniques-Probability (Simple Random, Stratified Random,) and Non-probability (Incidental, Purposive)

5.4 : Tools of data collection

- 5.4.1 : Criteria of a good research tool.
- 5.4.2 : Nature, Merits and Demerits of tools-Observation, Questionnaire, Interview, Likert scale.

Let Us Sum up

Suggested Reading

Assignment

INTRODUCTION

Welcome to the arena of Educational Research. But before going into the Blok, first ask yourself what is Research? And think about that. In the quest for knowledge, which marks this civilization, research has become an essential part of human activity. Research is a search or investigation directed to the discovery of some fact by careful consideration or study of a subject; a course of critical or scientific enquiry. In this Block, we will discuss the different methods of acquiring knowledge like—authority, tradition, reasoning, etc. Then we will try to understand the basic concepts of scientific inquiry, research and educational research. Then we will discuss some of the types of educational research. Research is a scientific process, so go through the Block thoroughly and critically and evaluate yourself. We hope you will enjoy this Block and it will motivate you to think in new ways.

OBJECTIVES

By the end of this Block you will be able to :

- b define and explain the meaning and nature of scientific inquiry, research and educational research;
- c describe the steps of research ;
- d explain the meaning of basic, applied, longitudinal, cross-sectional, quantitative and qualitative research;
- e differentiate basic and applied, applied and action, longitudinal and cross-sectional, quantitative and qualitative research;
- f cite examples of different types of research;

Block-5

Unit-1

Basic concepts of Research

5.1.1 : MEANING AND NATURE OF RESEARCH

Research is a careful and exhaustive investigation of a phenomenon with an objective of advancing knowledge. Dictionaries describe ‘**Research**’ as “the study of materials and sources in order to establish facts and reach new conclusion.” (Oxf. Dict.) According to Theodorson and Theodorson “it is a systematic and objective attempt to study a problem for the purpose of deriving general principles”. Robert Burns describes it as “a systematic investigation to find solution to a problem.” According to Howard & Sharpe research “is seeking through methodical processes to each to one’s body of knowledge and hopefully to let of others, by the discovery of nontrivial facts and insights”. Redman & Mary have defined research as a systematized effort to gain new knowledge. Two points are clear from the above definitions of Research-it is **systematic** and the main purpose is **advancing or generating knowledge**.

Now the question arises—what are the general methods for acquiring knowledge? How does research differ from these methods? Try to understand these differences.

Nature and Characteristics of Research

Let us learn this area of knowledge step by step.

Research originates with a question or problem. Look around you. The world is filled with unanswered questions, unresolved problems. Everywhere we look, we observe things that cause us to wonder, to speculate, and to ask questions. Consider the unresolved situations that evoke these questions: Why? What’s the cause of that? What does it all mean? These are everyday questions. With questions like these, research begins. And by asking questions, we strike the first spark igniting a chain reaction that terminates in the research process. An inquisitive mind is the beginning of research.

Research requires a clear articulation of a goal. A clear, unambiguous statement of the problem is critical. This statement is an exercise in intellectual honesty. This is basic and is required for the success of any research undertaking. Without it, the research is on shaky ground indeed.

Research requires a specific plan of procedure. Research is not an excursion into happy expectation. It is, instead, a carefully planned attack, a search-and-discover mission explicitly planned in advance. The overall research effort must be explicitly planned and logically designed. Researchers

plan their overall research design and specific research methods in a purposeful way—that is, to yield data relevant to their particular research problem.

Research usually divides the principal problem into more manageable sub problems. The whole is composed of the sum of its parts. That is a universal natural law; that is also a good precept to observe in thinking about one's principal goal in research. We break down principal problems much more frequently than we realize. The researcher usually cannot deal with the principal research problem in toto. To proceed logically, one should closely inspect the principal problem because research will soon cause the appropriate and, in fact, necessary sub problems to float to the surface. By resolving them, we finally resolve the main problem. If researchers don't take the time or trouble to isolate the lesser problems within the major problem, their research projects become cumbersome and unwieldy.

Research is guided by the specific research problem, question, or hypothesis.

Having stated the problem and the attendant sub problems, each sub problem is then viewed through a **construct** called a hypothesis. A hypothesis is a logical supposition, a reasonable guess, and an educated conjecture. It may direct your thinking to the possible source of information that will aid in resolving the research problem through the resolution of each attendant sub problem.

Research accepts certain critical assumptions. In your research, it is important that others know what you assume with respect to your problem. For, if one is to judge the quality of your study, then the knowledge of what you assume as basic to the very existence of your study is vitally important. The assumption must be valid or else the research cannot proceed. An assumption is a condition that is taken for granted, without which the research situation would be impossible.

Research requires the collection and interpretation of data in attempting to resolve the problem that initiated the research. Having now isolated the problem, divided it into appropriate sub problems, posited reasonable questions or hypotheses, and recognized the assumptions that are basic to the entire effort, the next step is to collect whatever data seem appropriate and to organize them in meaningful ways so that they can be interpreted.

Research is, by its nature, cyclical; or more exactly, helical. The research process follows a cycle and begins simply. It follows logical, developmental steps.

Best and Kahn (1999) have described the following *characteristics* of research :

1. Research is directed toward the solution of a problem.
2. Research emphasizes the development of generalization, principles, or theories that will be helpful in predicting future occurrences.
3. Research is based upon observable experiences or empirical evidence.

4. Research demands accurate observation and description.
5. Research involves gathering new data from primary or first-hand sources or using existing data for a new purpose.
6. Research is more often characterized by carefully designed procedures that apply rigorous analysis.
7. Research requires expertise.
8. Research strives to be objective and logical, applying every possible test to validate the procedures employed, the data collected and the conclusion reached.
9. Research involves the quest for answers to unsolved problems.
10. Research is characterized by patient and unhurried activity.
11. Research is carefully recorded and reported.

WHAT IS NOT RESEARCH

Research is not mere information gathering

**Research is not mere transportation of facts
from one location to another**

Research is not merely rummaging for information

Research is not a catchword used to get attention

12. Research sometimes requires courage and intellectual honesty.
13. Research, especially in education, is not value-neutral.

Let us check our progress I :

1. The main purpose of research is _____ .
2. When someone proceeds from specific to general principles then/he is reasoning _____ .
3. Hypothesis means _____ .
4. According to the most of the writers, the first step of scientific inquiry is _____

5.1.2 : CONCEPT OF EDUCATIONAL RESEARCH

We have had a lot of discussion about research, its steps and characteristics. From the above discussion—can you define educational research? Stop, think and progress. Educational research is

an application of scientific method to the study of educational problems. It is also a systematic investigation to gain a better understanding of the educational process. Therefore the steps of educational Research must be the same as mentioned in steps of scientific method. Let us look at some definitions of educational research.

Definition of Educational Research

Travers : Educational research is that activity which is directed towards development of a science of behaviour in educational situation. The ultimate aim of such a science is to provide knowledge that will permit the educator to achieve his goals by the most effective methods.

Lazarsfeld and Sieber : By educational research it is meant here the whole of the efforts carried out by public or private bodies in order to improve educational methods and educational activities in general, whether involving scientific research at a high level or more modest experiments concerning the school system and educational methods.

According to the Report of the **First International Conference on Educational Research** : Research is literally speaking a kind of human behaviour, an activity in which people engage. In education, teachers, administrators, scholars, or others engage in educational research, when they systematically assemble information about schools, school children, the social matrix in which a school system is determined, the characteristics of the learner or the interaction between the school and the pupils.

From the above definitions, you must agree that educational research involves an application of the main principles of scientific research to the solution of different educational problems. Educational research, however, cannot always be viewed as strictly scientific. Because of the nature of problem it attempts to solve, educational research acquires some special features as stated below :

- ☐ A sound philosophy of education must form the basis of evaluating any principles and activities of educational research. Due to the social nature of education, most of the problems are complex and philosophical nature.
- ☐ Educational research demands imagination and insight as well as scientific attitude of mind.
- ☐ An educational problem is generally related with several disciplines like—psychology, philosophy, sociology, anthropology etc. Therefore, educational research demands an inter-disciplinary approach.
- ☐ Many educational research deal with historical, philosophical or comparative data and involve subjective interpretation and deduction.
- ☐ Educational research cannot achieve the degree of precision as in the physical sciences.

- ❑ Most educational research do not require very costly material.
- ❑ Educational research is not only meant for specialist. Any teacher with common sense, intelligence and insight can undertake this type of research, but in the beginning, such persons need some guidance and training from an expert.
- ❑ Most of the results in educational research are not too precise due to the difficulty of controlling of variables.
- ❑ Educational research always aims explicitly at human well-being, hence it is never value-free.
- ❑ Educational research may admit varying paradigms of world view about the reality, hence it may be either of quantitative, qualitative or mixed type.

CLASSIFICATION OF SCIENTIFIC

Knowledge, especially scientific knowledge, can be classified into six categories :

1. **Facts** : an idea or action that can be verified. Example: population of India in the latest census.
2. **Concepts** : rules that allow for categorization of events, places, ideas, etc. Example: a DESK is a piece of furniture (also a concept) designed with a flat top for writing.
3. **Principles** : relationship(s) between/among facts and/or concepts. Example: Maxims of teaching
4. **Hypotheses** : educated guess about relationships (principles). Example: natural intelligence is a better predictor of eco-friendly behaviour than other intelligence.
5. **Theories** : set of facts, concepts, and principles that allow description and explanation. Example : Piaget's theory of cognitive development. and
6. **Laws** : firmly established, thoroughly tested, principle or theory. Example: a fixed interval schedule for delivering reinforcement produces a Scalloping effect on behaviour.

5.1.3 : DIFFERENT TYPES OF RESEARCH IN SOCIAL SCIENCE

Now we are going to discuss about different types of research in social science. Let's start the discussion in a sequential order.

5.1.3.1 : Basic, Applied, and Action

In general, research can be classified as basic research or applied research. Some researchers adopt a more detached, scientific and academic orientation; others are more activist, pragmatic and

reform oriented. This difference in orientation resolves around who consumes the findings and who uses them.

Simply, some use research to advance knowledge, whereas, others use it to solve specific problems. Basic research is for advancing fundamental knowledge and applied research is directed towards specific practical use.

Basic / Fundamental / Pure / Academic Research : Basic research advances fundamental knowledge and often leads to knowledge for knowledge's sake. This type of research has no immediate or planned application, may later result in further research of an applied nature. It is the source of most new scientific ideas and ways of thinking and its primary evidence is the scientific community. According to Travers—"Basic research is designed to add to an organized body of scientific knowledge and does not necessarily produce results of immediate practical value." It is primarily concerned with the formulation of theories or generalization to increase the volume of existing knowledge.

Although pure research may find some practical application in future, it is conducted basically for its own sake without considering the application. This type of research is generally carried out in a laboratory setting or other sterile environment and sometimes with animals. One such example is the development of "**Theory of Operant Conditioning**" by Skinner.

Applied Research : As education is applied in nature, most researches in the field of education is applied in nature. Applied research involves the application of theories or principles developed through basic research to the solution of practical problems. Here the established theories or principles are operationalized in the actual field. The primary audiences of applied research findings are practitioners like teachers, counselors, decision makers etc. According to Travers—"Applied research is undertaken to solve an immediate practical problem and the goal of adding to scientific knowledge is secondary." Applied research, too can build new knowledge. Nonetheless, applied research is essential for nourishing the expansion of knowledge. However, its methodology is not as rigorous as that of basic research. Application of Skinner's theory for the development of **programmed learning** material is an example of applied research in the field of education.

Action Research : A very significant trend in educational research has been the involvement of practitioners of education in research work like—teachers, administrators and others. This approach is called action research. It is a significant variant of applied research, which differs from its other variants with respect to the researcher's involvement in the action process in order to improve them. Here are some definitions given by experts to explain the meaning of Action Research :

Educational action research is an enquiry which is carried out in order to understand, to evaluate and then to change, in order to improve same educational practice (Bassey, 1998)

Action research is a flexible spiral process which allows action (change, improvement) and research (understanding, knowledge) to be advised at the same tense. (Dick, 2002)

Action research is the research a person conducts in order to enable him to achieve his purposes more effectively. A teacher conducts action research to improve his own teaching. A school administrator conducts action research to improve his administrative behaviour. (Corey)

“Action research is a small-scale intervention in the functioning of the real world and a close examination of the effects of such intervension” — (Cohen and Manion, 1985).

After receiving different definition, it can be said that a action research :

1. has a practical, problem solving emphasis.
2. is carried out by individual professions and educators.
3. aim to improve educational process.
4. is undertaken to understand, evaluate and change the process.
5. involves a cyclic process.

Here an action research acts as a practioner in which the researcher undertakes to solve imminent problem and takes quick decisions for the improvement of existing practices. In this context Lehmann and Mehrens oriented research, but with the stipulation that the researcher is the same person as the practioners who will make and live with the decision. “Action researcher is focused on immediate application, not on the development of theory or on general application. Action research is primarily conducted on the immediately available small sample to solve the immediate problem of the same group. According to Corey—the process by which practioners, attempts to study their problems scientifically in order to guide, correct, evaluate their decision and action is called action research.

The simplest approach of action research can be viewed in term of following diagrammatic representation :

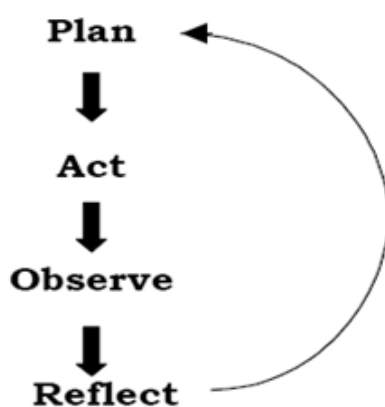


Fig. 5.1 : Simple Action Research Model

Here, the researcher first considers the particular focus of educational problem and then plans to implement some activities to solve the problem. Then he implements a series of activities as considered. Next he observes the outcome. Then he evaluates the outcomes reflecting what has happened and then plans further if necessary. So, if we consider the extended action research, the diagram is as follow :

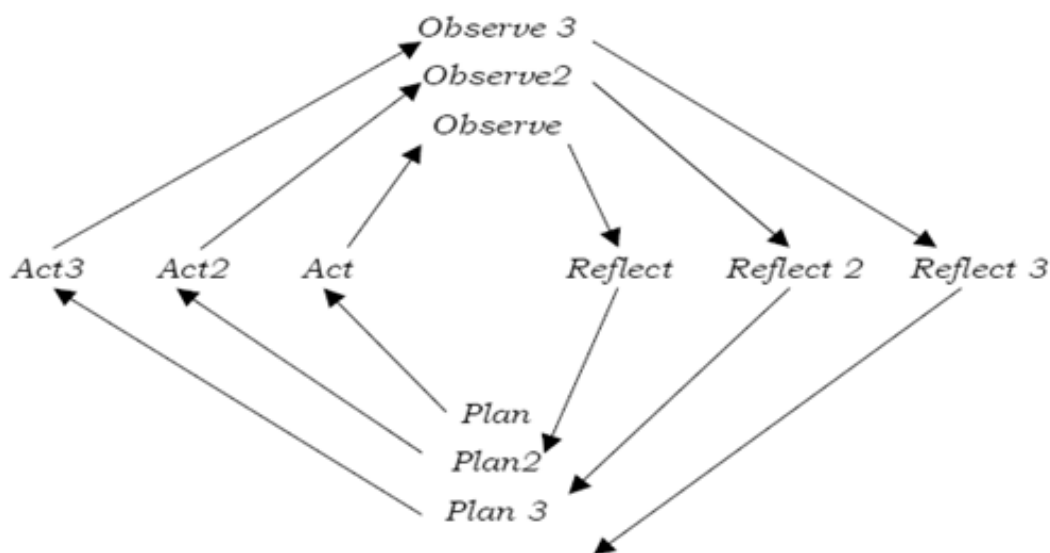


Fig. 5.2 : Extended Model of Action Research

Do not think that there is any conflict between basic or applied research. There is no rigid separation. The difference is only in emphasis and not in method or spirit. Researchers in the two areas cooperate and maintain friendly relations. Anyone can move from one wing to another at different stages of research work. The most important feature of action research is that its outcomes are put into immediate action.

The purposes of action research in educational practice generally fall into five categories : a means for remedying problems diagnosed ; a means for continuous teacher development, a means for injecting additional knowledge and skills in teaching curriculum development or evaluation strategies, a means for improving communication between practising teachers as regular researchers and a means for local theory generation.

5.1.3.2 : Qualitative, Quantitative, and Mixed

The quantitative approach involves the collection of numerical data in order to explain, predict and/or control phenomena of interest, data analysis is mainly statistical. This research employs

quantitative measurements. This approach uses structured questions where the response options have been predetermined and a large number of respondents are involved. The earlier presentation given in this Block basically pertains to quantitative research method. It may be denied as :

“**Quantitative research** is a means for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that numbered data can be analysed using statistical procedures. The final written report has a set structure consisting of introduction, literature and theory, methods, results and discussion.” (Creswell, 2008). Some examples of this type of research approach involve research strategies like Correlational studies, Survey research, Causal-comparative studies, ex-post-facto-studies, quasi-experimental studies, experiential studies, etc. You will get ample scope to understand some of these research strategies in other Blocks of EDC-4 of your course.

Qualitative research is an umbrella term. “It is a way of knowing that assumes that the researcher gathers, organizes and interprets information (usually in words or pictures) with his or her

Knowledge	Specificity	Quantifiability
Domain or Expertise	Subject: domain. Mastery is evidenced by the domain.	Depth: mastery. Is a depth with developed skills, a reasonable approximation of mastery can be assigned.
Conceptual/Procedural Knowledge	Conceptual: being an actor of knowledge is assigned. Procedures: is associated with the idea of a constructed reality.	Conceptual: a relatively complete approach to assigned knowledge.
Mode of Acquisition	Knowledge is gained in any mode. Epistemological: not based on researcher's experience and background.	Knowledge: data on various aspects of the system. Acquired through different situations.
Observability, Cases and Effects	Not observed in action and effect on surroundings, but must attempt to apply learned knowledge.	Clear to apply transfer situations.
Applied Learning	Multiple ways of knowing. We can learn about something in many ways.	One way of learning is through the previous situation.
Prognosis	Forecasted and compared with actual outcomes.	One hypothesis: there is some real effect. Prediction.
Group/Individual	Focus is on transfer, individuals. Knowledge may be learned in form of being studied.	Focus is on groups, naturally selected. Knowledge: important.
Transfer	Study of the whole system from specific variables.	A few variables studied.
Type of Data/Construct	Empirical: the events themselves related to knowledge.	Empirical as evidence.
Type of Data/Analysis	History and theory: focus on comparison.	Historical analysis: Empirical.
Writing Style	Less formal, more personal.	Scientific and impersonal.

eyes and ears as a filter. It is a way of doing that often involves in-depth interviews and/or observations of humans in natural and social settings. It can be contrasted with quantitative research, which relies heavily on hypothesis testing, cause and effect, and statistical analyses.”—(Lichtman, 2006).

Further, Creswell, (2007) puts : “**Qualitative research** is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. The process of research involves emerging questions and procedures, data typically collected in the participant’s setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data. The final writing report has a flexible structure.”

Qualitative methodology and quantitative methodology differ in many aspects though they are not mutually exclusive. The differences between the two approaches are located in the overall form, focus, and emphasis of study. Let us now see to what extent qualitative and quantitative research do differ.

Comparison : Qualitative vs. Quantitative Research (Lichtman, 2006)

Some **examples** of qualitative research strategies may be cited as : Ethnography, Grounded theory, Case Studies, Phenomenal research, Narrative research.

However, a third kind of research is mixed method research. It has features of both quantitative and qualitative research. “**Mixed methods research** is an approach to inquiry that combines or associates both qualitative and quantitative forms. It involves philosophical assumptions, use of qualitative and quantitative approaches, and the mixing of both approaches in a study.” (Creswell & Plano Clark 2007). This is relatively new research method with differing mixing up of strategies. One popular example is Triangulation.

Finally, it is instructive to you that which of these three research approaches are good or bad can not be concluded in a straightforward way. Employing a particular research approach in educational studies basically depends upon many linked considerations, nature of research problem, and the type of world view assumed by the researcher. This world view is popularly known as **paradigm** of research methodology which is underpinned by ontology, epistemology and axiology.

Let us check our progress III :

1. Explain in your own words—Qualitative and Quantitative research in education.
2. Compare between qualitative and quantitative research.

Mixed research :

Mixed methods research is a methodology for conducting research that involves collecting, analysing and integrating quantitative (e.g., experiments, surveys) and qualitative (e.g., focus groups,

interviews) research. This approach to research is used when this integration provides a better understanding of the research problem than either of each alone.

Quantitative data includes close-ended information such as that found to measure attitudes (e.g., rating scales), behaviours (e.g., observation checklists), and performance instruments. The analysis of this type of data consists of statistically analysing scores collected on instruments (e.g., questionnaires) or checklists to answer research questions or to test hypotheses.

Qualitative data consists of open-ended information that the researcher usually gathers through interviews, focus groups and observations. The analysis of the qualitative data (words, text or behaviours) typically follows the path of aggregating it into categories of information and presenting the diversity of ideas gathered during data collection.

By mixing both quantitative and qualitative research and data, the researcher gains in breadth and depth of understanding and corroboration, while offsetting the weaknesses inherent to using each approach by itself. One of the most advantageous characteristics of conducting mixed methods research is the possibility of triangulation, i.e., the use of several means (methods, data sources and researchers) to examine the same phenomenon. Triangulation allows one to identify aspects of a phenomenon more accurately by approaching it from different vantage points using different methods and techniques. Successful triangulation requires careful analysis of the type of information provided by each method, including its strengths and weaknesses.

Mixed method of research– “as a method, it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than either approach alone.”

5.1.3.3 : Historical, Descriptive, and Experimental

Historical :

Historical approach involves a procedure supplementary to observation, a process by which the historian seeks to test the truthfulness of the reports of observations made by others. Its major purpose is to tell “what was.” When research is conducted on the basis of historical data, the researcher is said to have followed historical approach. Historians, philosophers, social psychiatrists, literary men, as well as social scientists, use the historical approach as an aid in visualizing society as a dynamic organism, and its structures and functions as steadily growing and undergoing change and transformation. Social scientists, in particular are concerned with social change as all groups, institutions and personalities undergo changes to a lesser or greater degree.

Descriptive :

Descriptive approach describes and interprets what is. It is concerned with conditions or relationships that exist; practices that prevail; beliefs, point of view, or attitudes that are held; processes that are going on; effects that are being felt; or trends that are development. Its major purpose is to tell “what is”. It seeks to describe a field or a problem by using questionnaires and opinionnaires. The approach is mostly directed towards identifying the various characteristics of the research problem and to create observations conducive to further research. This type of research is becoming very popular these days and is extensively followed by researchers to explore new areas of investigation. Mostly empirical problems are investigated by this approach. While using this approach, usually researcher gains insights into other aspects of the problem which otherwise may not be within the scope of his research proforma.

Experimental :

This approach is a scientific investigation in which an investigator manipulates and controls one or more independent variables and observes the dependent variable or variables for variation concomitant to the manipulation of the independent variables. Its major purpose is to determine “what may be.” It is based on scientific methods in so far as casual relations are studied under controlled conditions. Its applications in social sciences help to explain the variations in an explained variable through the changes or manipulations made in the explanatory variable. Normally changes occurring in independent variable are held to explain the changes that take place in the dependent variable which is supposed to depend on the explanatory character of the independent variable.

We may say that the historical research is past-oriented studies, the descriptive research is present-oriented studies and the experimental research is future-oriented studies. Secondly, we may note that the above three-fold classification of approaches to researches in the field of educational research is not exhaustive. Many experts also classify educational researchers in other different ways. We are following here a popular classification scheme only.

LET US SUM UP

There are some methods of acquiring knowledge- authority, tradition, personal experiences, deduction, induction, media etc. But they are not so reliable and objective. For gaining or advancing objective and reliable knowledge, you have to rely on scientific inquiry or method.

Scientific inquiry is a systematic process. The general steps of scientific inquiry are - defining the problem, reviewing the literature, framing hypothesis, collecting data, analyzing data and drawing conclusions. There is some relationship between scientific inquiry and research. According to Best

and Kahn-research is more systematic process to discover or develop an organized body of knowledge. There are some definite characteristics of research, which are explained in this Block.

Educational research is the application of scientific method to solve the educational problems or to advance knowledge regarding educational process. It has also some specific characteristics.

Educational researches are of various types. The primary focus of basic research is knowledge advancement, but the main focus of applied research is to solve a practical problem. Action research is a variant of applied research. The other types of researches are—quantitative, qualitative and mixed research. Former type uses quantitative data for drawing conclusions, but later uses qualitative data.

SUGGESTED READINGS

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ASSIGNMENTS

1. Explain the characteristics of research. Define educational research. Discuss the special features of educational research.
2. Explain the meaning of basic, applied and action research with suitable examples. Discuss the differences of these researches.
3. What is action research? What are the characteristics of action research? Explain the model of action research.
4. Explain the meaning of 'quantitative and qualitative approach' of educational research. Compare between qualitative and quantitative research.
5. Suggest at least one name of research topic of each type of educational research.

Block-5

Unit-2

Review and Hypothesis

5.2.1 : REVIEW OF RELATED LITERATURE

Etymologically, the word review means to look into something again. Dictionary meaning refers to re-examine or critical evaluation. Review in research parlance is a combination of all these meanings. In order to review related studies the researcher needs to follow a series of steps.

At the first phase it is necessary to collect titles from various sources which appear to be relevant. Books on the specific area, articles in edited books, research papers from journals, abstracts from internet, etc. provide the source of information. A provisional bibliography is prepared for future references.

An initial screening follows to eliminate those appear not much relevant.

The researcher goes through the selected books, articles, journals and takes necessary note on

- (1) the problem,
- (2) theoretical foundation,
- (3) sample,
- (4) tools used,
- (5) mode of data analysis and
- (6) conclusions.

Then these are examined to find what bearing these have upon the study in question, whether there is any methodological weakness, if the interpretations are adequate and if the results of different studies show any contradiction. The researcher may identify if there is any gap of knowledge or if further works are implied in the conclusions.

The reviewed research studies are classified and a summary of review is prepared with necessary comments on the researcher's part. Thus, the meaning of review of related studies, is best manifested through the steps as in above.

5.2.1.1 : PURPOSE OF REVIEW

Obviously, this refers to the question, why do we at all take so much pain for review of literature. Is it only an academic exercise, or it has any practical utility ?

Academic purposes of the review are by this time quite obvious to the readers but the other side of usefulness is by no means negligible. The following issues may be highlighted.

1. After thorough review of literature the researcher gets convinced about the need of his / her research.
2. She / he can understand whether the selected problem is researchable.
3. She / he can get necessary help about the planning of her research—his / her design, sample, tools,
4. analysis etc.
5. She / he can gather logical or empirical support for his / her points of view.
6. The bibliography prepared initially may well be incorporated into his / her own bibliography.
7. At the end of research, she / he can compare her own conclusions with those of others.
8. The researcher can ascertain the merit of his / her own research in comparison to similar other studies and the originality of her work, if any.

Therefore, review of research reports is a function which begins before a research project commences but continues upto the end which makes it an integral part of any research study.

Let Us Check Our Progress

1. Give two reasons for usefulness of review of related literature
2. What precautions would you adopt while reviewing related studies ?

5.2.2 : RESEARCH HYPOTHESIS

A research without hypothesis is blind search of a needle in the hay stack. Hypothesis is a brief statement that exactly mentions the relationship between two or more variables that the researcher expects and plans to examine. In our real life also we frame hypothesis in terms of the cause of some episode. For example, when we say ‘he did not come because he is most likely ill’. If, on enquiry afterwards, it is found that he was really ill, the above assumption is accepted and the cause of absence of the person concerned is established.

But a research hypothesis is not simply a guess-work like that in the above statement. It has several characteristics.

The variables in a research hypothesis may be discrete, continuous or categorised but in any case it is a well-defined concept.

The assumed relationship in the hypothesis is based on logical analysis of the constructs and variables.

Hypothesis specifies the nature of relationship between the variables which may be both positive and negative.

Hypothesis must be testable. In the methodology of research, hypothesis occupies a key role and therefore, once the problem of research is formulated, the researcher needs to go through the details of hypothesis framing usually presented in a separate chapter.

5.2.2.1 : MEANING OF TESTABLE HYPOTHESIS

Meaning of testable hypothesis is whether the hypothesis can be examined by appropriate method either to accept it as true or to reject it as false. At the time of formulating a research problem, the question of testability of hypotheses must be kept in view.

When the concepts involved into the hypothesis is not defined operationally, it may not be testable. As for example, a researcher likes to frame the following hypothesis : Adolescent girls face more problem than boys. In this hypothesis she actually wants to examine the relation between gender (boys & girls) and problem (during adolescence). Gender is well defined as a variable but 'problem' is so vague a word that it cannot be defined as a single variable and therefore, the hypothesis cannot be tested.

Even if the variables are defined, a hypothesis may not be testable. If the researcher has no clear idea about the nature of relationship that may exist between two variables, the concerned hypothesis cannot be tested.

Example : Attitude towards co-education is partly related to the level of education one possesses.

In this hypothesis, attitude towards co-education is well defined and measurable. Level of education can be ascertained and it is a variable because it increases systematically. But who are the persons involved and what does it mean by partly ? Therefore, unless the hypothesis is very specific in assuming a relationship, it is not testable.

To many variables in one hypothesis showing varieties of relationship makes it untestable.

Example : MLL of the neoliterates depends on age education and experience of their parents and teachers.

Parental attributes are uncorrelated with teachers' attributes. Again age, education and experience may have some interrelationship within themselves, obviously, different for parents and teachers. In this situation it is not possible to test the hypothesis.

In sum, hypothesis, when written in an unambiguous statement form assuming a simple relationship which can be verified on the basis of a set of data using appropriate methods and the inference drawn either in favour or against the hypothesis when generalizable, it is called a testable hypothesis.

5.2.2.2 : NEED FOR HYPOTHESIS

Why does a researcher need an hypothesis ? The word has two parts — 'Hypo' which means less than and 'thesis' which means 'what has been proved to true'. Thus hypothesis is the prior stage

of the final decision about the relationship or structure of the variables under study. A thesis can be proved by empirical evidence or by logical arguments or by both. In fact, for scientific research empirical evidence, that is, the facts, data, information etc. forms the primary basis of drawing a conclusion. But empirical evidence have their own limitations. For example, you can prove by actual measurement of one hundred triangles that in each case sum of the three angles is equal to two right angles. But there are still hundreds of triangles left out of your measurement. Therefore, empirical evidences may help you to draw a tentative conclusions inductively which is proved exhaustively when you advance a deductive proof making the inductive conclusion a theorem.

Hypothesis in a research provides us with the probable thesis or the deductive theory that may be proved to be true or false. Unless we have any such probable truth to guide us, in fact we don't have any goal and research becomes a blind searching. A hypothesis speaks us about what to measure or which type of data are needed, who are the persons involved or wherefrom we may get the relevant data, what kind of data we may get and by which method, and what should we do with the obtained data. Therefore, it is obvious that a good hypothesis steers the whole research in the right direction and to the ultimate goal, the truth.

Many researchers struggle with framing hypothesis because, they have clear notion of the goal they want to attain. On the other hand the merit of a research problem can be best judged by how far it is translated into testable hypothesis. Another important point about research hypothesis is that it is the mirror of the research design the researcher has worked out. Therefore, hypothesis is the lifetime of any research endeavour. Thus, a hypothesis,

1. provides the basis of empirical evidences ;
2. reflects the research design ;
3. helps to draw inductive conclusions ;
4. provides the basis of deductive arguments ; and
5. ultimately culminates into a theory, law, or the truth.

5.2.2.3 : CRITERIA OF A GOOD RESEARCH WORTHY HYPOTHESIS

Our experience leads us to ponder over some criteria, though not so rigid, that should be taken into account while judging worth of a hypothesis. The criteria may be listed down as :

The hypothesis :

1. ...must be testable. The hypothesis that is presently testable is superior to the hypothesis that is potentially testable.
2. ...should be in general harmony with other hypothesis in the field of the concerned research.

3. ...should be parsimonious. If two hypotheses are advanced to answer a given problem; the more parsimonious one should be preferred.
4. ...should answer (i.e., be relevant to) the problem.
5. ...should have logical simplicity.
6. ...should be expressed in a quantified form, or susceptible to convenient quantification.
7. ...should have a large number of consequences, should be general in scope... The hypothesis that yields a large number of deductions (consequences) explains more facts or will make more predictions about events that are yet unstudied or un-established.

Block-5

Unit-3

Concepts of Population and Sampling

5.3.1 : INTRODUCTION

This Unit discusses for our understanding of some technical aspects of educational research which purports to extend boundary of knowledge and strives to integrate our piecemeal observations into a generalized body of reliable and valid knowledge. For the sake of economy of observation and getting reliable knowledge with minimum error researchers over the years have formulated the conceptualization of sampling. Sampling per se is a mathematical/statistical concept though it has been much useful in social science research too. Unlike census, it takes into care of a sub set of the whole set of information/data for systematically estimating the nature and the characteristics of the whole constituting all the members (elements) of the whole with the assumption that the wholeness implies homogeneity. Hence, this concept has been now a most powerful tool as well as aid to empirical research.

5.3.1.1 : Population

Population is the entire pool from which a statistical sample is drawn. In statistics, population may refer to people, objects, events, hospital visits, measurements, etc. A population can, therefore, be said to be an aggregate observation of subjects grouped together by a common feature.

A population can be defined by any number of characteristics within a group, which statisticians use to draw conclusions about the subjects in a study. A population can be vague or specific. Examples of population defined vaguely include number of new born babies in North America, total number of tech startups in Asia, average height of all CFA exam candidates in the world, mean weight of U.S. taxpayers and so on. Population can also be defined more specifically—number of new born babies in North America with brown eyes, the number of start-ups in Asia that failed in less than three years, the average height of all female CFA exam candidates, mean weight of all U.S. taxpayers over 30 years of age, among others.

Most times, statisticians and researchers want to know the characteristics of every entity in a population, so as to draw the most precise conclusion possible. This is impossible most times, however, since population sets tend to be quite large. For example, if a company wanted to know whether each of its 50,000 customers serviced during the year were satisfied, it might be challenging, costly and impractical to call each of the clients on the phone to conduct a survey. Since the

characteristics of every individual in a population cannot be measured due to constraints of time, resources and accessibility, a sample of the population is taken.

5.3.1.2 : Sample and Sampling

Even if we have well defined population, for all practical purposes, it is not feasible to collect data from all the individuals in the population unless it is very very small. For most of the psychological and educational variables it is not necessary also. Therefore, the researcher further shortens his population and draws a small segment whom he thinks equivalent to the original population group. In other words, the researcher assumes that any smaller segment of the population has the same characteristics as that of the population because, the elements are homogenous in respect to those characteristics. This smaller segment is known as sample and the process of isolating the sample from the population is known as sampling.

5.3.1.2.1 : MEANING OF SAMPLE AND SAMPLING DESIGN

Sample is not just a casually drawn smaller part of the population but it is that segment of all the population which is selected following sound procedure and having the same characteristics as in the original population. In other words in order to get the required number we need to follow some rules or principles for inclusion or exclusion of a particular element in or from the sample, i.e. we need a careful plan for sampling. The plan of sampling is known as *sampling design*. A sampling design includes both the principles and procedure of sampling.

5.3.1.2.2 : PURPOSE OF SAMPLE

A sample primarily serves two purposes, namely—

- (1) Estimate of parameters and (2) Hypothesis testing.
- (1) *Estimate of parameters*—It is stated earlier that while defining the population we think of some criteria for the inclusion or exclusion of an individual. From statistical perspective these criteria or characteristics are called parameters. Similarly, a sample is selected on the basis of parameters same as the population. But in reality, a sample is drawn from the population and the sampling parameters are attributed to the population, because, it is not practically feasible to isolate the population from the universe. The estimated parameters direct the nature of statistical treatment given to the data and that of inferences drawn.
- (2) *Hypothesis testing*—Hypothesis testing means statistical judgement for acceptance or rejection of an hypothesis. Sample parameters help in framing the hypothesis and also testing it. One cannot collect data from the whole population and test the hypothesis. The researcher applies research tools for data collection to the sample, tests the hypothesis and then generalizes the conclusion for his population.

The other purposes of sampling are in fact its advantages. These are,

- It is economic, as it saves time, energy and effort.
- It is practically feasible.
- A good sample improves accuracy of the research findings.
- Sampling is conducive to our daily life because we are in the habit of drawing conclusions on the basis of observation of samples (though often inadequate).

Sampling is a process of selecting samples from a group or population to become the foundation for estimating and predicting the outcome of the population as well as to detect the unknown piece of information. A sample is the sub-unit of the population involved in your research work. There are a few advantages and disadvantages associated with the sampling process.

A sample is a random selection of members of a population. It is a smaller group drawn from the population that has the characteristics of the entire population. The observations and conclusions made against the sample data are attributed to the population. The information obtained from the statistical sample allows statisticians to develop hypotheses about the larger population. In statistical equations, population is usually denoted with an uppercase 'N' while the sample is usually denoted with a lowercase 'n.'

10. Advantages of Sampling

Among the advantages are that sampling can save cost and human resources during the process of research work. In ICT, sampling does not cause much constraint such as heavy use of tools and technology in predicting the research output.

11. Disadvantages of Sampling

A researcher may not find the information about the population being studied especially on its characteristics. The research can only estimate or predict them. This means that there is a high possibility of error occurrence in the estimation made. Sampling process only enables a researcher to make estimation about the actual situation instead of finding the real truth. If you take a piece of information from your sampling population, and if your reasoning is correct, your findings should also be accurate to a certain degree.

When selecting a sample, it is very important for a researcher to consider the possibility of error during the selection process. In the field of ICT, sampling has little significance because the main

purpose of ICT research is to explore or describe diversity in technology, phenomenon and issues. Another factor is the nature of ICT research which focuses on qualitative approach. Qualitative approach does not make an attempt to quantify or determine the extent of diversity. A researcher can select a sample and describe his/her inquiry based on the research problem. Then, the study proceeds based upon the obtained sample.

You must always remember that qualitative research has a characteristic called saturation point. Saturation point is where a researcher reaches the limit of obtaining information after many attempts to get new information. When you find you are not obtaining new information, it is assumed you have reached the saturation point. Again, saturation point is subjective judgment which a researcher always decide about it in the entire research process.

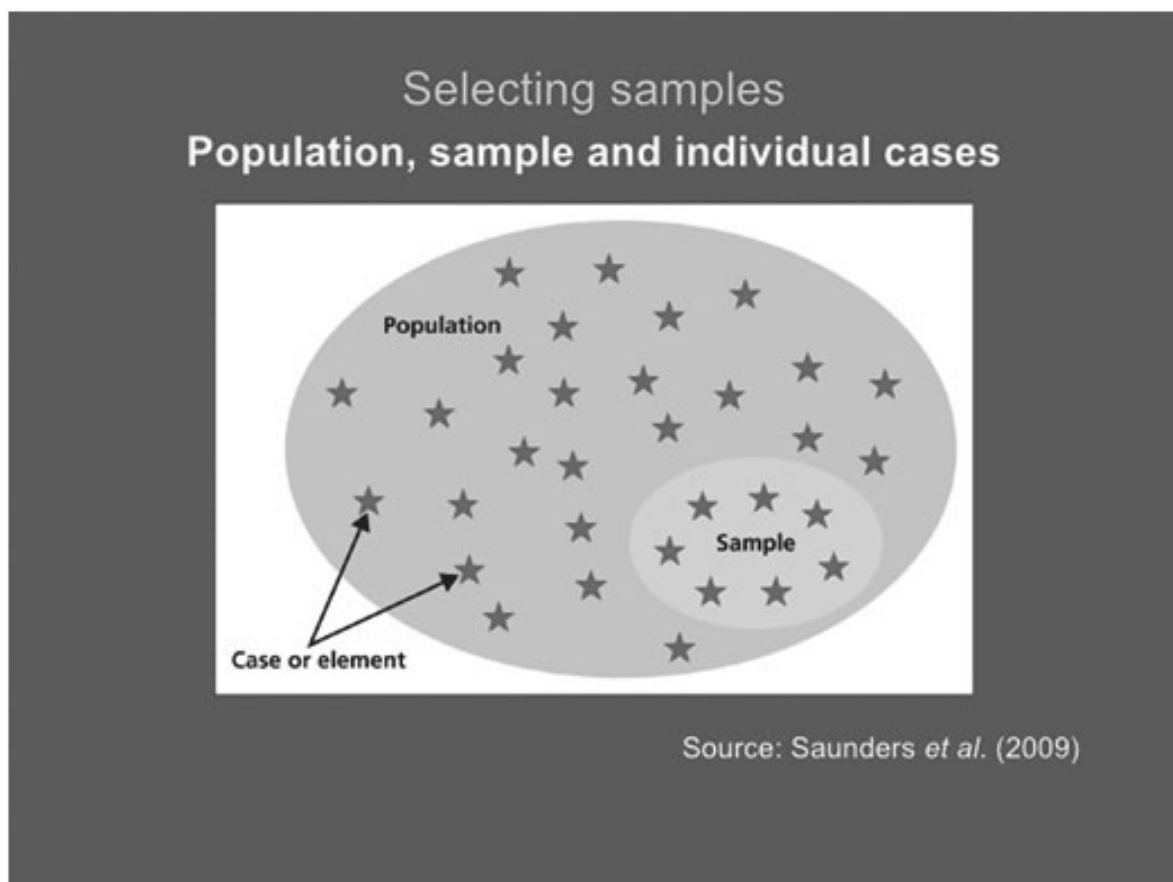


Figure 1.1

5.3.1.2.3 : Types of Sampling

There are two major types of sampling i.e. Probability sampling and Non-probability Sampling, which are further divided into sub types as follows :

1. Probability sampling

Simple Random Sampling

Stratified Sampling

Systematic Sampling

Cluster Sampling

Multi-stage Sampling

2. Non-probability Sampling

Purposive Sampling

Incidental Sampling

Snow-ball Sampling

Quota Sampling

According to syllabus we will discuss few types of sampling techniques :

1. Random Sampling

Every member and set of members has an equal chance of being included in the sample. Technology, random number generators, or some other sort of chance process is needed to get a simple random sample.

Example—A teachers puts students' names in a hat and chooses without looking to get a sample of students.

2. Stratified random sample

The population is first split into groups. The overall sample consists of some members from every group. The members from each group are chosen randomly.

Example—A student council surveys 100 students by getting random samples of 25 freshmen, 25 sophomores, 25 juniors, and 25 seniors.

3. Accidental or Incidental Sampling

Accidental or incidental is that type of sampling in which a researcher pick up data or information's from those who fall into hand or present at the time of research. It continues the process till the completion of the sample size. It is accidental because it is selected accidentally from all type of people comes to face like, teacher, students, house wife, tailors, workers, etc.

4. Judgmental or Purposive Sampling

In judgemental or purposive sampling, the sample is formed by the discretion of the judge purely considering the purpose of study along with the understanding of target audience. Also known as

deliberate sampling, the participants are selected solely on the basis of research requirements and elements who do not suffice the purpose are kept out of the sample. For instance, when researchers want to understand the thought process of people who are interested in studying for their master's degree. The selection criteria will be: "Are you interested in studying for Masters in ...?" and those who respond with a "No" will be excluded from the sample.

Block-5

Unit-4

Tools of data collection

CONTENT STRUCTURE

Introduction

Objectives

5.4.1 : Criteria of Good Research Tools

5.4.2 : Nature, Merits and Demerits of various tools

5.4.2.1 : Observation technique

5.4.2.2 : Questionnaire technique

5.4.2.3 : Interview technique

5.4.2.4 : Likert Scale

Let Us Sum up

Suggested Reading

Assignments

INTRODUCTION

Man being a complex creature possesses different traits such as intelligence, attitude, and aptitude in different measures. For measuring the traits students apply Research tools. So, it is necessary for the students to know the needs and criteria of good research tools. Development and selection of appropriate research tools are therefore, an essential step for conducting a research. It is necessary that the research tools are to be selected / developed as per the objectives of research work. In addition to that, good research tools must possess some essential characteristics that the researcher needs to ascertain. Data can be obtained by directly asking respondents about their search problem or through some indirect ways keeping respondents unaware about the research purpose. Data can be obtained from the person concerned directly or about the person from some other persons. Data can be obtained about some events or objects as well. Data can be obtained through various techniques depending on the objectives of their search as well as availability of resources like manpower, money and time. The researcher is the best judge to decide about the particular technique for data collection. It is therefore essential to have a thorough knowledge of the different data collection techniques and the associated tools.

In this Unit we shall learn aspects of tools and techniques for data collection.

OBJECTIVES

You will be able to :

- Mention the criteria of good research tools;
- Acquainted with the criteria of good research tools;
- Discuss the uses of different types of tools.

5.4.1 : CRITERIA OF GOOD RESEARCH TOOLS

A psychological test has been defined in various ways. According to Anastasi, “A psychological test is essentially an objective and standardized measure of a sample of behaviors.”

According to Freeman “A psychological test is a standardized instrument designed to measure objectivity one or more aspects of a total personality by means of samples of verbal or nonverbal responses, or by means of other behaviors.” Generally, tests are very widely used as tools in educational and psychological measurement and evaluation. A brief classification of the tools used in evaluation is given below.

Tools

1. Tests :

(a) Educational tests

- Achievement test
 - ☐ Teacher made test
 - ☐ Standardized test
- Diagnostic tests

(b) Psychological tests

- Aptitude tests
- Intelligence tests
- Personality tests
- Creativity tests

2. Inventories

- Interest inventory
- Personality inventory

3. Attitude Scale
4. Observation
5. Interview
6. Questionnaire
7. Rating Scale
8. Test of Performance or Performance Test

Technique can be defined as the mode of collecting evidences whereas tools are the instruments that help to employ a particular technique. Techniques that are generally used for data collection can broadly be divided into the following manner—

- **Testing Technique**

Testing Technique requires the use of tests.

- **Non-Testing Technique**

Non testing Techniques can be divided into :

- a. **Inquiry** : Interview, Questionnaire and Rating Scale.
- b. **Observation** : Observation Schedule
- c. **Analysis** : Documents

A good research tool must possess the following essential characteristics :

- **Objectivity** : A good measuring instrument should be objective i.e. it should be free from any subjectivity. Objectivity may be of two types : (i) objectivity of items (ii) Objectivity of scoring. The administration, scoring and interpretation of scores should all be independent of the subjective judgment of the individual examiner. The scores should be identical regardless of who happens to be the examiner. The personal error should be minimum.
- **Reliability** : It signifies the accuracy with which the test measures a particular trait. According to Garrett, “the reliability of a test depends upon the consistency of scores to whom it is applied”.
- **Validity** : Validity is the extent to which it measures, what it claims to measure. According to Garrett “the Validity of a test the degree to which it measures what it intends to measure.” For example if a test is made to measure English vocabulary of class VI, then it should measure English Vocabulary of class VI. A valid test is always reliable but reliable test is not always valid.
- **Economic** : Test must be economic in terms of time and money. Tests can be given in a short period of time are likely to gain the cooperation of the subject and saves the time of

all those involved in test administration. The matter of expense of administering a test is often a significant factor if the testing programme is being operated on a limited budget.

- **Simplicity** : Ease of administration, scoring and interpretation is an important factor in selecting a test, particularly when expert personnel or an adequate budget are not available.
- **Standardization** : A good test is a standardized measure for the comparison of individuals. The materials employed in the test, time limit, oral instructions to be given to the testees, preliminary demonstration, ways of handling queries from testees, the surroundings are standardized and guidance regarding all these be made available in the test manual.
- **Norms** : Norms are scores typical or characteristics of pupils of a given age or grade. A test which provides appropriate and accurate norms, whether they be in the form of age, grade, percentile rank, or standard score, is a good measure. These norms should be meaningful in the context of the purpose for which the test is intended and to the groups of persons with whom it is to be used. It helps in reducing interpretive error and defines the boundary of interpretation.
- **Practicability** : A test must also be practical from the point of view of the time taken in its completion, length scoring, etc. in other words, the test should not be lengthy and the scoring method should not be difficult, not the one which can only be done by highly specialized persons or a scorer needs special training.
- **Comparability** : Scores of standardized test must be comparable over time. For example in general practices we say that 60% marks are not as valuable today as they were 20 years back. This should not be the condition. Test scores of different subjects should be comparable with each other. For example 75% marks in Math's are not comparable to 75% in English.
- **Discrimination ability** : A good test must be able to discriminate between more able and less able students. For this it is necessary that some items in the test must be like that only more able student can solve them.

Let Us Check Our Progress

1. Mention the characteristic of good research tools.
2. Why would you a valid test?—justify.

Environmental condition : As far as possible, the testing environment should be such that light, sound and other comforts are equal and uniform to all the examinees otherwise it will tend to lower the reliability of the test scores. Putting in another way, this means that testing situation will be humane, not threatening.

5.4.2 : NATURE, MERITS AND DEMERITS OF VARIOUS TOOLS

5.4.2.1 : Observation Technique.

Observation is the process in which one or more persons observe what is occurring in some real life situation, and they classify and record pertinent happening according to some planned scheme. It is used to evaluate the overt behaviour of individuals in controlled and uncontrolled situation. Observational methods have occupied an important place in descriptive education research. P.V. Young has pointed out in the following lines :—

“Observation—a deliberate study through the eye—may be used as one of the methods for scrutinizing collective behaviour and complex social institutions as well as the separate units composing of totality”.

5.4.2.1.1 : Types of Observation Technique

Observation Technique may be classified as : —

- Participant, and
- Non-participant observation.

Participant observation is an observation technique in which the observer becomes more or less one of the group under observation and shares the situation as a visiting stranger, an attentive listener, an eager learner, or as a complete participant observer, registering, recording and interpreting behaviour of the group. The observer, thus, plays a double role. He gets the feel of what the various processes and activities of a group mean to the members.

Non-participant observation is used with such groups as those of infants, children or professional persons. The observer takes a position at a place where his presence is the least disturbing to the group but from where he can observe in detail the behaviour of an individual under observation or some specific characteristics of a small group. It permits the use of recording instruments and the gathering large quantities of data.

In another sense, observation Technique may be of two types on the basis of degree of control put in the system of observation :—

- Controlled observation, and
- Un-controlled observation.

Controlled observation is a systematic observation which is based on logic and reasoning. This type of observation is carried out on the basis of a plan previously drawn. In this type of observation, an attempt is made to exercise control over the phenomenon. This is done according to a particular plan, as a result of which it is possible to make an objective study and keep the observation free from bias and prejudices.

Un-controlled observation is made in the natural surroundings. There is no planning on the basis of which observation is made. In this method, the observer does not examine the problem but he is an active participant in the factors and the conditions that are responsible for the problem. Through this participation, he acquires knowledge about social relations and social problem.

5.4.2.1.2 : Advantages of Observation

1. Very direct method for collecting data or information—best for the study of human behavior.
2. Data collected is very accurate in nature and also very reliable.
3. Improves precision of the research results.
4. Problem of depending on respondents is decreased.
5. Helps in understanding the verbal response more efficiently.
6. By using good and modern gadgets – observations can be made continuously and also for a larger duration of time period.
7. Observation is less demanding in nature, which makes it less bias in working abilities.
8. By observation, one can identify a problem by making an in depth analysis of the problems.

5.4.2.1.3 : Disadvantages of Observation

1. Problems of the past cannot be studied by means of observation.
2. Having no other option one has to depend on the documents available.
3. Observations like the controlled observations require some especial instruments or tools for effective working, which are very much costly.
4. One cannot study opinions by this means.
5. Attitudes cannot be studied with the help of observations.
6. Sampling cannot be brought into use.

Let Us Check Our Progress

1. State the uses of observation technique in educational research.
2. State five merits of observation.

5.4.2.2 : Questionnaire

One of the most popular and widely used techniques of data collection used in field surveys is the questionnaire. A questionnaire is a form containing a series of questions and providing space for their replies to be filled in by the respondent himself. According to Barr, Davis and Johnson, “A questionnaire is a systematic compilation of questions that are submitted to a sampling of population from which information is desired”. Lundberg says, “Fundamentally, the questionnaire is a set of

stimuli to which literate people are exposed in order to observe their verbal behaviour under these stimuli”.

5.4.2.2.1 : Characteristics of a good Questionnaire

- It deals with an important or significant topic so that it enthruses respondent to give response.
- It seeks only that data which cannot be obtained from the resources like books, reports and records.
- It is as short as possible, only long enough to get the essential data.
- It is attractive in appearance, neatly arranged and clearly duplicated or printed.
- Directions are clear and complete, important terms are clarified, each question deals with a single idea, and is worded in as simple and clear manner as possible and provides an opportunity for easy, accurate unambiguous response.
- The questions are objective, with no clues, hints or suggestions as to the responses desired. Leading questions are carefully avoided.
- Questions are presented in good psychological order proceeding from general to more specific responses.

5.4.2.2.2 : Advantages of questionnaires

1. Practical
2. Large amounts of information can be collected from a large number of people in a short period of time and in a relatively cost effective way
3. Can be carried out by the researcher or by any number of people with limited affect to its validity and reliability
4. The results of the questionnaires can usually be quickly and easily quantified by either a researcher or through the use of a software package
5. Can be analysed more ‘scientifically’ and objectively than other forms of research
6. When data has been quantified, it can be used to compare and contrast other research and may be used to measure change
7. Positivists believe that quantitative data can be used to create new theories and/or test existing hypotheses.

5.4.2.2.3 : Disadvantages of questionnaires

1. Is argued to be inadequate to understand some forms of information-i.e. changes of emotions, behaviour, feelings etc.

2. Phenomenologists state that quantitative research is simply an artificial creation by the researcher, as it is asking only a limited amount of information without explanation
3. Lacks validity
4. There is no way to tell how truthful a respondent is being
5. There is no way of telling how much thought a respondent has put in
6. The respondent may be forgetful or not thinking within the full context of the situation

Let Us Check Our Progress

1. Mention two nature of a Questionnaire.
2. Mention the merits of Questionnaire in educational research.

5.4.2.3 : Interview Technique

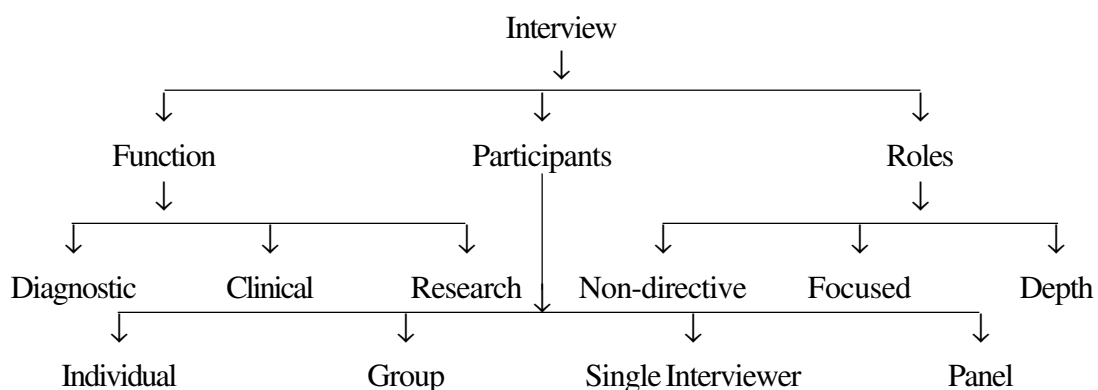
Interview as a research technique is in a sense, an oral type of questionnaire or schedule whereby the subject supplies needed information in a face to face relationship. “The dynamics of interviewing, however, involve much more than an oral questionnaire”. (Good, C. V.) It is based on a process of communication or interaction between the interviewer and the interviewee or respondent.

A good interview is based on proper motivation provided by the interviewer to the respondent in the form of achieving some practical ends or some satisfaction in the relatively more flexible a tool than any written inquiry form and permits of explanation, adjustment and variation according to the situation.

5.4.2.3.1 : Types of Interview

Three main bases of classifying interviews may be distinguished as below :

- Function of interview,
- Number of persons participating and
- Roles assumed by the interviewer and interviewee.



i) Diagnostic Interview :

It is used frequently in clinics as well as by social workers or by a teacher. It proposes to locate the possible causes of an individual's problems through getting information about his past history, family relations and personal adjustment problems, quality of educational performances, etc.

ii) Clinical Interview :

Following the screening of diagnostic interview, clinical interview takes place as a means of introducing the patient to therapy. It may take the form of guiding friends and relatives or a student in their dealings with the patient, or of an exit or termination interview before the patient is discharged from the clinic. It is for remediation.

iii) Research Interview :

For the purpose of research, interview may be used as a tool for gathering data required by the investigator to test his hypothesis or solve his problems of historical, experimental, survey or clinical type.

iv) Individual and Group Interview :

In the past, individual interviews, that is, the practice of interviewing one person at a time, were much more common than the group interviews. These days, however, they are being replaced or supplemented by group interviews. A proper setting for group interview required a group of not more than 10 to 12 persons with social, intellectual and educational homogeneity which ensures effective participation of all. A circular seating arrangement with the interviewer as one of the group is conducive to full and spontaneous participation of all.

v) Single-Interviewer and Panel Interviews :

Both individual and group interviews may be conducted by a single interviewer or a panel of interviewers, according to the design and purpose of the interview. Usually, interviews for selection and treatment purposes are held by a panel of interviewers composed of experts in different but related fields. Interviews for research purposes are usually held by the single investigators the number of interviews in a panel should not be more than 3 to 4 as a larger panel tends to scare and confuse the respondents.

vi) Non-directive, Focused and Depth Interviews :

In relation to the socio-psychological process of interaction, the interviewer and interviewee may assume different roles to suit the requirements of the interview. Non-directive, Focused and Depth interview are terms used for types of interview which are all unstructured or

unrestricted by a definite series of preplanned questions. In these types of interview the subject matter and field of inquiry are certainly definite and preplanned but the interviewer is largely free to arrange the form and order of questions.

The Non-directive interview includes questions of the open-end form and permits much freedom to the interviewee to talk freely about the problems under study.

Directive approach, on the otherhand, is structured and includes questions of the closed type or suggestive and definite in a prepared order.

The Focused interview concentrates on some particular event or experience rather than on general lines of inquiry about it. It aims at determining the responses of individuals to specific communication situations like a movie or a speech. It involves an unstructured form, a non-directive approach, and artistic and empathetic skills.

The Depth Interview is an intensive and searching type of interview with emphasis on such psychological and social factors as attitudes, emotions or convictions. It determines the respondent's degree of detachment or attachment towards an experience or an activity. It usually involves flexibility of interview situation, focus on feelings and a restatement to implied or expressed feelings.

Beside the above classification there are structured and unstructures Interviews as the types of interview on the basis of form or nature of interview.

Structured interview is a type of interview in which the form is already determined. There is everything written about the material to be collected. The interviewer or the field worker has only to carryout the instructions.

Unstructured interview is an even informal type of schedule in which interviewer has full freedom. He can use the language or the words that he likes. There is no binding in regard to the objectives or the methodology.

5.4.2.3.2 : Requisites of a GoodInterview

As a tool of research good interview requires——

- Proper preparation,
- Skill ful execution,
- Adequate recording and interpretation.

i) Preparing for Interview :

The following factors need to be determined in advance of the actual interview :

- a clear conception of the purpose and of what information is needed;
- the kind of interview best suited for the purpose.

- a clear outline, schedule or checklist of the best sequence of questions and simulating comments that will systematically bring out the desired information, and
 - 1 a well thought out plan for recording responses.
- ii) Execution of the Interview :
- 1 The initial task of securing the confidence and co-operation of the subject of building what is called rapport requires and expertness and sensitivity almost amounting to art.
 - 1 Securing desired information through asking the planned sequence of questions should be done in not too rigid a manner but with stimulating and encouraging comments and necessary explanations and recording.
 - 1 The recording device selected should be used without distracting the interviewee.
- iii) Recording and Interpreting Responses :
- 1 It is best to employ, if possible, a device of recording which would retain the actual wording of the responses. Tape-recording is convenient and not too expensive if a tape-recorder is available. It permits a complete and objective analysis at a later time by preserving the actual words as well as the tone of voice and emotional impact of the responses.
 - 1 If the responses to questions in the interview have to be noted down, it can be done either simultaneously with the interview or immediately after it. The former is often found to be of a distracting nature while the latter often fails in being complete in detail. For using either of these devices successfully a skillful and practised hand is necessary.
 - 1 Some times, instead of recording responses, the interviewers tend to record their evaluations of them as the interview goes on. It is, however, advisable to interpret and evaluate the responses later, on the basis of the recording of responses, rather than simultaneously. Hurry and lack of thought can easily distort the process of thorough interpretation required for the purpose.

5.4.2.3.3 : Advantages of interviews

The main advantages of interviews are :

- 1 they are useful to obtain detailed information about personal feelings, perceptions and opinions
- 1 they allow more detailed questions to be asked
- 1 they usually achieve a high response rate
- 1 respondents' own words are recorded
- 1 ambiguities can be clarified and incomplete answers followed up
- precise wording can be tailored to respondent and precise meaning of questions clarified (eg for students with English as a Second Language)

- interviewees are not influenced by others in the group
- some interviewees may be less self-conscious in a one-to-one situation.

5.4.2.3.4 : Disadvantages of interviews

The main disadvantages of interviews are :

- they can be very time-consuming : setting up, interviewing, transcribing, analysing, feedback, reporting
- they can be costly
- different interviewers may understand and transcribe interviews in different ways.

Let Us Check Our Progress

1. Write down the Types of Interview.
2. State some merits of Interview.

5.4.2.4 : Likert Scale

The Likert Scale is an ordinal psychometric measurement of attitudes, beliefs and opinions. In each question, a statement is presented in which a respondent must indicate a degree of agreement or disagreement in a multiple choice type format.

According to Bissonnette (2007), Likert scale was named after inventor, psychologist Resins Likert. It is a measuring scale or a tool used to determine the opinions, behaviors and perceptions of individuals' or consumers. It's an interview or set of questions used to know the agreements of respondents on variety of items, products and services.

Likert scales are usually used for market research. There are normally five possible choices used during the research which includes : strongly agree, agree, neutral, disagree and strongly agree (Bissonete, 2007). There are various tips used in likert scale key among them includes. Words make difficult for the respondents to give their feelings on the items, hence numbered or labeled scales are highly recommended, even scales are normally not allowed as it makes the respondents unable to put across the point views, hence the data becomes useless.

In terms of spacing the numbered scales should be evenly spaced and the respondents or consumers should be given a variety of choices to enhance the market surveys in addition to this unnecessary survey questions should be avoided to as to obtain an elaborate research. Data should be ready by numbering the responses choices for example Agreed is coded 1, Disagree is coded 2 meaning each choice is given to one research question and always remember to obtain the non-numeric concepts data and data whose exact difference is known. Display the likert analyzed data statically meaning the research uses central tendency such mean, mode or medium to fully describe

the data, normally mode is usually suitable for interpretations. Distribution of observations in bar charts is may be deemed necessary.

Usually testing of the hypotheses depends on the nature of questions used during the study, the most commonly used technique is Kristal Wallis test which assists to evaluate the variance techniques further organization of data takes effect where combining of the respondents different choices takes place in this the most common used method is Chi Square technique. i.e. agree/disagree, accept/reject.

5.4.2.4.1 : Advantages of Likert Scales

One can easily make a wider market research to quite a number of respondents or consumers hence the cost of hiring a service provider such as Research companies is not incurred thereby giving the business greater returns on investments (Likert, 1932). Because the target groups or individuals are known collection of real time feedbacks is necessitated due to the openness of the choices. Moreover the speed is enhanced as with likert scales it faster and quick to collect feedbacks within a short period of time hence the business organization can make informed decisions on the products and services offered. Confidentiality is greatly enhanced since users or respondents are allowed invisibility, thus honest feedbacks regarding the products can be obtained since the communications are made private, other than that possibility of covering all choices is enhanced as the researcher can ask as many questions as possible.

Future adjustments can be made on the business products because through the questionnaires the researchers make predictions and create new market strategies in addition there is limited pressure as the respondents have a period of time to answer the questions mostly for online respondents. Provision of direct and reliable assessments of respondents' behaviors can be easily determined through well-constructed scales.

5.4.2.4.2 : Disadvantages of Likert Scales

Some respondents normally lie in the questionnaire due to either biasness or attempt to keep privacy hence leading tom wrong conclusions, sometimes respondents may misunderstand the questions asked and give wrong feedbacks leading to skewed results, because in some cases someone might not be available to explain.

Questionnaires cannot fully determine the respondents' emotions without cooperating face to face conversations that can assist to know the facial expressions, nevertheless some questions are difficult to answer due to their content nature hence making it difficult for the respondents to give proper feedbacks this in turn affects the survey. Skipping of questions is possible more so for online questionnaires, hence the need to make the questions brief and precise (Mogey, 1999). Occasionally,

results are easily faked where individuals want to present a false impression of their attitudes thereby compromising on the surveys.

Intervals between points on the scale do not present equal changes in attitude for all individuals for example the differences between strongly agree and agree and even internal consistency of the scale may be difficult to achieve therefore care must be taken to have uni dimensional items aimed at a single person, groups, event or method.

LET US SUM UP

In this Unit an attempt has been made to make you familiar with research tools. We have presented the essential criteria of a good research tools. learnt the steps for a construction of a research tool. We have also gained knowledge about the needs of a research tool. We have discussed the construction, types of various tools like Observation, Interview, Questionnaire, Rating Scale. The importance of the use of Observation, Interview, Questionnaire, Rating Scale, has been highlighted. These tools and techniques though presented in different headings, they are used in educational researc has per the nature of the problem to be solved through the design of the research.

SUGGESTED READING

1. Sukhia, Mehrotra & Mehrotra (1971) : Elements of Educational Research; Allied Publishers Pvt. Ltd., Delhi
2. Sidhu, K.S. (2002) : Methodology of Research in Education, Sterling Publishers Pvt. Ltd. New Delhi.
3. Koul, L. (2003) : Methodology of Educational Research, Vikas Publishing House Pvt. Ltd. New Delhi.
4. Singh, A.K. (2004) : Tests, Measurements and Research Methods in Behavioural Sciences, Bharati Bhawan, New Delhi.
5. Sahu, B.K. (2005) : Statistics in Psychology and Education, Kalyani Publishers, Ludhiana.
6. Sharma, R.A. (2005) : Mental Measurement and Evaluation, R. Lall Book Depot, Meerut.

ASSIGNMENTS

1. What are research tools? Discuss the steps for construction of any type of research tool. Explain the importance of research tools in educational research.

2. What is a Questionnaire ? Mention the characteristics of a good Questionnaire. Discuss the procedure of constructing a Questionnaire. How can you improve validity of a questionnaire?
3. Define Interview. Describe the different types of Interviews. Explain the uses of Interview as a research tool in education.
4. Describe the types of Observation. What are the basic requisites of good Observation? How can you increase quality of observation as a research technique.
5. Mention any four merits of likert scale.

EDO-01

Fundamentals of Education and Research (Open Course)

Block-6

Statistics in research and Report writing

CONTENT STRUCTURE

Introduction

Objectives

6.1 : Statistics in research

6.1.1 : Scales of measurement

6.1.2 : Central tendencies and Dispersion

6.1.3 : Measures of Variability

6.1.4 : NPC

6.1.5 : Inferential statistics-Parametric and Non-parametric tests

6.2 : Reporting of research

6.2.1 : Research report : Concept and importance

6.2.2 : Basic components of writing research report

Let Us Sum up

Suggested Reading

Assignment

INTRODUCTION

In the present age, measurement has influenced the progress in education and psychology too. Today, the age of theoretical education is over, and effort is being made to make education and psychology more and more practical. Under education and psychology are studied different human behaviours and problems. For this, it becomes necessary to measure human behaviours.

Educational measurement is not a new concept. The teacher has been testing students since times immemorial in order to know their progress in studies, and to see what type of behavioural changes have occurred in students, if they are optimal and what direction these behavioural changes

have taken. A teacher wants to know the shortcomings of the method of teaching he uses, for which these tests have been found to be very important.

The introduction of evaluation in the educational world is comparatively new. In fact, it was introduced in this field in order to get rid of the serious shortcomings of measurement. From the beginning of the twentieth century, three types of important progresses were noted down in the field of educational measurement, they were testing, measurement and evaluation.

OBJECTIVES

After going through this unit, you will be able to–

1. Use different scales of measurement.
2. Compute mean, median, mode from grouped and ungrouped data.
3. Calculate the value of range, AD, SD.
4. Define inferential statistics.
5. Understand different types of parametric and non-parametric tests.
6. Explain the importance of research report.
7. Describe the format given by American Psychological Association (APA).

Block-6

Unit-1

Statistics in research

6.1.1 : SCALES OF MEASUREMENT

Statistics operate on a data set. The data set may be viewed as a two dimensional matrix, very similar to a blank spreadsheet found in many contemporary software packages such as Excel. The rows of the data matrix are observations. In neuroscience, observations are usually organisms (humans, rats, mice) but occasionally they may be other phenomena such as cell cultures. The columns of the data matrix consist of attributes—sex, parietal lobe activity in a PET (positron emission tomography) scan, number of bar presses—measured on the observations. This chapter explains measurement scales, the different mathematical classes for the attributes.

Statisticians call an attribute on which observations differ a variable. The type of unit on which a variable is measured is called a scale. Traditionally, statisticians talk of four types of measurement scales :

- (1) nominal,
- (2) ordinal,
- (3) interval, and
- (4) ratio.

1. Nominal Scales

The word nominal is derived from nomen, the Latin word for name. Nominal scales merely name differences and are used most often for qualitative variables in which observations are classified into discrete groups. The key attribute for a nominal scale is that there is no inherent quantitative difference among the categories. Sex, religion, and race are three classic nominal scales used in the behavioral sciences. Taxonomic categories (rodent, primate, canine) are nominal scales in biology. Variables on a nominal scale are often called categorical variables.

2. Ordinal Scales

Ordinal scales rank-order observations. Class rank and horse race results are examples. There are two salient attributes of an ordinal scale. First, there is an underlying quantitative measure on which the observations differ. For class rank, this underlying quantitative attribute might be composite grade point average, and for horse race results it would be time to the finish line. The second attribute is that individual differences individual on the underlying quantitative measure are either

unavailable or ignored. As a result, ranking the horses in a race as 1st, 2nd, 3rd, etc. hides the information about whether the first-place horse won by several lengths or by a nose. There are a few occasions in which ordinal scales may be preferred to using a quantitative index of the underlying scale. College admission officers, for example, favor class rank to overcome the problem of the different criteria used by school districts in calculating GPA. In general, however, measurement of the underlying quantitative dimension is preferred to rank-ordering observations because the resulting scale has greater statistical power than the ordinal scale.

3. Interval Scales

In ordinal scales, the interval between adjacent values is not constant. For example, the difference in finishing time between the 1st place horse and the 2nd horse need not be the same as that between the 2nd and 3rd place horses. An interval scale has a constant interval but lacks a true 0 point. As a result, one can add and subtract values on an interval scale, but one cannot multiply or divide units. Temperature used in day-to-day weather reports is the classic example of an interval scale. The assignment of the number 0 to a particular height in a column of mercury is an arbitrary convenience apparent to everyone anyone familiar with the difference between the Celsius and Fahrenheit scales. As a result, one cannot say that 30°C is twice as warm as 15°C because that statement involved implied multiplication. To convince yourself, translate these two into Fahrenheit and ask whether 86°F is twice as warm as 50°F. Nevertheless, temperature has constant intervals between numbers, permitting one to add and subtract. The difference between 28°C and 21°C is 7°Celsius units as is the difference between 53°C and 46°C. Again, convert these to Fahrenheit and ask whether the difference between 82.4°F and 69.8°F is the same in Fahrenheit units as the difference between 127.4°F and 114.8°F?

4. Ratio Scales

A ratio scale has the property of equal intervals but also has a true 0 point. As a result, one can multiply and divide as well as add and subtract using ratio scales. Units of time (msec, hours), distance and length (cm, kilometers), weight (mg, kilos), and volume (cc) are all ratio scales. Scales involving division of two ratio scales are also themselves ratio scales. Hence, rates (miles per hour) and adjusted volumetric measures (mg/dL) are ratio scales. Note that even though a ratio scale has a true 0 point, it is possible that the nature of the variable is such that a value of 0 will never be observed. Human height is measured on a ratio scale but every human has a height greater than 0. Because of the multiplicative property of ratio scales, it is possible to make statements that 60 mg of fluoxetine is three times as great as 20 mg.

6.1.2 : CENTRAL TENDENCIES AND DISPERSION

The purpose is to provide a single summary figure that best describes the central location of an entire distribution. It also helps us to compare two or more groups on same dimension. According to Tate, central tendency is “a sort of average or typical value of the items in the series and its function is to summarize the series in terms of this average value”.

The most common measures of central tendency used in education and behavioural sciences are :

- Mean
- Median
- Mode

6.1.2.1 MEAN

The mean is the arithmetic average, or what most people call average. It is also called arithmetic mean. This is the most popular and widely used measure of central tendency. The mean is the sum of all the scores in a distribution divided by the total number of scores.

$$\text{Therefore we can say Mean} = \frac{\Sigma X}{N}$$

Where, M = Mean

ΣX = sum of all scores

N = Number of cases

If X is the variable and $X_1, X_2, X_3, \dots, X_N$ are the values of X, then the arithmetic mean M is equal to

$$M = \frac{\Sigma X}{N}$$

Now we will discuss the computation of mean in different situation :

6.1.2.1.1 Computation of mean in an ungrouped data

When the data are ungrouped, then mean is computed by using the above formula.

Example 1 :

Compute mean of the scores given below : 12, 9, 10, 7, 13, 15, 19

$$\begin{aligned}
 \text{Solution : Mean (M)} &= \frac{\Sigma X}{N} \\
 &= \frac{\Sigma 12 + 9 + 10 + 7 + 11 + 13 + 15 + 19}{8} \\
 &= \frac{96}{8} \\
 &= 12.00
 \end{aligned}$$

6.1.2.1.2 Computation of mean from grouped data

(when scores and frequencies are given)

Example 2 : Compute mean of the following data :

Score	5	8	10	11	12	15	20
Frequency	2	4	3	5	3	7	1

Solution : Here, you have to use the following formula :

$$M = \frac{\Sigma fX}{N}$$

Where X = score

f = frequency

Score (X)	frequency (f)	fX
5	2	10
8	4	32
10	3	30
11	5	55
12	3	36
15	7	105
20	1	20

$$N = 25$$

$$\Sigma fX = 288$$

$$\begin{aligned}
 \text{Therefore, } M &= \frac{\Sigma fX}{N} \\
 &= \frac{288}{25} \\
 &= 11.52
 \end{aligned}$$

6.1.2.1.3 Computation of mean from grouped data (frequency distribution table)

Direct (Long Method) :

Example 3

Class Interval	10-14	15-19	20-24	25-29	30-34	35-39
Frequency	2	4	6	8	3	5

Mean is calculated here by using the same formula just mentioned above :

$$M = \frac{\Sigma fx}{N}$$

Where, f = frequency of each class interval

x = midpoint for each class interval

N = total number of frequency

For this you have to frame the following table :

Class Interval	Midpoint (x)	Frequency (t)	fx
35-39	12	2	24
30-34	17	4	68
25-29	22	6	132
20-24	27	8	216
15-19	32	3	96
10-14	37	5	185

N = 28

$\Sigma fx = 721$

Short-cut (Assumed Mean Method) :

It makes computation comparatively simple. You can avoid lengthy calculations of multiplication of midpoints with corresponding frequency.

Example 4 : Consider example 3 again.

Step 1. Locate the class interval that lies almost at the middle of the distribution. If you come across two class intervals, choose the one with greater frequency. In our example it is '25-29'.

Step 2. Calculate the midpoint of the above class and it is taken as the Assumed Mean (AM). Here it is 27.

Step 3. Calculate the deviation (d) for each class interval. Deviation == (X- AM / i). Simply you can put zero against the class interval containing AM and +1, +2, +3, etc. against class interval of larger score and (-)1, (-)2, (-)3, etc. for smaller score.

Step 4. Calculate fd for each class interval.

Step 5. Find out Σfd .

Class Interval	Midpoint (x)	frequency (t)	Deviation (d)	fd	
35-39	32	5	+2	10	13
30-34	29	3	+1	3	
25-29	27 AM	.8	0	0	
20-24	22	6	-1	-6	
15-19	17	4	-2	-8	-20
10-14	12	2	-3	-6	

$$\begin{aligned} Lfd &= 13-20 \\ &= (-) 7 \end{aligned}$$

Now apply the following formula for computing mean

$$M = AM + \frac{\Sigma fd}{N} \times I$$

Where, AM = Assumed Mean
d = deviation (X-AM / i)
I = size of class interval

$$\therefore M = 27 + \left(\frac{-7}{28} \right) \times 5$$

$$\begin{aligned}
&= 27 - \frac{35}{28} \\
&= 27 - 1.25 \\
&= 25.75
\end{aligned}$$

6.1.2.2 Median

Median (symbolized as Mdn.) is the middle most value of a distribution. It divides the distribution into two equal halves so that an exactly equal number of scores fall above and below this point *i.e.* 50% of the scores will be above the median and the remaining 50% below the median. Since median clearly denotes the position of a distribution, it is also called position average.

6.1.2.2.1 Computation of Median from ungrouped data

Example 5 : 2, 9, 4, 5, 17, 11, 10

Example 6 : 3, 12, 18, 10, 9, 15

First arrange the scores in ascending or descending order.

For Example 5 : 2, 4, 5, 9, 10, 11, 17

For Example 6 : 3, 9, 10, 12, 15, 18

Find out $(n + 1)^{\text{th}}/2$ term of this distribution. Here n = number of cases.

This value is median of the distribution.

For Example 5. $(n + 1)^{\text{th}}/2$ term means $[(7 + 1)/2]^{\text{th}} = 4^{\text{th}}$ term, *i.e.* 9 is the median.

For Example 6. $(n + 1)^{\text{th}}/2$ term means $(6 + 1)/2 = 3.5^{\text{th}}$ term, *i.e.*, between the scores of 10 & 12 that means 3.5^{th} term = $(10 + 12)/2 = 11$, therefore, median = 11.

6.1.2.2.2 Computation of Median from grouped frequency distribution

Example 7. Compute median of the following distribution :

Class Interval	20-24	25-29	30-34	35-39	40-44
frequency	9	15	18	10	12

For computing median from frequency distribution, the following formula is used :

$$Mdn = 1 + \left[\frac{N/2 - fb}{fm} \right] xi$$

[in case of computation of median from lower score]

Where, L = exact lower limit of the median class

N = total number of frequency

fb = total of all frequencies below the median class

fm = frequency of median class

i = size of class interval

Steps for computation of median

1. Convert all class intervals in exact class limits.
2. Find the median class. Here total frequencies (N) is 64. Start computing the cumulative frequencies from lower end to higher end and mark the median class which contains $N/2 = 32$ value therein. Here it is 30-34, so '30-34' is the median class.
3. Find the value of L, fb and fm. Here, $L = 29.5$, $fb = 24$ and $fm = 18$.
4. Calculate median by applying the formula

$$Mdn = L + \left[\frac{N/2 - fb}{fm} \right] \times i$$

Class Interval	Exact Class Limit	frequency	Cumulative frequency
40-44	39.5-44.5	12	64
35-39	34.5-39.5	10	52
30-34	29.5-34.5	18	42
25-29	24.5-29.5	15	24
20-24	19.5-24.5	9	9

- median class

$$\therefore Mdn = L + \left[\frac{N/2 - fb}{fm} \right] \times i$$

$$\therefore Mdn = L + \left[\frac{N/2 - fb}{fm} \right] \times i$$

$$= 29.5 + \left[\frac{64/2 - 24}{18} \right] \times 5$$

$$= 29.5 + \left[\frac{32 - 24}{18} \right] \times 5$$

$$= 29.5 + 2.22$$

$$= 31.72$$

6.1.2.3 Mode

Mode is the value in a distribution that corresponds to the maximum concentration of frequencies. Therefore mode is the most frequently occurring score. It is symbolized as Mo.

6.1.2.3.1 Computation of Mode

Consider the following examples :

Example 8 : 2, 4, 8, 2, 10, 11, 4, 2, 9, 13

Arranging the data, we get – 2, 2, 2, 4, 4, 8, 9, 10, 11, 13

Since the score 2 has the highest frequency ($f = 3$) then the mode is 2.

Example 9 : 11, 11, 12, 12, 13, 14, 14, 17

Here adjacent scores of 11 and 12 have the highest but equal frequencies ($f = 2$), hence the average of these two values will be the mode,

$$\text{i.e., } (11 + 12)/2 = 11.5$$

Example 10 : 33, 37, 37, 40, 41, 42, 42, 45

Here two non-adjacent scores 37 and 42 have the largest but equal frequencies ($f = 2$), hence the scores have two modes, i.e., 37 and 42 and it is bimodal.

There are also possibilities to get multimodal scores.

6.1.2.3.2 Computation of Mode from frequency distribution

Example 11 :

Class Interval	frequency
35-39	4
30-34	7
25-29	10
20-24	8
15-19	5
9-14	2

In this distribution, there are maximum frequencies (10) in the class interval 25-29. This is the modal class and the midpoint of the class i.e., 27 is the mode.

But this is crude mode. True mode can be computed by applying the two formulae :

$$Mo = L + \frac{f_1}{f_1 + f_2} \times i$$

Where, L = the exact lower limit of the modal class

f_1 = frequency of the preceding modal class'

f_2 = frequency of the immediate next modal class

i = size of class interval

In the above example, the modal class is 25-29.

Therefore, L = 24.5, $f_1 = 7$, $f_2 = 8$, i = 5

$$\begin{aligned} Mo &= 24.5 + \frac{7}{7 + 8} \times 5 \\ &= 24.5 + 2.33 \\ &= 26.83 \end{aligned}$$

6.1.2.4 Comparison of Mean, Median and Mode

In some situation, the three measures of central tendency may vary close to each other but in other occasion they may vary. This largely depends on the nature of distribution. When the distribution is perfectly symmetrical the values of mean, median and mode are equal. (Mean = Median = Mode). In a moderately asymmetrical distribution, the values of mean, median and mode do not coincide. In case of positively skewed distribution the value of mean is highest, the mode is the lowest and the median will be about 1/3rd distance from the mean towards the mode. And in case of negatively skewed distribution mean will be the lowest, mode would be the highest and median would be approximately at 1/3rd distance from mean towards mode.

The relationship for moderately skewed distribution may be put in the form of following formula :

$$\text{Mode} = 3 \text{ Median} - 2\text{Mean}$$

Among these three measures, the choice depends on the type of data and objective of the study. However, the mean is highly desirable because mean is more precise, reliable and stable measure. If further statistical analysis is needed, you should go for mean, as the mean is the best for further statistical computation.

Mean is useful :

- When scores are symmetrically or nearly symmetrically distributed around a central point, *i.e.*, distribution is not markedly skewed.

- When the situation demands a measure of central tendency, having greater stability.
- When researcher wants to compute other statistics for inferential purpose.
- When more accuracy and precision is needed.

Limitation of Mean :

It may be affected by extreme values.

It cannot be computed for open-ended class intervals like 10 and above.

It is impossible to calculate mean even if a single observation is missing.

If there are very high and very low values in a distribution, then mean cannot be a true representative.

Median is useful :

When incomplete distribution is given.

When the exact midpoint of the distribution is needed.

When the distribution is markedly skewed, i.e., one or more very extreme cases are there in the distribution.

Limitation of Median :

It is not based on all the observations.

It is not amenable to most of the inferential analysis.

Mode is Useful :

When a quick and approximate measure is required.

When the 1110st typical value is needed like - the most popular belief of sample about a phenomenon.

When data is incomplete or distribution is skewed.

Limitation of Mode :

It is not rigidly defined.

It is not based on all observations.

it is not suitable for further statistical interpretation.

Let Us Check Our Progress

1. Calculate the median of the following frequency distribution

Class Interval	60-65	65-70	70-75	75-80	80-85
Frequency	8	10	15	7	9

2. Calculate mean of the following distribution by assumed mean method:

Class Interval	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Frequency	1	2	4	8	11	9	7	4	3	1

6.1.3 MEASURES OF VARIABILITY

Look at the following two sets of scores :

Set I : 7, 7, 7, 7, 7, 7

Set II : 4, 5, 6, 7, 8, 9, 10

Compute the mean of the two set of scores. What do you get? Yes, it is seven. Here central tendency of both sets is equal. Can you conclude that both the sets are equal in nature? The answer should be 'NO'. So what is the difference? The difference is the spread of scores. In set I, the spread of scores is zero. But in set II, the spread of scores are from 4 to 10. Therefore, you can see that it is possible that two or more set of scores have same mean or median, but may differ in terms of spread. This characteristic of a set of scores is called variability, dispersion, or scatter.

A measure of variability is a numerical index that provides information about how spread out or dispersed the data are or how much variation is present. If there is a little variability in a set of scores you can then call them as **homogeneous**. And if the variability is more enough then they are **heterogeneous**.

Here in this Unit for the purpose of research we shall discuss the following measures of variability:

- Range
- Average deviation
- Standard deviation and Variance

6.1.3.1 Range

It is one of the simplest measures of variability. It is symbolized as 'R'. Range is defined as the difference between the largest score and the smallest score of a distribution. The equation of the range is :

$$R = X_{\max} - X_{\min}$$

Where, $R = \text{Range}$

$X_{\max} = \text{highest score}$

$X_{\min} = \text{lowest score}$

6.1.3.1.1 Computation of Range

Example : Find out the score of the following data

12, 9, 8, 11, 5, 6, 13, 21

Here $X_{\max} = 21$

$X_{\min} = 5$

$\therefore R = 21 - 5 = 16$

6.1.3.1.2 Merits and Limitations of Range

Merits of Range :

- It is the easiest to understand and to compute.
- Good if the distribution is not much skewed.
- If data are at ordinal scale range is the only measure, which is technically meaningful.

Limitations of Range

- It is based on only two extreme scores so it does not provide any information about the variability among intermediate scores.
- Not amenable for further statistical treatments.
- Insensitive to change inside the distribution.

6.1.3.2 Average deviation

It refers to the arithmetic mean of the difference between each score and the mean. It is commonly denoted as AD. AD is the average distance between the mean and the scores in a distribution. It is commonly denoted as AD.

6.1.3.2.1 Computation of AD from ungrouped data

$$\text{Formula : AD} = \frac{\sum |x|}{N}$$

Where, AD = Average Deviation

$|x|$ = Absolute value of the deviation from mean irrespective to positive or negative sign

N = total number of frequencies

Example : Compute AD of the following scores

10, 9, 12, 20, 13, 17, 15, 8

Here, Mean = 13

Score (x)	$ x = X - M$
10	3
9	4
12	1
20	7
13	0
17	4
15	2
8	5
	$\Sigma x = 26$

$$AD = \frac{\Sigma |fx|}{N} = \frac{26}{8} = 3.25$$

6.1.3.2.2 Computation of AD from grouped data

Formula : $AD = \frac{\Sigma |fx|}{N}$

Where, $|fx|$ = product of frequency and corresponding deviation from mean irrespective of positive or negative sign

Example : Compute AD of the following frequency distribution

Class Interval	10-14	15-19	20-24	25-29	30-34	35-39
Frequency	4	9	8	7	6	5

Solution :

Class Interval	X (midpoint)	f	fx	x	fx
35-39	37	5	185	12.82	64.1
30-34	32	6	192	7.82	46.92
25-29	27	7	189	2.82	19.74
20-24	22	8	176	2.18	17.44
15-19	17	9	153	7.18	64.62
10-14	12	4	48	12.18	48.72
		N = 39	$\Sigma fx = 943$		$\Sigma fx = 261.54$

$$\therefore M = \frac{\Sigma fx}{N} = \frac{943}{39} = 24.18$$

$$\therefore AD = \frac{\Sigma |fx|}{N}$$

$$= \frac{261.54}{39}$$

$$= 6.71$$

6.1.3.2.3 Merits and Limitations of AD

Merits of Average Deviation :

- Readily comprehensible
- Easy to compute
- Affected less by extreme values compared to Standard Deviation.

Limitations of Average Deviation :

- Not suitable for open-ended classes.
- It ignores the sign.
- Not amenable for further statistical treatment.

6.1.3.3 Standard Deviation

Standard Deviation is the most stable index of variability. You must observe that when you calculate AD, the sign of deviation from the mean were not considered. In order to avoid the

discrepancy, instead of the actual values of deviation you may consider the squares of deviations. The outcome is called **variance**, and the square root of the variance is known as Standard Deviation (designated as SD). Therefore, it can be said that standard deviation is the square root of the mean of the square deviations of the scores from the mean. The SD of the sample and population are generally denoted as 'S' and 'G' respectively.

$$\text{Therefore, SD (S or G)} = \sqrt{\frac{\sum X^2}{N}}$$

Where, X^2 = squares of deviation of score from mean ($X - M$)

N = total number of scores

Remember that, deviations are calculated always from mean, not median or mode. The value of SD is always positive.

6.1.3.3.1 Computation of SD from ungrouped data

$$\text{Formula : SD} = \sqrt{\frac{\sum X^2}{N}}$$

or,

$$\text{SD} = \sqrt{\frac{\sum x^2}{N} - C^2}$$

Where, x = deviation of each score from mean

N = total 110. of scores

C^2 = square of correction between assumed mean and computed mean

Example : Compute SD of the following test scores of 10 students

20, 12, 15, 11, 18, 9, 20, 11, 13, 14

Long Method

X	x	x^2
20	5.7	32.49
12	(-) 2.3	5.29
15	0.7	0.49
11	(-) 3.3	10.89
18	3.7	13.69
9	(-) 5.3	28.09

20	5.7	32.49
11	(-) 3.3	10.89
13	(-) 1.3	1.69
14	(-) 0.3	0.09
N = 10	$\Sigma x = 143$	$\Sigma x^2 = 136.1$

$$SD = \sqrt{\frac{\Sigma x^2}{N}}$$

$$= \sqrt{\frac{136}{10}} = 3.69$$

6.1.3.3.2 Computation of SD from grouped data

(with class interval)

Calculate SD of the following distribution :

Class Interval	5-9	10-14	15-19	20-24	25-29	30-34	35-39
f	2	5	6	7	7	5	2

Formula : $SD = \sqrt{\frac{\Sigma fx^2}{N}}$

Where x = deviation of each score (midpoint) from mean. (X – M).

Class	Midpoint	f	tx	Deviation from Mean (x)	X ²	fx ²
35-39	37	2	74	14.85	220.52	441.04
30-34	32	5	160	9.85	97.02	485.10
25-29	27	7	189	4.85	23.52	164.64
20-24	22	7	154	-0.15	0.022	0.154
15-19	17	6	102	-5.15	26.52	159.12
10-14	12	5	60	-10.15	103.02	540.10
5-9	7	2	14	-15.15	229.52	459.04
	N = 34	$\Sigma fx = 753$				$\Sigma fx^2 = 2249.19$

$$\text{Mean} = 753/34 = 22.15$$

$$SD = \sqrt{\frac{\sum fx^2}{N}}$$

$$= \sqrt{\frac{2240.19}{34}}$$

$$= 8.13$$

Short Method (Using Assumed Mean)

$$\text{Formula : } SD = i \sqrt{\frac{\sum fx'^2}{N} - C^2}$$

$$= i \sqrt{\frac{\sum fx'^2}{N} - \left[\frac{\sum fx'}{N} \right]^2}$$

Where, i = size of class interval

x' = deviation from assumed mean

Consider the previous example

Class Interval	Midpoint X	f	x'	fx'	fX'^2
35-39	37	2	+3	6	18
30-34	32	5	+2	10	20
25-29	27	7	+1	7	7
20-24	22 (AM)	7	0	0	0
15-19	17	6	-1	-6	6
10-14	12	5	-2	-10	20
5-9	7	2	-3	-6	18
	N = 34		$\sum fx' = 1$	$\sum fx'^2 = 89$	

$$\begin{aligned}
 SD &= \sqrt{\frac{\sum X^2}{N} - \left[\frac{\sum X}{N} \right]^2} \\
 &= \sqrt{\frac{89}{34} - \left[\frac{1}{34} \right]^2} \\
 &= \sqrt{2.62 - (0.02)^2} \\
 &= \sqrt{2.62 - 0.0004} \\
 &= \sqrt{2.6196} \\
 &= 1.618
 \end{aligned}$$

6.1.3.3.3 MERITS AND LIMITATIONS OF SD

Merits of Standard Deviation :

- Based on all observations.
- Suitable for further statistical treatment.
- Least affected by fluctuations of sampling.

Limitations of standard Deviation :

- Difficult to compute.

Let Us Check Our Progress

1. Distinguish between AD and SO.
2. Mention at least two uses of SD in educational research.

LET US SUM UP

Data refers to the set of observations. There are different types of scales for collecting data. They are nominal, ordinal, interval and ratio scales. The operations to be performed depend on the type of measured scaled used. In research the data can be presented in three types of graphs- histogram, polygon and ogive. Two important features of any data are central tendency and variability. Central tendency describes the central position of any distribution. There are generally three

types of measures of central tendency- mean, median and mode. Variability tells about the spread of the scores. Variability can be measured different ways. We have discussed three types- range, average deviation and standard deviation.

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ASSIGNMENT

1. What do you mean by levels of measurement? Explain the meaning of different levels of measurement with suitable examples.
2. What is central tendency? Explain the different ways to measure central tendency.
3. Find out mean of the following scores :

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	22	40	52	70	65	10	19	21

4. Calculate median of the following distribution :

Class Interval	1-5	6-10	11-15	16-20	21-25	26-30	31-35
Frequency	7	10	15	32	24	18	9

5. Define mean, median and mode.
6. When should mean, median and be used?
7. What are the relative advantages of mean and median?
8. Draw a histogram from the data given below :

Class interval	100 -109	110 -119	120 -129	130 -139	140 -149	150 -159	160 -169	170 -179	180 -189	190 -199
Frequency	7	7	2	6	8	38	11	15	4	2

Superimpose a frequency polygon upon this histogram.

9. Draw a ogive from the data' given in assignment no. 8.
10. What do you mean by variability? What are the different measures of variability? Mention their merits and demerits in statistics.
11. Consider the following frequency distribution table :

Class interval	100 -109	110 -119	120 -129	130 -139	140 -149	150 -159	160 -169	170 -179	180 -189	190 -199
Frequency	7	7	2	6	8	38	11	15	4	2

Compute average deviation, standard deviation, and variance.

ANSWERS TO 'CHECK YOUR PROGRESS'

1. 72.14
2. 44.6

6.1.4 : NPC : CONCEPT AND CHARACTERISTICS

INTRODUCTION

This Section presents the concept, characteristics and use of normal distribution in relation to the educational evaluation and research. Moreover, this Section likes to give you some basics of inferential statistics as well as the ways how we can transform scores for wide comparison and application in educational research.

OBJECTIVES

You will be able to:-

- Explain the concept of normal probability curve
- Discuss the characteristics of normal probability curve and their applications.
- Calculate the z-score and T-Score
- Compute Significance of Mean in case of Large and Small Samples, etc.

6.1.4.1 : NORMAL PROBABILITY CURVE

Probability is a part of our everyday life. In every sphere of our daily life, we face uncertainty and use probability theory whether or not we admit the use of something so sophisticated. When we hear a weather forecast of a 70 percent chance of rain, we change our plans from a picnic to a pool game.

In general, probability refers to the chance that something will happen. Probabilities are expressed as fractions $\left(\frac{1}{6}, \frac{1}{2}, \frac{8}{9}, \text{etc.}\right)$ or as decimals (0.16, 0.50, 0.889, etc.) and range between zero and 1. Assigning a probability of zero means that something can never happen; a probability of 1 indicates that something will always happen.

In probability theory, an event is one or more of the possible outcomes of doing something. If we toss a coin, getting a tail would be an event, and getting a head would be another event. An example of an event closer to your life, perhaps, is being picked from a class of 100 students to answer a question.

The activity that produces such an event is referred to in probability theory as an experiment.

Using this formal language, we could ask the question, "In a coin-toss experiment, what is the probability of the event head?" And, of course, if it is a fair coin with an equal chance of coming down on either side, we would answer " $\frac{1}{2}$ " or "0.5". The set of all possible outcomes of an experiment is called the sample space for the experiment. In the coin-toss experiment, the sample space is

$$S = \{ \text{head, tail} \}$$

Events are said to be mutually exclusive if one and only one of them can take place at a time. Consider again the example of the coin. We have two possible outcomes, heads and tails. On any toss, either heads or tails may turn up, but not both. As a result, the events heads and tails on a single toss are said to be mutually exclusive.

When a list of the possible events that can result from an experiment includes every possible outcome, the list is said to be collectively exhaustive. In our coin example, the list "head and tail" is collectively exhaustive. A collectively exhaustive list sets out all possible outcomes.

The probability of an event may be stated mathematically as a ratio. Probability of an event A , denoted by $P(A)$ is defined as $P(A) = \frac{F(A)}{T(A)}$, where $F(A)$ = Favourable no. of cases and $T(A)$ = Total no. of cases. The range of $P(A)$ is $0 \leq P(A) \leq 1$.

If a fair coin is tossed, either a head (H) or a tail (T) will turn up. The probability that a head will appear is one chance in two. Expressed as a ratio, therefore, the probability of H is $\frac{1}{2}$; of T is $\frac{1}{2}$; and we have:

$$\begin{aligned} P(H + T) &= P(H) + P(T) \\ &= \frac{1}{2} + \frac{1}{2} \end{aligned}$$

If we toss two coins, C_1 and C_2 , at the same time, there are four possible arrangements which the coins may take:

(1)	(2)	(3)	(4)
C_1	C_2	C_1	C_2
H	H	T	T

Both coins (C_1 and C_2) may fall H; C_1 may fall H and C_2 T; C_1 may fall T and C_2 H; or both coins may fall T. Expressed as ratios, the probability of two heads is $\frac{1}{4}$ and the probability of two tails is $\frac{1}{4}$.

Also, the probability of two heads is $\frac{1}{4}$ and the probability of TH combination is $\frac{1}{4}$; and since it obviously makes no difference which coin falls H or which falls T, we may add these two ratios to obtain $\frac{1}{2}$ as the probability of an HT combination. The sum of these probability ratios is =

$$\frac{1}{4} + \frac{1}{2} + \frac{1}{4} = \frac{4}{4} = 1$$

The expected appearance of heads and tails can be expressed as:

$$(H + T)^2 = H^2 + 2HT + T^2$$

in which

$$H^2 = \text{both heads} : 1 \text{ out of 4; probability ratio} = \frac{1}{4}$$

$$2HT = 1 \text{ head } 1 \text{ tail} : 2 \text{ out of 4; probability ratio} = \frac{1}{2}$$

$$T^2 = \text{both tails} : 1 \text{ out of 4; probability ratio} = \frac{1}{4}$$

$$\text{Total} = 1$$

If we toss three coins (C_1), (C_2) and (C_3) simultaneously, there are eight possible outcomes:

(1)	(2)	(3)	(4)
C_1	C_1	C_1	C_1
C_2	C_2	C_2	C_2
C_3	C_3	C_3	C_3
H	H	T	T
H	H	H	H
H	T	H	T
T	H	H	H
T	T	H	T
T	H	T	T
T	T	T	T

We may then define a normal probability curve as :

A normal curve is a graphical plot of the mathematical function represented by the equation

$$f = f(x) = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

where,

$$-\infty < x < +\infty$$

μ = mean and σ = standard deviation,

e and π are two mathematical constants having the approximate values 2.718 and 3.1416 respectively.

μ and σ are known as parameters of this distribution.

Let Us Check Our Progress

1. What do you mean by probability ?
2. Relate normal probability curve and probability ?

6.1.4.2 Characteristics of Normal Probability Curve (NPC) :

The NPC has the following characteristics :

- The Normal Curve is bell shaped.
- The normal distribution has two parameters μ and Standard Deviation = σ .
- Mean = Mode = Median in NPC
- The normal curve is unimodal. (has a single Mode)
- It is perfectly bilateral symmetrical about the mean,

6.1.5 : INFERENCE STATISTICS- PARAMETRIC AND NON-PARAMETRIC TESTS

INTRODUCTION

Educational research consists of systematically organised variables and its ultimate purpose is the discovery of general principles based on observed relationships between variables. If it were necessary to observe all of the individuals in the population about which one wished to generalise, the process would be highly expensive, never-ending and impracticable. The practical solution is to select samples that are representative of that population; then, through observations and analysis of the sample data, the researcher may infer characteristics of the population. Inferential statistics enable the researcher to make generalization or inferences about the population from his observations of the characteristics of samples. In methodology of education perspective the main task of inferential statistical tests is to draw statistical decision about null hypothesis formulated by a researcher in context of his/her researcher problem.

This Unit will help you systematically to be acquainted with Inferential Statistics for testing null hypotheses using both the non-parametric and parametric technique, and interpretation of results, thus emerged.

OBJECTIVES

After going through this Unit, we will be able to :

- Define inferential statistics;
- Define and establish null hypothesis;
- Give the meaning of the term level of significance/confidence;
- Define and illustrate the concept of degrees of freedom;
- State the meaning of two-tailed and one-tailed tests of significance;
- Explain Type I and Type II errors ;
- State the assumptions on which the use of parametric tests are based;
- Describe the situations for using non-parametric tests
- Discuss the difference between parametric and non-parametric techniques;
- Test the null hypothesis and interpret the results ;
- Describe and illustrate the use of chi-square test ;

- Describe and illustrate the use of the median test ;
- Test the significance of the difference between means
- Describe the uses of F-test or analysis of variance ;
- List the basic assumptions in analysis of variance
- Apply analysis of variance (one-way)
- Describe the basic concept of two-way analysis of variance.
- Describe the uses and list the basic assumptions of analysis of co-variance.

6.1.5.1 : INFERENCE STATISTICS FOR TESTING NULL HYPOTHESES AND INTERPRETATION OF RESULTS

6.1.5.1.1 : Inferential Statistics

Research is generally conducted by means of a sample on the basis of which generalizations concerning the population from which the sample was drawn are reached. The researcher computes certain statistics (sample values) the basis for inferring what the corresponding parameters (population values) might be as it is rarely, if ever possible to measure all of the members of a given population. The values of the parameters for a given population are usually unknown. Ordinarily, the researcher draws a single sample from a given population and his problem becomes one of determining how well he can infer or estimate the parameter from the sample statistics. But he can, under specified conditions, predict the parameters from the sample statistics with a known degree of accuracy. The degree to which a sample statistic represents its parameter is an index of the significance of the computed sample statistics. By applying inferential statistics, the researcher makes decisions or draws inferences from sample data, which have wider generalizability.

6.1.5.1.2 : Null Hypothesis (H_0)

A statistical hypothesis is an assumption made about some parameter, i.e., about a statistical measure of population. The commonly used method of stating statistical hypothesis in research is known as *null hypothesis* (H_0). It states that there is no significant difference or relationship between two or more parameters. It concerns judgement as to whether apparent differences or relationships are true differences or relationships or whether they merely result from sampling error. The experimenter formulates for statistical purposes a null hypothesis, a no-difference or no-relation hypothesis. It should be mentioned that, although the null hypothesis is needed for statistical purposes, most actual hypotheses are alternatives to the null, that is, hypotheses that propose that differences will exist.

The latter type of hypothesis is generally known as alternative hypothesis (H_1). Alternative hypothesis is derived from research hypothesis, though it is stated in operational form.

It may seem rather indirect to test a positive hypothesis by testing its alternative, a null hypothesis. But this is precisely what we have to do. The reason is that we can apply a mathematical model in the case of null hypothesis, but there is no easy way for testing alternative hypothesis. When the null hypothesis is not true, there is a multitude of other possible hypotheses, each of which would have to be tested in turn. The null hypothesis is a particular, well-defined, testable case.

Rejecting a null hypothesis provides a stronger test of logic. Evidence that is inconsistent with a particular null or statistical hypothesis provides a strong basis for its rejection. Before a court of law, a defendant is assumed to be not guilty until the not-guilty assumption is discredited or rejected with the support of evidence/data. In a sense the not-guilty assumption is comparable to the null hypothesis.

If it is found, for examples on the basis of statistical test that the difference between the mean achievement of the experimental and the control groups is too great to attribute to the normal fluctuations that result from sampling error, the experimenter may reject the null hypothesis. The researcher may conclude that the experimental variable or treatment probably accounted for the difference in performance, as measured by mean test scores. If, on the other hand, it is found that the difference between means is not great enough to reject the null hypothesis, the researcher fails to reject it and concludes that there is no significant difference and that chance or sampling error may have accounted for any observed difference.

Such statistical decision on rejection of H_0 does not come in any adhoc manner. The decision is made on the basis of some appropriate decision model. This model in inferential statistics is popularly known as sampling distribution of statistics.

6.1.5.1.3 : Level of Significance

The rejection or acceptance of a null hypothesis is based on some level of significance (α) as criterion. In behavioural science research work, it is conventional to use the 0.05 and 0.01 levels of significance as a standard for rejection. When a null hypothesis is rejected at the 0.05 or 5% level of significance ($p < 0.05$), it is said that the chances are 95 out of 100 that the hypothesis is not true and only 5 chances out of 100 that it is true. 0.05 level of significance may also be called 95% level of confidence.

A more stringent test of significance is the 0.01 or level. If a null hypothesis is rejected at this level ($p < 0.01$) the chances are 99 out of 100 that the hypothesis is not true and only 1 chance out of 100 that it is true. So, 0.01 level of significance may also be called 99% level of confidence.

This level of significance on which null hypothesis will be rejected, should be set by the researcher before collecting data.

If the samples are large ($N < 30$ or more than 30), then the distribution of differences between means will be supposed to be a normal one and the critical value approaches the z (sigma) score. In these cases if the z value equals or exceeds 1.96, the researcher may conclude that the difference between means is significant at the 0.05 level and the null hypothesis is rejected at this level. Again, if the z value equals or exceeds 2.58, the researcher may conclude that the difference between means is significant at the 0.01 level and the null hypothesis is rejected at this level. The decision in this case is independent of sample size, however $N > 30$.

If the sample is small ($N < 30$), then the distribution of differences between means is assumed to take the form of t distribution and the shape of the t curve which will vary with the number of freedom. In this case, to test the null hypothesis, we first compute the t ratio in the same manner as Z scores in case of large samples. Then we enter the table of t distribution with $N_1 + N_2 - 2$ degrees of freedom (N_1 and N_2 stand respectively sizes of two samples drawn) and read the values of t given against the row of $N_1 + N_2 - 2$ degrees of freedom and columns headed by 0.05 and 0.01 levels of significance. If the computed t ratio equals or exceeds the values of t read from the Table. We will reject the established null hypothesis at the 0.05 and 0.01 levels of significance respectively. [Pl. see Table-A given is 5.4.9.9]

6.1.5.1.4 : Degrees of Freedom

The number of degrees of freedom on a distribution is the number of observations or observations or values that are independent of each other that can not be deduced from each other. It is denoted by the symbol df . By freedom we mean freedom to vary.

The concept of degrees of freedom is highly important in small sample statistics. When a statistic is used to estimate a parameter number of degrees of freedom (df) available depends upon the restrictions placed upon the observations. One df is lost for each restriction imposed. Therefore, the number of degrees of freedom will vary from one statistics to another. In computing population mean from the sample mean, for example, 1 df is used up or lost and so the number of degrees of freedom is $N - 1$.

A numerical illustration will make it clearer as to why the df used here is $N - 1$. If we have 7 scores. 1, 2, 3, 4, 5, 6 and 7 the mean is 4. we now use this value as estimate of the population mean. The deviations of the scores from the mean 4 are $-3, -2, -1, +1, +2$ and $+2$. The sum of these deviations is zero. Of the 7 deviations, only 6 i.e. $N - 1$. can be chosen freely i.e. independently as the condition that the sum equals to zero restricts the value of the 7th deviate. with this condition we can arbitrarily change any six of the deviates and thereby fix the seventh. We could take the first

six deviates as $-7, -6, -5, +4, +3$, and $+1$, which would mean that for the sum to be equal zero, the seventh has to be $+10$. Similarly, we can try any other changes, and if the sum is to remain zero, one of the seven deviations is automatically determined. Therefore, only 6 (i.e. $7-1$) are free to vary within the restrictive imposed. There are $N - 1$ degrees of freedom.

Whenever a statistic is used to estimate a parameter, the rule is that the df available equals N minus the number of parameters already estimated from the sample. The degrees of freedom will vary with the problem and the restrictions imposed, calculations of the variance and the standard deviation will be based on $N - 1$ independent observations of $N - 1$ degrees of freedom. As the coefficient of correlation (r) depends on the deviations from two means so in case of r , the number of degrees of freedom is $N - 2$.

6.1.5.1.5 : Two-tailed and one-tailed tests of significance

A final point about hypothesis testing must be made regarding the distinction between so called two-tailed and one-tailed tests of significance. The (two and one) tail refers to the tails of probability curves from which the value yielded by the statistical test is interpreted.

Suppose, a null hypothesis was set up that there was no difference, other than a sampling error difference, between the mean achievement scores of boys and girls. we would be concerned only with a difference, and not in superiority or inferiority in achievement of either group. To test this hypothesis. we apply two-tailed test or non-directional test as the difference between the obtained means may be as often in one direction (plus) as in the other (minus) from the true difference or zero : and in determining probabilities we take both tails or sampling distribution. We are hypothesizing that the two means will differ (1111y : either of the two may be higher in mean value.

If we change the above null hypothesis as: boys do not have higher achievement than girls; or boys do not have lower achievement than girls: then each of these hypotheses indicates a direction or the difference. When we are hypothesizing a direction of difference in a definite term. rather than the mere existence of a difference. we make use of one-tailed test or directional test.

6.1.5.1.6 : Decision Making: Type-I and Type-II Errors

Statistical decisions based on evidence observed in samples always involve the possibility of error. Statisticians do not deal with decisions based on certainty. They merely estimate the probability or improbability of occurrences of events.

The purpose of inferential statistics is to make inferences regarding outcomes, based on a sample. When we use inferential statistics to make decisions to reject or not reject a null hypothesis, there are four possible combinations of outcomes.

1. The researcher decides, based on the statistical findings, to reject the null hypothesis when it is false. — Correct decision.
2. The researcher decides, based on the statistical findings, to not reject the null hypothesis when it is true. — Correct decision.
3. The researcher decides, based on the statistical findings, to reject the null hypothesis when it is true. — Wrong decision. [Type-I Error]
4. The researcher decides based on the statistical findings to accept the null hypothesis when it is false. — Wrong decision. [Type-II Error]

Rejecting a null hypothesis when it is really true is known as a *Type I Error*. The probability of committing a Type I error is associated with the level of significance (α) selected. For example, when the researcher rejects a null hypothesis at the 0.05 level, he or she is taking a 5% risk of rejecting a null hypothesis, due to sampling error, that is actually true.

Not rejecting (i.e. accepting) a null hypothesis when it is really false is known as a *Type II Error*. It is usually represented by β . When H_0 is false and the researcher decides on the basis of a test of significance not to reject H_0 , then he or she is likely to commit Type II error.

Setting a level of significance as high as the 0.01 level minimizes the risk of a Type I error. Setting this high level of significance increases the risk of a Type II error. The researcher sets the level of significance based on the relative seriousness of making a Type I or Type II error. In educational research, we want to be particularly careful about a Type I error when making decisions about a new teaching method i.e., we do not want to take a chance on rejecting the null hypothesis (the new method is no better than the existing methods) when it is true. Thus, perhaps we want to use the 0.01 rather than 0.05 level of confidence. In each case, the researcher must decide which type of error is the greater risk. That is, which decision, if wrong, places people at greater risk for not getting what they should.

6.1.5.1.7 : Parametric and Non-parametric Techniques

In inferential statistics, for making the inferences about various parameters, two types of techniques are used: (1) parametric techniques and (2) Non-parametric techniques.

6.1.5.1.7.1 : Parametric Tests

Parametric tests are most powerful tests for testing the significance of the computed sample statistics and should be used if their basic assumptions are assumed met. These assumptions are based on the nature of the distribution of population and on the way the type of scale is used to quantify the data observations. However, according to Glass & Hopkins (1984), some parametric

tests (particularly the t test and analysis of variance) are appropriate even when some assumptions are violated as these are robust tests. The basic assumptions for most parametric tests are:

1. The observations are independent of the selection of any other case,
2. The population values are normally distributed. If not, the nature of the distribution is to be known.
3. The samples have equal, or nearly equal, variances. This condition known as equality or homogeneity of variances and is particularly important to determine when samples are small.
4. The variables described are expressed in interval or ratio scales. Nominal measures (frequency counts) and ordinal measures (ranking) do not qualify for parametric treatment.

t test, z test, Pearson Product Moment Correlation (r), Multiple Regression (R), Analysis of variance (ANOVA), Analysis of covariance (ANCOVA) Multivariate Analysis of variance (MANOVA), etc. are some of the examples of parametric tests, generally used in educational research.

6.1.5.1.7.2 : Non-Parametric Tests

Some statistical tests have been developed especially to take care of the experimental situation in which samples are small and the form of the population distribution is not normal. These techniques have often been referred to as non-parametric or distribution-free techniques. These techniques do not depend upon, the known distribution and parameters of the a population. Though never requiring population normality, in some instances nonparametric tests do involve limited assumptions about the nature of the population distribution. Non-parametric tests are used when :

1. The sample size is small.
2. The nature of the population, from which samples are drawn, is not known to be normal.
3. The variables are represented by frequency counts. (Nominal scale)
4. The variables are expressed in numerical scores which have the strength of ranks. (Ordinal scale)

Sometimes, it is necessary, or preferable, to use a non-parametric test. Non-parametric tests are usually much easier to compute than parametric tests. Another unique value of certain non-parametric tests is that they can be used to treat data which have been measured on nominal or ordinal scale.

Non-parametric tests, because they are based on counted or ranked data rather than on measured values, are less precise, have less power than parametric tests, and are not as likely to reject a null hypothesis when it is false. parametric tests offer more analysis flexibility to the researchers. The

possibilities of categorizing variables in such a way as to simultaneously study relationships between a dependent variable and many independent, as well as interaction relationships between such variable is highly advantageous. Many statisticians suggest that parametric tests be used. If possible, and that non-parametric tests be used only when parametric assumptions cannot be met. Others argue that non-parametric tests have greater advantage than is often attributed to them because their validity is not based on assumptions about the nature of the population distribution, assumption that are so frequently ignored or violated by researchers using parametric tests.

Some examples of non-parametric tests are Chi-Square (X^2) Test, Median Test, Spearman's Rank Order Coefficient of Correlation [ρ , p -Coefficient, ϕ (ϕ)-coefficient, Mann-Whitney U Test, Kolmogorov-Smirnov Test, Sign Test and Wilcoxon Signed Rank Test.

Let Us Check Our Progress On 5.4.9.3

Answer in about 60 words each

1. Define null hypothesis.
2. What is meant by levels of significance?
3. State the assumptions on which the use of parametric tests are based.
4. Mention the characteristics of non-parametric tests.

Block-6

Unit-2

Reporting of research

INTRODUCTION

The purpose of research is not well served unless the findings are made known to others. The findings of research should invariably enter the general store of knowledge. Thus writing a research report is a challenging task. Is there any particular style format for writing research report? This Unit will first try to answer this question. Before submitting the final research report a researcher should check and evaluate the report. Or an interested person can judge and assess a research reported submitted to a University or to the concerned funding agency or to the editor of a scientific journal for publication. This Unit will also highlight the steps to be considered to evaluate a research report. Generally quantitative research report differs from qualitative research report writing. This Unit will highlight this issue.

6.2.1 : RESEARCH REPORT: CONCEPT AND IMPORTANCE

Research report is the systematic, articulate, and orderly presentation of research work in a written form. Reports usually are spread across a vast horizon of topics but are focused on communicating information about a particular topic and a very niche target market. The primary motive of research reports is to convey integral details about a study for marketers to consider while designing new strategies. Certain events, facts and other information based on incidents need to be relayed on to the people in charge and creating research reports is the most effective communication tool. Ideal research reports are extremely accurate in the offered information with a clear objective and conclusion. There should be a clean and structured format for these reports to be effective in relaying information.

A research report is a reliable source to recount details about a conducted research and is most often considered to be a true testimony of all the work done to garner specificities of research.

Importance of Research report

After conducting a research study, a researcher's task is to prepare a research report. A research report is a written document, which communicates the methods and findings of research study to

others. It is more than a summary of findings; it is a record of the research process. Once Charles Darwin expressed “*We naturalists’ life would be a happy one if we had only to observe and never to write.*” But the work of a researcher should be recorded because there is something in a research, which must be uncovered, communicated and offered to the society. The writing of research report is equally challenging as the research itself. The purpose of research report is not to convince the readers but to let them know what has been done, why it was done, what results are obtained and what the conclusions are. It records the purpose, importance, limitations, procedures, findings and conclusions in such a way that may benefit-

- The researcher to clarify and systematize his/her work.
- The other researchers to guide their work of similar nature.
- Others to make use of the findings of the study.

Writing of research report requires imagination, logical analysis, creativity and resourcefulness. The writing differs somewhat depending on whether the study is quantitative or qualitative in nature. Quantitative researches focus on hypotheses testing, whereas qualitative researches are mostly exploratory in nature and bridge a variety of approaches or methods. These differences will be discussed later.

6.2.2 : BASIC COMPONENTS OF WRITING RESEARCH REPORT

6.2.2.1 : STYLE FORMAT OF A RESEARCH REPORT

Now the question arises here-is there any all agreed format for writing a research report. In fact, there are many style formats in writing the research report. However, in order to have uniformity, especially social sciences including education, the international research community prefer the style format suggested by APA. Here we follow the format given by the *Publication Manual of the American Psychological Association* [APA]. APA style is the style of writing used by journals published by the American Psychological Association. The style is documented in the *APA Publication Manual*. APA format described in it is a widely recognized standard for scientific writing in psychology and education. According to this manual there are seven major sections in any research report. Here are brief outlines of each section :

Title Page : It contains title, author’s name, and institutional affiliation.

Abstract : It is a comprehensive summary of the content.

Introduction : It contains a general introduction, review of related literature, purposes of the study, and hypotheses.

Methods : this section may be divided into some subsections-Participants (sample), Apparatus (instrument), and Procedure of the study.

Results : it includes presentation of data and analysis of data.

Discussion : The purpose of this section is to interpret and evaluate the results obtained.

References : It provides a list of all citations in the text of research report. The general principles, in this context, may be cited as :

- Clear communication of ideas, propositions, arguments, etc;
- Continuity of words, concepts, themes from the beginning to the end;
- Smoothness and economy of expression of ideas, logic, etc;
- Correctness of presentation of data, references, date, year, etc.
- Free from personal bias, belief, prejudice, etc.

We shall discuss this format in other way for better understanding. Generally, the components of a research report submitted for a degree requirement consist of three parts-preliminary pages, the main body of the report, and the appendixes. Now we shall describe these stages separately.

PRELIMINARY PAGES

1. **Title page**-The title page usually includes the title of the report, the author's name, the degree requirement being fulfilled, the name and location of the college or university awarding the degree. The title should describe the purpose of the study as clearly as possible.
2. **Approval Sheet**-If any approval required, a page of the report allots space for necessary certificate from the supervisor.
3. **Acknowledgments page**-The acknowledgments page allows the writer to express appreciation to persons who have contributed significantly to the completion of there port.
4. **Preface (if any)**-Sometimes a preface or forward, one or two pages long, follows the acknowledgment page, containing some initial remarks and a brief statement of scope, aim and general character of there search.
5. **Table of contents**-The table of contents is basically an outline of your report that indicates on which page each main section (or chapter) and subsection begins.
6. **List of Tables and figures (if any)**-The list of tables and figures, which is presented on a separate page, gives the number and title of each table and figure and the page on which it can be found.

7. **Abstract (if any)**-The abstract describes the most important aspects of the study, including the problem investigated, the type of participants and instruments, the design, the procedures, the major results, and the major conclusions. Generally, it ranges from 100 to 150 words.

MAIN BODY OF THE REPORT

1. **Introduction**-The introduction section is the first section of the main body of the report and includes a well-written description of the problem, a review of related literature, a statement of the hypothesis, and definition of terms. The introduction also includes operational definitions of terms used in the study that do not have a commonly known meaning.
 1. **Introduction of the Problem**-This is a general introduction of the research. This includes researcher's intention about the research.
 2. **Review of Related Literature**-The review of related literature describes and analyzes what has already been done related to the problem.
 3. **Statement and Title of the study**-Here the researcher clearly states the problem and finally mentions the title of the study.
 4. **Purpose and Objectives of the study**-After stating the purposes the researcher clearly states the objectives of the study.
 5. **Assumption and Hypothesis of the study**-A good hypothesis in a quantitative study states as clearly and concisely as possible the expected relationship (or difference) between two variables, and defines those variables in operational, measurable terms. Researcher should mention the assumptions underlying the hypotheses.
 6. **Delimitation of the study**-Here researcher states how s/he delimits the study in workable form.
 7. **Significance of the Study**-It includes the importance and significance of the study in future.
 8. **Definition of important terms**-Researcher here defines the important terms in the research title.
2. **Method**-The method section includes a description of participants, instruments, design, and procedure.
 1. **Participants**-The description of participants in a quantitative study includes a definition and description of the population from which the sample was selected and may describe the method used in selecting the participants. The description of participants in a

qualitative study will include description of the way participants were selected, why they were selected, and a detailed description of the context in which they function.

2. **Instruments**-The description of each instrument should relate the function of the instrument in the study (for example, selection of participants or a measure of the dependent variable), what the instrument is intended to measure.
3. **Design**-There are different types or approaches of research. Researcher mentions which type of research it is.
4. **Procedure**-The procedure section should describe each step followed in conducting the study, in chronological order, in sufficient detail to permit the study to be replicated by another researcher.
3. **Results**-The results section describes the statistical techniques or qualitative interpretation that were applied during data analysis. Information about the process applied during data analysis should be provided. Tables and figures are used to present findings in summary or graph form and add clarity to the presentation. Good tables and figures are uncluttered and self-explanatory; it is better to use two tables (or figures) than one that is crowded. Tables and figures follow their related textual discussion and are referred to by number, not name or location. Each research finding or result should be discussed in terms of its agreement or disagreement with previous results obtained by other researchers in other studies or hypotheses stated at the start of the study. Over generalization refers to the statement of conclusions that are not warranted by the results and should be avoided.
4. **Discussion (Conclusions and Recommendations)**-The researcher should discuss the theoretical and practical implications of the findings and make recommendations for future research or future action.

THE REFERENCE SECTION

1. **Footnotes**-Although footnotes spread throughout the text of the body, it really is part of the reference section.
2. **References (Bibliography)**-The reference or bibliography section of the report should list all the sources, alphabetically by authors' last names that were directly used in writing the report. Every source cited in the paper must be included in the references, and every entry listed in the references must appear in the paper. The required style manual will guide the format of various types of references.

3. **Appendix**-appendixes include information and data pertinent to the study that either are not important enough to be included in the main body of the report or are too lengthy-for example, tests, questionnaires, and cover letters, raw data, and data analysis sheets.
4. **Index (if any)**-Although an index is very useful for the readers, yet typed reports seldom contain an index.

6.2.2.2 : Some general rules for typing Research Report

- A good quality paper of 8½" x 11" should be used.
- All margin should be 1½"-top, bottom, left and right.
- Only one side of the sheet is used for typing.
- All materials should be double-spaced.
- Throughout the script an indentation of seven spaces should be used at the beginning of paragraphs, quotations, and footnotes.
- Ditto marks should not be used.

6.2.2.3 : APA format reference style

The *APA Publication Manual* now instructs authors to use hanging indents for references, and to use *italics* for titles. The hanging indent is one-half inch (1.25 cm), just like paragraph indents. All titles in references are set in sentence caps, but titles quoted in the text are set in heading caps. No quotation marks are used around titles of articles in references, but quotes are used when citing article titles in the text. The *APA Publication Manual* (2001) contains 95 examples of different reference types (pp. 240-281). Here are a few examples of the most commonly used formats.

For Books

Format : Author's last name, first initial. (Publication date). *Book title*. Additional information.
City of publication : Publishing company.

Examples :

Carson, R. (1956). *The sense of wonder*. New York : Harper and Row.

Cobb, E. (1977). *The ecology of imagination in childhood*. New York : Columbia University Press.

Bogdan, R.C., & Biklen, S.K. (1992). *Qualitative research for education : An introduction to theory and methods*. Boston : Allyn and Bacon.

For Encyclopedia & Dictionary

Format : Author's last name, first initial. (Date). Title of Article. *Title of Encyclopedia* (Volume, pages). City of publication : Publishing company.

Examples :

Merriam-Webster's collegiate dictionary (10th ed.). (1993). Springfield, MA : Merriam-Webster.

For Magazine & Newspaper Articles

Format : Author's last name, first initial. (Publication date). Article title. *Periodical title, volume number (issue number if available)*, inclusive pages.

Note : Do not enclose the title in quotation marks. Put a period after the title. If a periodical includes a volume number, italicize it and then give the page range (in regular type) without "pp." If the periodical does not use volume numbers, as in newspapers, use *p.* or *pp.* for page numbers.

Note : Unlike other periodicals, *p.* or *pp.* precedes page numbers for a newspaper reference in APA style.

Examples :

Henry, W. A., III. (1990, April 9). Making the grade in today's schools. *Time*, 135, 28-31.

Kalette, D. (1986, July 21). California town counts town to big quake. *USAToday*, 9,p. A1.

For Website or Webpage Format :

Online periodical :

Author's name. (Date of publication). Title of article. *Title of Periodical*, volume number, Retrieved month day, year, from full URL

Online document :

Author's name. (Date of publication). *Title of work*. Retrieved month day, year, from full URL.

Note : When citing Internet sources, refer to the specific website document. If a document is undated, use "n.d." (for no date) immediately after the document title. Break a lengthy URL that goes to another line after a slash or before a period. Continually check your references to online documents. There is no period following a URL.

Note : If you cannot find some of this information, cite what is available.

Note : If a document is contained within a large and complex website (such as that for a university or a government agency), identify the host organization and the relevant program or department before giving the URL for the document itself. Precede the URL with a colon.

Examples :

Dove, R. (1998). Lady freedom among us. *The Electronic Text Center*. Retrieved June 19, 1998, from Alderman Library, University of Virginia website : <http://etext.lib.virginia.edu/subjects/afam.html>

Devitt, T. (2001, August 2). Lightning injures four at music festival. The Why? Files. Retrieved January 23, 2002, from <http://whyfiles.org/137lightning/index.html>

This is a general format style of writing a research report. Now the question is do both quantitative and qualitative researchers follow the same research report format? Generally quantitative researchers follow the above mentioned style format. But it may be quite different for the researchers who are trying to write research report in qualitative research.

Let Us Check Our Progress

1. What are the numbers of sections of a research report as mentioned in APA Manual 2001?
2. All margins in research reporting should be———.
3. What portion of research report contains findings and recommendations?
4. Research tools are included in———heading.
5. What do you mean by the following abbreviation within a reference :
 - a. ed
 - b. Ed
 - c. pp

LET US SUM UP

Writing a research report is an important part of any research process. This is not an easy task. There are so many styles to write the report. The researcher may get confused to select the style. However in psychology and education the researchers generally follow the format given by APA Manual. There are seven parts in this format. But for better understanding we consider three major

parts- preliminary, main body, and references. In each part there are many subdivisions. APA also suggests many guidelines for typing and writing the research report. All of them are not included in this unit. Some important instructions have been discussed here. The style of writing of quantitative and qualitative research is not same. The differences were also discussed here. The writing of a research is creative work. Sometimes researcher may deviate the format as given by APA. Therefore before submitting the report a researcher must evaluate his report. The steps of evaluation of a research report have been discussed in the last part of this unit.

SUGGESTED READING

Best, J.W. & J.V. Kahn (1999). **Research in Education** (7th edition). Prentice-Hall of India Pvt. Ltd. New Delhi.

Dwivedi, R. S. (2008). **Research Methods in Behavioural Sciences**. Macmillan Ltd.

Kothari, C. R. (1999). **Research Methodology** (2nd Edition). Wishwa Prakashan, New Delhi.

Koul, L. (1998). **Methodology of Educational Research** (3rd Revised edition). Vikas Publishing House Pvt. Ltd.

Neuman, W. L. (2007). **Social Research Methods : Qualitative and Quantitative Approaches**. (6th Edition). Pearson Education.

Sukhia, S. P., P. V. Mehrotra & R. N. Mehrotra (1991). **Elements of Educational Research**. (3rd Revised Edition). Allied Publishers Ltd.

Singh, A.K. (2002). **Tests, Measurement And Research Methods In Behavioural Sciences**.

Bharati Bhawan.

Johnson, B. & L. Christensen (2008). **Educational Research Quantitative, Qualitative and Mixed Approaches**. (3rd Edition). Sage Publications, New Delhi.

ASSIGNMENT

1. What are the importances of writing a research report?
2. Describe the seven sections of research report as mentioned by APA.
3. Describe preliminary, main body and reference sections of a research report with necessary illustration.

NOTES