DIRECTORATE OF DISTANCE EDUCATION

UNIVERSITY OF JAMMU

JAMMU

SELF LEARNING MATERIAL

B.A. SEM-II

SUBJECT : EDUCATION	**UNIT : I-V**
ED - 201	**LESSON NO.: 1-19**

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COURSE CO-ORDINATOR

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EDUCATIONAL PSYCHOLOGY AND STATISTICS

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SYLLABUS

EDUCATION

Course No. : ED-201 | Title : Educational Psychology and Statistics

Duration of Exam. : 3 Hrs | Total Marks : **100**

Theory Examination : **80**

Internal Assessment : **20**

Objectives of the Course :

To help the students to :

- Understand Nature of Psychology as a scientific discipline and its use in the discipline of Education.
- Understand the Nature of Educational Psychology as a field of applied Psychology.
- Understand the process of Human growth and development through different sequential stages.
- Acquaint students with basic Concepts and Principles offered by different theories of Learning and their implications to learning situations.
- Understand the concept of Transfer of Learning.
- Motivate themselves for efficient and effective learning by understanding basic principles of learning.
- Understand concept of Intelligence and Intelligence quotient.
- Acquaint themselves with use of statistics in Educational situations, and
- Develop in them the skills of graphical representation of data, classification of data, and computation of measures of Central Tendency.

Unit-I

Psychology and Education :

Meaning and definitions of : i) Education ii) Psychology iii) Educational

Psychology. Relationship between Education and Psychology. Difference between Psychology and Educational Psychology.

Human Growth and Development : Meaning and Definitions of Growth and Development, Difference between Growth and Development. Factors affecting Growth and Develoment (Biological and Environmental). Basic Principles governing the process of human growth and development.

Unit-II

Learning : Meaning and Definitions of Learning :

Approaches to Learning - Behaviouristic and Cognitive.

Theories of Learning - Thorndike's Trial and Error Theory - Concept, Experiment, Laws of Learning based on the theory. Educational Implications of the theory.

Geatalt Theory of Learning by Woflgang Kohler, Concept, Experiment, Educational Implications.

Transfer of Learning / Training : Meaning and Definitions of Transfer of Learning / Training. Forms of Transfer of learning, Role of Teacher in facilitating the process of transfer of Learning / Training.

Unit - III :

Intelligence : Meaning and Definitions of Intelligence.

Theories of Intelligence :

Two Factor Theory by Charles Spearman. Description of the Theory, Characteristics of 'g' factor and 's' factors, Educational Implications of the Theory.

Primary Mental Abilities Theory by LL Thurstone : Description of the Theory. Educational Implications of the Theory.

Intelligence Tests : Concept of Intelligence Tests. Uses of Intelligence Tests.

Concepts of I.Q. (Intelligence of Quotient) MA (Mental age) and CA (Chronological age)

Classification of I.Q. gibven by L.M. Terman.

Unit- IV :

Memory and Forgetting : Meaning and Definitions of Memory and Forgetting.

Components of Memory : Learning, Retention, Recall and Recognition.

Types of Memory, Signs of good Memory, Methods of memorizing, Factors responsible for causing Forgetting.

Emotions : Meaning and Definitions. Factors Influencing Emotional Development of the Individual (Social and Psychological).

Unit - V

Statistics and its use in Education

Meaning and Definitions of Statistics, Importance of Statistics for students in Education.

Data - Concept, Collection of Data, Types of Data (Grouped and Ungrouped), Graphical Representation of the Data - Histogram and Frequency Polygon.

Measures of Central Tendency : Concepts of Mean, Median and Mode, Computation of Mean, Median and Mode of grouped and ungrouped data. Uses of various Measures of Central Tendency in Educational Situations.

Questions Paper Setting

The question paper would contain two types of questions, that is **Long Answer Type Questions and Short Answer Types Questions.**

There would be **two long answer type questions,** set from each unit; out of which one question will have to be attempted by the students, **unit wise.**

Similarly, there would be **two short answer type questions,** set from each unit. The student will have to attempt **one short answer type questions** from each unit. In all, students will have to attept **five long answer type questions and five short Answer type questions** out of five units.

Long answer type questions would carry **Sixty marks for five questions (12 marks, each question);** and

Short answer type questions would carry **Twenty marks** for five questions (**4 marks, each question).** These questions would be set **unit wise** in the question paper, separately.

(Answer to short answer type question should not be more than 100 words, each question).

Internal Assessment (Total Marks : 20)

20 marks for theory paper in a subject reserved for intrenal assessment shall be distributed as under :-

(i)	Class Test	:	10 marks
(ii)	Two Written Assignments / project reports	:	10 marks (05 marks each)

Books recommended

1. Aggarwal, J.C. (2001) : Essentials of Educational Psychology. New Delhi : Vikas Publishig House.
2. Bhatia, H. R. (1968) : Elements of Educational Psychology. 3rd Edition, Calcutta, Orient Longman.
3. Bhatnagar, Suresh (2001) : Advanced Educational Psychology. Meerut : R. Lal Book Depot.
4. Bower, Gordon and Hillgard, R. Earnst (1986) : Theories of Learning Eastern Economy Edition. New Delhi : Prentice Hall of India.
5. Carlson, Neil, R. (1996) "Psychology : The Science of

EDUCATIONAL PSYCHOLOGY AND STATISTICS

CONTENTS

LESSON NO.1 **UNIT-I**

MEANING AND RELATIONSHIP BETWEEN EDUCATION AND PSYCHOLOGY

By: Anupama Sharma

Structure

1.1 INTRODUCTION:

Human mind is the richest resource, which has no frontiers. The knowledge of it in real sense has no parallel. A part of it is processed scientifically and systematized as a branch of knowledge, namely psychology which is applied in the field of education i.e. Educational Psychology. It deals with the Art and Science of teaching and learning education broadly intends to prepare the child for life which is the most valuable thing.

"Education is the handmade of Psychology". Education cannot bring any fruit

without Psychology.

1.2 OBJECTIVES:

The main objective of this lesson is to equip you with.

- The meaning of Education and Psychology.
- The meaning of Educational Psychology.
- The constituents of Educational Psychology.
- Relationship between Education and Psychology.

PSYCHOLOGY AND EDUCATION

Psychology is a growing subject. It is a developing science extending its branches in different spheres. Today Psychology has its challenges from the contemporary world of social sciences. Primary aim of Psychology is to understand human nature the secondary aim is to serve society.

Psychology occupies a prominent place in the educational theory of today. Although Psychology cannot formulate the aim of education, it tells us at once whether an aim is in vain or whether it is possible to achieve. Psychology can tell how far the aim is realistic and helps us to evaluate our results. It is of utmost value in the process of achieving the aim i.e. the means of achievement.

Adam says that the task of the teacher is to influence learner, the study of Psychology will enable the teacher to understand himself and understand the innate endowment of the child, laws of his development, the evergrowing complexity of the mind, the effect of environment and development of personality.

1.3 WHAT IS PSYCHOLOGY:

Psychology seeks to understand and explain behaviour in terms of mental and bodily activities. Its Chief problem is how and why we behave, how we think, know, feel and act and why we think, know, feel and act in the way we do. Psychology infact is the independent field of study. It has emerged from Philosophy. The word Psychology was used by Roudolf Goeckle in the year 1590 for the first time.

It is a combination of 2 Greek words Psyche and logos Psyche means soul and logos means talk about. Thus by derivation Psychology means talk about soul or the science of soul. During 16th Century the soul was replaced by mind. Later on the term mind was replaced by consciousness. The functionalists define it as a "Science of behavior".

1.4 WHAT IS EDUCATION:

Education is the touch stone of the civilization and culture of a country. It is an integral part and basis of human life and it is as old as human existence and shall continue function as long as human being lives. In other words we can say that human life begins with education. The fulfillment of the needs of human life is possible only through education.

Etymologically the term education originated from latin word educare which means to bring up or to nourish. It means that the child has to be nourished according to certain norms. Moreover it is also derived from the latin word educare which means to lead out and at last derived from the word educatum which means "The act of teaching or training".

1.5 WHAT IS EDUCATIONAL PSYCHOLOGY:

Educational Psychology is nothing but one branch of applied psychology. It is the study of the psychological aspects of educational studies, which deals with the teaching and learning process. Credit goes to Russian for introducing the psychological tendency in Education more and more educational psychology helps in understanding the capacities potentialities and limitations of the child. It studies both Latin and John. Latin stands for the mastery over the subject and John stands for the child. Educational Psychology must know the child as he is. So in the nut shell educational psychology can be defined as the science of education i.e. a discipline which can be used to improve the process and product of education in a scientific manner.

1.6 WHAT CONSTITUTES EDUCATIONAL PSYCHOLOGY

Educational-Psychology is a branch of applied psychology and applies the psychological methods and techniques to the work of teaching. Let us have a brief look on the following constituents of educational psychology.

WHO LEARNS ? Learners with individual differences this is learning experience.

WHO TEACHES ? The teacher with the knowledge of individual differences in their

abilities, aptitudes, interests and personality qualities.

WHEN TO TEACH ? Keeping the learning capacity of the children in view the suitably prepared content or content suitably composed by him is to be introduced by making learners ready to receive it.

WHERE TO LEARN ? Though formally one learns in the classroom, with this acquired spirit of learning from everything and everywhere learning is to be a relationship of science of psychology to the theory and practice of education.

1.7 RELATIONSHIP BETWEEN EDUCATION AND PSYCHOLOGY

The Swiss school master, Pestalozzi, was the Ist to realize that the educator can draw great advantage from a study of the minds of pupils and the art of education must be based on an accurate knowledge of mental life. He wanted to psychologize education and instruction.

"When the rule of the thumb fails the law of psychology can bring fruitful results".

1.8 DEFINITIONS

Crow and Crow: "Education Psychology describes and explains the learning experiences of an individual from birth through old age:

PEEL, E.A. : Education Psychology is the science of education.

TROW: - "Education Psychology is the study of Psychological aspects of educational situations".

KOLESNIK : "Educational Psychology is the application of the findings and the theories of psychology in the field of education".

STEPHEN : "Educational Psychology is the systematic study of educational growth and development".

SKINNER : "Educational Psychology deals with teaching learning process".

Some of the points which throws light on the relationship of Psychology and education are as below.

1. **Psychology and the Learner :** Learner is said to be the core and apex of

psychology. Every psychological fact revolves around the learner. Education psychology studies the behavioural problems of learners and gives solution to their problems.

2. **Psychology and Techniques of Teachings:** Methods of teaching should be simple and psychological so that the learner catch the problem and understand the topic easily hence psychology gives new methods and techniques to education.

3. **Psychology and Audio -Visual Aids :-** Moreover psychology suggests new aids like Audio-visual aids by adopting which the teacher can motivate the students easily and effectively and make the difficult concept more clear and short cut.

4. **Psychology and Formulation of Text-Books:- It is rightly said that** "Books are keys to wisdom". Psychology has helped in the planning and construction of text-books keeping in view the proper development of the child.

5. **Psychology and Role of the Teacher:-** Proceeding forward Psychology also determines the role of the teacher i.e. he should be sympathetic, co-operative, and he should be a good friend, philosopher and guide to his students, he should Ist come down to the level of his students then understand them properly to achieve proper results.

6. **Psychology and Time-Table:-** It is due to psychological foundations of education that subjects are kept in the time-table. No two difficult subjects are taught in successive periods. These are arranged properly in time table keeping in view their difficulty level.

7. **Psychology Measurement and Evaluation:-** Psychology introduce new tools and techniques for measuring the intelligence and personality of the students.

8. **Psychology and Aims of Education:-** Aims provides guidelines and directions to learners and teachers and psychology gives guidelines to education, by keeping in view the needs and desires of the child and society.

9. **Psychology and concept of discipline:-** It is difficult to think of educational process without the concept of discipline. It is Psychology which has helped education in evolving the concept of discipline in educational institutions. Psychology

has introduced the concept of discipline which grows from the heart of the children. There is no place for fear in it.

10. **Psychology & Co-curricular activities:-** The relationships of Psychology & Education can also be understood in the light of the present status enjoyed by Co-curricular activities in the educational process. There was a time when the Co-curricular activities was considered to be the wastage of time but now-a-days Modern Psychology has changed this notion and these activities are regarded as a part and parcel of educational process leading to sound personality of children.

1.9 DIFFERENCE BETWEEN PSYCHOLOGY AND EDUCATIONAL PSYCHOLOGY:

Psychology is an independent discipline whereas Educational Psychology is a branch of Psychology. Psychology is a positive science of behaviour whereas Educational Psychology is an applied science which came into existence as the result of application of knowledge of Psychology in the field of Education. As a science of behaviour, Psychology develops theories and principles for studying the behaviour of the organism whereas Educational Psychology is concerned with the application of the findings and theories of Psychology in the field of education. For example psychology gives different theories of learning whereas application of implications of these learning theories is the job of Educational Psychology.

Psychology being a science of behaviour studies the behaviour of the organism in general whereas Educational Psychology being an applied Science studies the behaviour of the individual in relation to the learning environment. Psychology being a positive Science studies only the behaviour of an organism as it is whereas Educational Psychology goes a step ahead. It studies the behaviour of the individual in its present status and also suggests educational provisions to modify the behaviour of the individual in desirable manner. Psychology identifies the innate potentialities, talents and abilities of the individual whereas Educational Psychology identifies all these potentialities, talents, abilities etc and also suggests the educational provisions for the proper sublimation and optimum possible development of these talents and abilities.

1.10 ASK YOURSELF

1. What do you mean by the term Education?
2. What is Educational Psychology?
3. Define the relationship between Education and Psychology ?
4. What do you understand by the term Psychology give its definitions also.

1.11 SUGGESTED READINGS:-

Walia, J.S. (1996): Foundations of Educational Psychology, Paul Publishers, Jalandhar (Punjab).

Skinner, C.E. (1984) : Essentials of educational psychology, Agra Publishing House, Bombay.

Sharma, R.N. (2001): Foundations of Educational Psychology, Surya Publications, Meerut.

Mathur, S.S. (1994): Educational Psychology, Vinod Pustak Mandir, Agra.

Mangal S.K. (1997) : Educational Psychology, Printice-Hall of India Pvt. Ltd., New Delhi.

LESSON NO.- 2 **UNIT-1**

MEANING AND PRINCIPLES OF GROWTH AND DEVELOPMENT

By: Anupama Sharma

STRUCTURE

2.1 OBJECTIVES:

To help the students to:-

- Understand the meaning of Growth & Development.
- Acquaint students with appropriate characteristics of Growth & Development.
- Understand various aspects of Growth & Development.
- Understand various principles of Growth & Development.

2.2 INTRODUCTION:

As the aim of education is wholesome development of the learner, educational

psychology starts studying the child right from its conception, how the child starts from a single fertilized cell, how the prenatal development takes place and how the post natal development in various aspects takes place. A child's constantly changing behavior, due to interaction with the surroundings, is to be understood by prospective teachers, so the most potent fact in psychology is that of growth and development. An understanding of the nature and principles of human growth & development is very essential for the realization of the aim of education.

2.3 MEANING OF GROWTH:

Child is a growing being. As he grows he gains height, weight, movements, perception, emotional control, language, social adjustment, moral judgment and so on. Growth starts with the increase in the size of a single celled organization, which multiples and grows into a multi celled organization with distinct organs to carry out specific functions-physical and physiological functioning. In simple words growth means increase in size, height and weight. It implies growth of heart, brain muscles and body in general. It can be easily observed and appraised.

Meaning of Development:

Development is the product of maturation and learning. It is a bigger and comprehensive term not limited to growing larger or heavier. It means change in structure, form or shape and improvement in functioning. Development means enrichment of thinking, reasoning and a clear logical perception by the individual of interrelationships between the past, present and the future. Thus development can be defined as a progressive series of changes in an orderly coherent pattern. The term progressive signifies that the changes are directional leading forward rather than backward.

2.4 DEFINITIONS OF GROWTH:

1. Crow & Crow defines "Growth as Structural and Psychological changes".
2. Frank defines growth as "the multiplication of cells i.e. Growth in height and weight or it may be changes in the particular aspects of the body or it means increase and enlargement of the body or some parts of the body".
3. Gesell : "Growth carries a more dynamic connotation; which organically ties the

present with the past and directs it toward the future".

DEFINITIONS OF DEVELOPMENT:

1. Peary defines it as, "Development means the whole sequence of life from conception to death".

2. Frank defines, "Development may imply the change in organism as a whole".

3. Hurlock defines it "as progressive series of changes in an orderly coherent pattern". The changes are directional leading forward, rather than backward and result in new characteristics and new abilities on the part of the individual.

2.5 CHARACTERISTICS OF GROWTH & DEVELOPMENT:

Growth starts from a fertilized egg, which after nourishment turns into a full-fledged human being. After the birth of child its growth largely depends upon the enlargement of small cells of the body. The rate of Growth is rapid in early stages i.e. infancy and childhood, but it slows down after the adolescence age and stops when maturity has been attained. Growth does not continue throughout life.

Development is a regular and continuous process it goes from womb to tomb i.e. from birth to death. The changes however small may be continue through out the life span of an individual. In development the process of first stage influences the next stage certainly there is time gap between the first development to reach the next development like physical, moral and social takes place in various dimensions, time factor plays an important role in the process of development.

2.6 ASPECTS OF GROWTH & DEVELOPMENT

1. Physical & Motor Development : Physical development means progressive development of the various parts of the body and their capacity to function. It includes the development of internal as well as external body organs of the individual.

   Motor Development includes the development of strength, speed & precision in the use of one's arms, legs and other body muscles.

2. Intellectual Development : Intellectual development includes the development of intellectual powers like thinking, reasoning, imagination, memory, attention,

intelligence, sensation etc.

3. Emotional Development : In emotional development, the evolution of different instincts & emotions lead to the formation of sentiments & the progress sentiments to character.

4. Moral Development: It includes the evolution of moral sense and development of character.

2.7 Principles of Growth and Development

1. **Growth Starts From Conception:**

Growth begins with conception process or from a single fertilized cell. It becomes more and more complex and finally shaped as a human being.

2. **Growth and Development are due to Heredity and Environment:**

An individual is the product of Heredity and Environment. These two factors heredity and environment plays very significant role in harmonious personality development of an individual. The child gets the body structure and metal abilities due to heredity factors but he develops by using and interacting with his environment.

3. **Development is continuous process.**

Development is a continuous process i.e. it is never ending process it remain continuous throughout the life, so the process of development continues from birth to death in some or the other form.

4. **Growth is Commulative :**

As a small organism the child is not able to make specific and finer movements but as he grows the activity proceeds from general to specific, this is due to the commulativeness of Growth Process.

5. **Development occurs at different rates:**

Development occurs at different rates for different parts of the body i.e. different objects of physical and mental traits develop of their own rates and reach maturity at different times. Growth proceeds more rapidly during earliest and adolescence

and later this speed decreases.

6. **Growth is spontaneous:**

Growth is spontaneous in nature i.e. it occurs spontaneously child learns new words and things with amusement and without being aware of the growth to which it leads.

7. Development is progressive in nature:-

The process of development is slow but it is regular and continuous. It means that changes in one stage influence the other stage also.

8. Development is predictable:

Although there are individual differences in the rate of growth, but the growth rate tends to remain constant due to uniformity of pattern of development. We can safely predict the physical and mental development of the child on the basis of aptitude or intelligence tests given in earlier years.

9. Development occurs as a whole:

Most important characteristic of Growth and Development is that individual growth and develops as a whole his physical, intellectual, emotional social and other types of development are interdependent.

10. Individual differences in development remain constant:

It is to be noted that development process remains same for all children but each child follows his own time schedule of growth. One child may learn a task earlier than the other.

2.8 EDUCATIONAL SIGNIFICANCE OF PRINCIPLES OF GROWTH & DEVELOPMENT

The knowledge of the principles of Growth and Development is very important and useful for parents, teachers and educationists. Some of the uses of the principles of Growth & Development are as below:-

1. It helps the teacher in adjusting school programmes, procedures and practices

according to the level of development of the child.

2. It helps parents and teachers in treating their children or pupils sympathetically and solving their problems in a realistic way.

3. It helps the teacher in providing the proper guidance programmes.

4. It helps the parents and the teachers in knowing and creating importance of healthy and good environment.

2.9 Ask Yourself

1. Define the term growth and development.

2. What are the characteristics of Growth & Development?

3. Discuss various principles affecting Growth and Development.

4. Define various aspects of Growth & Development.

5. What is the significance of the principles of Growth & Development?

2.10 Suggested Readings:

Walia, J.S. (1996): Foundations of Educational Psychology, Paul Publishers, Jalandhar (Punjab).

Skinner, C.E. (1984) : Essentials of educational psychology, Agra Publishing House, Bombay.

Sharma, R.N. (2001): Foundations of Educational Psychology, Surya Publications, Meerut.

Mathur, S.S. (1994): Educational Psychology, Vinod Pustak Mandir, Agra.

Mangal S.K. (1997) : Educational Psychology, Printice-Hall of India Pvt. Ltd., New Delhi.

Panda, B.N. 1999 Advanced Educational Psychology, Discovery Publishing House, New Delhi.

LESSON NO.- 3 **UNIT-1**

FACTORS AFFECTING GROWTH AND DEVELOPMENT (BIOLOGICAL & ENVIRONMENTAL)

By: Anupama Sharma

STRUCTURE

3.1 OBJECTIVES:

Main aim of the lesson is to equip you with:

- The meaning of Growth and Development
- Factors affecting Growth & Development
- Biological Factors
- Environmental Factors

3.2 INTRODUCTION:

As the aim of education is wholesome development of the learner, edu-psychology

starts studying the child right from its conception, how the child starts from a single fertilized cell, how the prenatal development takes place and how the post natal development in various aspects takes place. A child's constantly changing behavior, due to interaction with the surroundings, is to be understood by prospective teachers, so the most potent fact in psychology is that of growth and development. An understanding of the nature and principles of human growth & development is very essential for the realization of the aim of education.

3.3 MEANING OF GROWTH:

Child is a growing being. As he grows he gains height, weight, movements, perception, emotional control, language, social adjustment, moral judgment and so on Growth starts with the increase in the size of a single celled organization, which multiples and grows into a multi celled organization with distinct organs to carry out specific functions-physical and physiological functioning. In simple words growth means increase in size, height and weight. It implies growth of heart, brain muscles and body in general. It can be easily observed and appraised.

Meaning of Development:

Development is the product of maturation and learning. It is a bigger and comprehensive term not limited to growing larger or heavier. It means change in structure, form or shape and improvement in functioning. Development means enrichment of thinking, reasoning and a clear logical perception by the individual of interrelationships between the past, present and the future. Thus development can be defined as a progressive series of changes in an orderly coherent pattern. The term progressive signifies that the changes are directional leading forward rather than backward.

3.4 DEFINITIONS OF GROWTH:

1. Crow & Crow defines "Growth as Structural and Psychological changes".
2. Frank defines growth as "the multiplication of cells i.e. Growth in height and weight or it may be changes in the particular aspects of the body or it means increase and enlargement of the body or some parts of the body".
3. Gesell : "Growth carries a more dynamic connotation; which organically ties the present with the past and directs it toward the future.

DEFINITIONS OF DEVELOPMENT:

1. Peary defines it as, "Development means the whole sequence of life from conception to death".

2. Frank defines, "Development may imply the change in organism as a whole".

3. Hurlock defines it "as progressive series of changes in an orderly coherent pattern. The changes are directional leading forward, rather than backward and result in new characteristics and new abilities on the part of the individual".

3.5 Difference between Growth and Development:

1. Growth means changes in particular aspect of body and behavior on the contrary Development implies change in shape, form or structure.

2. Growth is a quantitative phenomenon whereas development is qualitative aspect and phenomenon.

3. Growth stops after the attainment of maturity while Development is continuous and never ending process. It continues throughout life.

4. Development is the direction in which Growth takes place as a result of factors outside the maturing individual. In this sense growth is a natural process development is a result of the environmental factors that affect the organism as he grows.

3.6 GROWTH & DEVELOPMENT IN PRENATAL AND POSTNATAL STAGE:

1. Prenatal : Various things that have to do with the baby's growth and development from conception to birth are referred as Pre-natal. The womb of the mother is the prenatal environment. If the mother is in good physical condition and takes a good balanced diet, the body will grow and develops normally.

2. Post-natal : Post natal environment means environment after the birth of the child. Various factors like nutrition of the child his physical fitness, proper environment i.e. fresh, air and sunlight, family and environment, injuries and diseases, environment of the school etc. all these plays very significant role in the growth and development of the child.

3.7 FACTORS INFLUENCING GROWTH AND DEVELOPMENT:

There are number of internal as well as external factors or Biological as well as Environmental factors which influence human growth and development. Much of the physical growth depends partly upon Biological conditions and also upon certain environmental factors. Moreover, these are inter-dependent upon each other.

HEREDITICAL OR BIOLOGICAL FACTORS:

Hereditary factors are those that resides in the child from the moment of conception. Heredity certainly determines various aspects of development. Some of the hereditary factors are as below.

a) **PHYSIQUE** :The height, weight, complexion, colour of eyes, characteristics of hair, physical structure and defects like deafness, dumbness may develop a feeling of inferiority of other persons tease him. Deformities of the body have adverse effect on development. These people have to face some adjustment problems in social environment. In this way their social development is negatively affected. On the contrary a child of good health generally develops emotionally balanced attitude towards life.

b) **INTELLIGENCE:** Intelligence is mainly hereditary. This power of intelligence plays an important role in the Growth and development of the child. The children having high intelligence grow and develop earlier whereas children having low I.Q. develops slowly. Moreover intelligent childrens are likely to be inventive, imaginative and creative.

c) **SEX DIFFERENCE:** Boys are more assertive and tough minded, they show interest in machinery and outdoor activities, but girls are interested in less vigorous games, they have a better sense of tolerance, sympathy and sense of honour etc. Girls attain maturity earlier than boys.

d) **NERVOUS SYSTEM:** Nervous system plays a vital role in the various aspects of development of the person. Any injury to nervous system will have negative effect in the development of the person. Nervous system limits ones, learning capacity also.

e) **FUNCTIONING OF GLANDS:** Glands play an important role in growth and development of a person. The malfunctioning of these glands has an adverse effect on various aspects of growth and development, for instance the slowness of the activities of

thyroid glands make the child lazy and becomes weak.

EXTERNAL FACTORS OR ENVIRONMENTAL FACTORS

External factors influences growth and development. External or environmental factors that affects the rate of Growth and development are as below:-

a) **Food or Balanced Diet :** Balanced diet is required for proper growth and development. In the absence of a balanced diet, there is every possibly of the child developing many diseases and ailments hence the child should be given balanced diet to become healthy and fit.

b) **Fresh Air and Sunlight :** Fresh air and sunlight is very essential for harmonious development of an individual. Childrens brought up in impure and polluted environment heve very slow growth and development whereas childrens brought up in pure environment have very quick growth and development.

c) **Physical Exercises:** Exercises also play an important role in overall growth and development. Physical exercises such as sports, drill, games, dancing, wrestling etc. influence growth and development.

d) **Family Environment :** In well adjusted families there are better chances of growth and development. Disruptive family environment may produce disrupted, delinquent and maladjusted personalities.

e) **Neighbourhood :** More and More neighbourhood also exerts some influence on the personality of an individual. Cultured and educated neighbours influence the development in a positive way on the other hand drunkard, alcoholic and illiterate neighbourers put bad effect on the personality of an individual.

f) **Friends and Companions (Peer-Group) :** Besides all of the above, peer group exercises a good deal of influence on the development of an individual.

3.8 ASK YOURSELF:

Q. Define the term Growth.

Q. What do you understand by the term Development.

Q. Discuss various Environmental factors of Growth and Development.

Q. Discuss various Biological Factors affecting Growth and Development.

3.9 SUGGESTED READINGS:

Walia, J.S. (1996): Foundations of Educational Psychology, Paul Publishers, Jalandhar (Punjab).

Skinner, C.E. (1984) : Essentials of educational psychology, Agra Publishing House, Bombay.

Sharma, R.N. (2001): Foundations of Educational Psychology, Surya Publications, Meerut.

Mathur, S.S. (1994): Educational Psychology, Vinod Pustak Mandir, Agra.

LESSON No. 4 **UNIT–II**

LEARNING

By: Dr. Netar Parkash Sharma

STRUCTURE

4.1 INTRODUCTION

In this Lesson, we shall discuss the concept of learning and nature of learning. You will also study the theories of learning. You will also come to know about various laws which have been deduced from the learning theories and the factors affecting learning.

4.2 OBJECTIVES

After going through this unit you shall be able to :

- explain the meaning of Learning.
- reproduce two definitions of Learning.
- describe the nature of Learning.
- describe the theory of learning Trial and Error.

4.3 MEANING OF LEARNING

Learning is a very comprehensive term. It is not limited to classroom learning or deliberate learning of any skill. It includes all sorts of activities and experiences acquired through experience. Learning is the acquisition of habits, knowledge and attitudes. It involves new ways of doing things and it operates in an individual's attempt to overcome obstacles or to adjust to new situations. Learning is a progressive change in behaviour brought about through experience by various stimuli. An individual reacts to a situation in an effort to adopt his behaviour effectively to demands made upon him. It enables him to satisfy interests or to attain goals. The following example will illustrate this learning process. When the child is born, he performs certain actions automatically. But in the course of time, he goes on learning new skills, gaining fresh information and developing new beliefs and attitudes. Not only this, there is a change in his behaviour also. While approaching a burning fire since the child gets burnt and withdraws himself away, next time when he faces a burning candle, he takes no time to withdraw himself from it. Thus, we come to know that the child has learnt that if one touches a flame, he gets burnt up.

4.3.1 Definitions of Learning

The definitions of learning given by different psychologists are as under :

- According to Gates and other, "Learning is the modification of behaviour through experience and Training".
- According to Melvin H. Marx, "Learning is relatively enduring change

in behaviour which is a function of prior behaviour (usually called practice)."

- According to G.D. Box, "Learning is the process by which the individual acquires various habits, knowledge and attitudes that are needed for meeting the demands of life in general."
- According to Gardner Murphy, ''The term learning covers every modification in behaviour to meet environmental requirements."
- According to Guilford, ''Learning is a change in behaviour resulting from behaviour."
- According to Hilgard, "Learning refers to change in a subject's behaviour to a given situation brought about by his repeated experiences in that situation, provided that behaviour change cannot be explained on the basis of native response tendencies, maturation or temporary state of organism (e.g. fatigue, drugs etc.)

4.3.2 Characteristics of Learning

From the discussion of concept of learning, we state the following characteristics of learning :

- Learning is a universal process.
- Learning is a continuous process.
- Learning is a change in behaviour through experience.
- Learning is an organization of behaviour.
- Learning is a process of solving problems.
- Learning is adjustment.
- Learning occurs both in formal and informal situations.
- Learning involves various dimensions of psychological and mental activities.
- Learning is function of practice.

- Learning is manifold in nature.
- Learning involves perceptual operation and motor process.

4.4 THEORIES OF LEARNING

4.4.1 Trial and Error Theory of Learning:

The Trial and Error Theory of learning was put forward by an American Psychologist Edward Lee Thorndike. According to Thorndike all learning takes place because of formation of bond or connection between stimulus and response. He further says that learning takes place through a process of approximation and correction. A person makes a number of trials, some responses do not give satisfaction to the individual but he goes on making further trials till he gets satisfactory responses.

Thorndike conducted a number of experiments on animals to explain the Process of Learning. His most widely quoted experiment is with a cat placed in a puzzle box. Thorndike put a hungry cat in a puzzle box. The box had one door which could be opened by manipulating a latch of the door. A fish was placed outside the box. The cat being hungry had the mativation of eating fish outside the box. But the obstacle was the latch on the door. The cat made random movements inside the box indicating trial and error type of behaviour-biting at the box, scratching the box, walking around, pulling and jumping etc. to come out to get the food. Now in the course of her movements, the latch was manipulated accidently and the cat came out to get the food. Over a series of successive trials the cat took shorter and shorter time and committed less number of errors and was in a position to manipulate the latch as soon as it was put in the box and learnt the art of opening the door. Thorndike concluded that it was only after many random trials that the cat was able to hit upon the solutions. He named it as Trial and Error Learning. An analysis of the learning behaviour of the cat in the box shows that besides trial and error the principles of goal, motivation, explanation and reinforcement are involved in the process of learning by Trial and Error.

Educational Implications of Trial and Error Learning

Thorndike's Theory of Trial and Error Learning has exercised an enormous influence in Teaching Learning process. It has the following educational implications :

- The theory lays emphasis on practice or repetition. The practice principle of this theory can be effectively applied in the learning of such material as arithmetical tables, spellings and formulae and in skill lessons like handwriting, dance, music, craft and drawing etc.
- The theory has highlighted the role of reward and praise in the process of learning. Rewards and recognition play a great role in encouraging the pupils. Due recognition should be given to good achievement so that pupil is cheered up to march forward. It is the task of the educator to provide to every child such learning situations that he gets success and satisfying feeling.
- The theory emphasizes the principle of drive, motive and goal which has wider educational implications. In the absence of drive learning cannot be effective. Hence teacher must arouse the interest of the students or readiness of pupils. In teaching any topic the teacher must tap their previous knowledge, arouse interest for the new topic through suitable questions and then announce the aim of the new lesson.

4.5 LAWS OF LEARNING

On the basis of his Trial and Error Learning Theory, Thorndike gave certain laws of Learning. We shall discuss three fundamental Laws of Learning in this section. These laws are :

1. Law of Readiness

This law refers to the fact that learning takes place only when the learner is prepared to learn. No amount of efforts can make the child learn if the child is not ready to learn. The dictum that 'you can lead a horse to the pond but you can't make it drink water unless it feels thirsty' goes very well with this law. In other words, if the child is ready to learn, he/she learns more quickly, effectively and with greater satisfaction than if he/she is not ready to learn. In the words of Thorndike the three stages of this Law of Readiness are :

- For a conduction unit ready to conduct, to conduct is satisfying.

- For a conduction unit ready to conduct, not to conduct is annoying.
- For a conduction unit not ready to conduct, to conduct is annoying.

Thus the Law of Readiness means mental preparation for action and not to force the child to learn if he is not ready. Learning failures are the result of forcing the learner to learn when he is not ready to learn something.

Educational Implications of Law of Readiness :

(i) The law draws the attention of teacher to the motivation of the child. The teacher must consider the psycho-biological readiness of the students so as to ensure successful learning experiences.

(ii) Curriculum / Learning experiences should be according to the mental level of maturity of the child. If this is not so, there will be poor comprehension and readiness may vanish.

Law of Exercise

This law explains the role of practice in learning. According to this law, learning becomes efficient through practice or exercise. The dictum 'Practice makes a man perfect' goes very well with this law. This law is further split into two parts — Law of use and Law of disuse. The law of use means that a connection between a stimulus and response is strengthened by its occurrence, its exercise or its use. In other words, the use of any response strengthens it, and makes it more prompt, easy and certain. Regarding the law of disuse, it is said that when a modifiable connection is not made between a stimulus and a response over a length of time, the strength of that connection is decreased. This means that any act that is not practised for some time gradually decays. Anything that is not used, exercised or practised for a certain period of time tends to be forgotten or becomes weak in strength, efficiency and promptness.

Educational Implications

- Exercise occupies an important place in learning. Teacher must repeat, give sufficient drill in some subjects like mathematics, drawing, music or vocabulary for fixing material in the minds of the students.

Thorndike later revised this law of exercise and accordingly it is accepted that Practice does bring improvement in Learning but it in itself is not sufficient. Practice must always be followed by some reward or satisfaction to the learner. The learner must be motivated to learn.

Law of Effect

This is most important of Thorndike's laws which state that when a connection between stimulus and response is accompanied by satisfying state, its strength is increased. On the other hand when a connection is accompanied by an annoying state of affairs, its strength is reduced or weakened. The saying 'nothing succeeds like success' goes very well with this law. In other words, the responses which produce satisfaction or comfort for the learner are strengthened and responses which produce annoyance or discomfort for the learner are weakened. Thorndike revised this law in 1930 and according to this revision he stated that reward strengthened the response but punishment did not always weaken the response. Then he placed more emphasis on the reward aspect than on the punishment aspect of Law of Effect.

Educational Implications

This law signifies the use of reinforcement or feedback in learning. This implies that learning trials must be associated with satisfying consequences. The teacher can use rewards to strengthen certain responses and punishment to weaken others. But the use of reward is more desirable than the use of punishment in school learning.

- The use of reward can be exploited by the teacher for motivating the students for learning situations.

4.6 LET US SUM UP

In this unit we have discussed the concept and nature of learning, the theories of learning. Learning is a change in behaviour through experience. It is a continuous and universal process. We learn at school, home, with our companions, anywhere, in any situation. It is also explained that the theories of learning has

been grouped under two major heads i.e. stimulus response theories and cognitive theories of learning. Trial and Error and Classical Conditioning theories are based on stimulus response bond and the Insight theory has been grouped under Cognitive theories of learning.

According to Trial and Error Theory an individual makes a number of responses to reach a goal. But after making a number of trials, some unsuccessful attempts, he comes to a successful attempt.

4.7 MODEL EXAMINATION QUESTIONS

1. Define Learning. How does learning take place through Trial and Error ? Explain.

   scribe the concept of Learning. Discuss the factors affecting learning.

4.8 SUGGESTED READINGS

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Lesson No.-5 **Unit II**

GESTALT THEORY OF LEARNING

STRUCTURE

5.1 OBJECTIVE

After studying the present lesson script the students should be able

- To explain the meaning of Gestalt theory of Learning
- To know about the Laws of Pragnanz.
- To know about the Kohler's Experiments.
- To know about the Limitations of Learning by insight.

5.2 INTRODUCTION

Insight theory of learning is also known as Gestalt theory of learning. It is the product of German Psychologists like Max. Wertheimer, Kurt Koffka and Wolfgang Kohler. Kohler is the chief exponent of this theory. These psychologists are known as Gestalt Psychologists. 'Gestalt' is a German word which means configuration or simply an 'organised whole'. Theory grew out of the studies of perception.

According to insight theory, learning is not by random steps, learning is nto by conditioning but by insight, introspection and understanding and the ability to see relatinship among various factors involved. While learning the learner always perceives the situation as a whole and after seeing and evaluating the different relationships takes the appropriate decision in an intellignet manner.

By placing apes and chimpanzees in their natural situations i.e., situations which they often come across in their routine life, Kohler shows the working of intelligence in them.

Kohler stressed that all learning takes place through insight. "Insight" means inner sight, seeing deep into the solution of the problem. According to Prof. Woodworth, "By insight is meant a good observation, perception of the situation as a whole or perception of those parts of the situation that provide a route to the gotal." Insight according to Prof. Kohler involves "Foresight" as opposed to "Hindsight", as if found in trial and error.

(i) **Foresight :** Foresight is seeing the way t the goal before trying it.

(ii) **Hndsight :** Hindsight is observing that a lead is good or bad after trying it.

In trial and error learning, the animal makes a large number of responses (say R1, R2, R3 etc.) and per chanve one of his respose (say R4) comes out to be successful response (i.e. R4) and repeats it till it gets fixed up. Hence learning by trial and error involves use of "aftr thought" whereas in learning by insight, the problematic situation is viewed as a whole and the solution at once comes vividly before the mind in the form of "foresight". The right solution is foreseen before the action. Hence learning by insight involves foresight. The learner realises the truth of the maxim, "Look before you leap."

In leraning by insight whole is mroe important than the parts. For meaningful

organisation of objectives, individuals apply different laws :

5.3 LAWS OF PRAGNANZ :

'Pragnanz' is a German word which means 'compact but significant'. The law suggests that our psychological organisation tends to move in one general direction always towards good gestalt (i.e., Pragnanz). A good gestalt has the property of stability, simplicity and regularity. According to this law, we accept only those experiments which do not disturb our psychological organisation or equilibrium.

The following subordinate laws explain the significance of 'Pragnanz' :

1. **Law of Similarity :** Similarity in form, shape, colour, size leads to meaningful organisation of the field. It is easier to learn similar things because similar stimuli have a greater tendency to be grouped together.

2. **Law of Proximity or nearness :** Law of Proximity or nearness things whihc are near to each other help in organisation. It implies that perceptual groups are formed according to nearness of parts. Hence we perceive all closely situated things or groups.

3. **Law of continuity :** Good continuation helps in meaningful organisation.

4. **Law of Closure :** It highlights that cetain closed areas (of our mental make up) are more stable than the 'enclosed' ones. Hence, those closed areas readily form figures of perception. It is like Thorndike's law of effect. The individual feels satisfied only when the work is completed, otherwise he has tension.

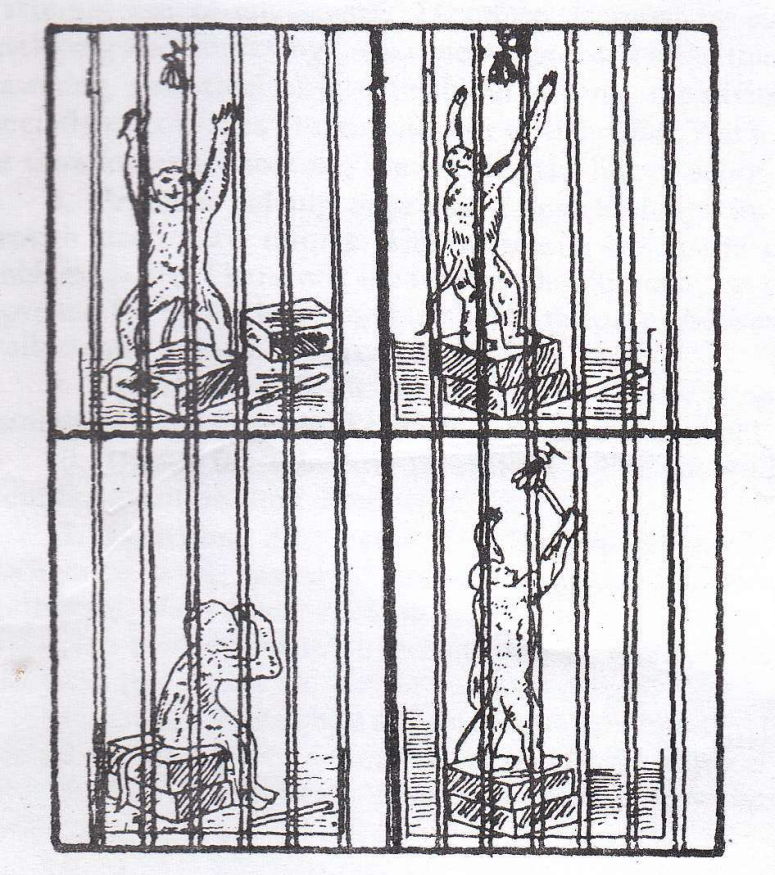
Meaningful organisation gives rise to insight and ability to understand the situation as a whole.

5.4 KOHLER'S EXPERIMENTS :

1. **Experiment with Sultan :** Kohler conducted experiments on chimpanzee. In some of the experimetns the name of the chimpanzee was Sultan. In the first situation, Sultan was kept hungry and put in a room. A bundle of bananas was suspended from the ceiling of the room. Two wooden boxes were placed near chimpanzee. It was observed that the chimpanzee could not get the banana only

by standing on one box. is put over the other only then chimpanzee could get the bananas. So chimpanzee tried this way and that way and thought over the whole situation. He kept one box over the other and then he was ina position to achieve the target. So by insight, he solved the problem.

2. **Experiment with two sticks :** Chimpanzee was put in a cage and two sticks were kept in the cage. The bananas were placed outside the cage. The sticks were such that if their ends could be joined together, they would become one. First the chimpanzee tried to get a banana kept outside the cage with the help of one stick but failed. Lastly, he joined two sticks and picked up the bananas. In this way, the chimpanzee got the balance with the help of insight.



5.5 EDUCATIONAL IMPLICATIONS OF LEARNIG BY INSIGHT (ROLE OF TEACHER IN INSIGHT LEARNING) :

1. **Integrated Curriculum :** The curriculum of the class should be an integrated whole i.e., there should be correlation between various subjects.

2. **Problem as a whole :** The whole problem is to be presented in the class. A piece meal approach will not develop learnig by insight. This theory believes, "The whole is not a sum of the parts." The teacher should present the things in the class as a whole atleast to start with. To give a complete insight into the learning material, we should always proceed from whole to the part. The lesson should form an integrated unit because insight is possible if the situation is perceived as a whole.

   (i) The whole sentence should be presented first and then analysed into words or letters.

   (ii) Whiel teaching Biology, the model of the whole body should be presented before the children and then the various parts and organs of the body should be emphasised.

   (iii) While teaching geography, we should start from the globe and then come down to country, state, district and city.

3. **Child as a whole :** Parents and teachers should see the child as a whole and in total setting. It is not wise to conclude on the basis of single act

about the child's behaviour.

4. **Importance of motivation :** The theory stresses the importance of motivation in learning. Therefore, the teacher should motivation the studens proprel for insightful learning.

5. **Importance of transfer :** The theory also emphasises the importance of transfer of learning. Previous experiences are helpful in learning. Hence the teacher should encourage the students to make the best use of transfer of learning.

6. **Emphasis on intelligent learning :** The theory is economical in terms of human energy. It puts emphasis on insight and understanding rather than rote learning. So spoon feeding and cramming should be discouraged. There are no useless and random efforts. The teacher should encourage the students to learn by understanding and insight i.e., intelligence.

7. **Development of higher mental faculties :** Insight involves the maximum use of intelligence. Therefore, learning by insight is helpful in developing and improving higher mental processes like thinking, imagination, reasoning, analytical ability, problem solving, creativity etc. The theory specially encourages creative activity of the child. The teacher has to view the situation as a whole as then decide the line of action.

8. **Problem solving approach :** Insight helps in solving problems through one's own efforts. This approach trains the child to solve his problems in life. Therefore, the teacher should make use of problem solving

approach for better learning. He should prepare children emotionally and intellectually to solve the problem.

9. **Useful for difficult subjects :** The theory is specically useful for learning difficult subjects like science, mathematics and literature.

10. **Useful for scientific inventions :** The theory is very useful for scientific inventions and discoveries.

11. **Individual differences :** (a) The teacher should keep in mind the intelligence level, maturity and other types of idividual differences. Intelligence plays a major role in learning by insight. The more intelligent a child is, the more he will learn through insight. The less intelligent child takes more time and makes more efforts to gain insight.

    (b) Insight of the child should be carefully handled by the teacher. He should know that its development is related to the physical maturation of the child. He should preent the problem keeping in view the maturatior of the child.

12. **Logical Presentation :** The teacher should present his lesson logically. He should proceed from 'simple to complex', concrete to abstract', 'empricial to rational' and 'psychological to logical'. The problems presented in the class should be linked with life so that the learnes have the greatest benefit out of them.

13. **Persistent efforts :** It needs a lot of patience on the part of the teacher. Insight does not develop in the learner immediately. It needs persistent efforts.

14. **Goal-oriented approach :** The teacher should develop in the learner the purpose of striving towards a goal o the basis of child's experience. He should relate the topic taught to the experiences of the child and then lead him towards the goal.

15. **Multiple approach :** Ability of the learner and his past experiences play an important role in sight. Therefore, the teacher should adopt a multiple approach in learning in the following manner :

    (i) **Planning lesson :** The teacher should plan his lesson appropriately.

    (ii) **Providing experiences :** He should provide sifnificant and meaningful experiences to the pupil.

    (iii) **Bringing Integration :** He should bring an integration between theory and practice.

5.6 LIMITTAION OF LEARNING BY INSIGHT :

1. **Involvement of trial and error :** In insightful learning, trial and error is involved. Difficult problems and tasks need trial and error before the success is achieved. Even the adults cannot solve the different puzzles

just in the first attempt. Insight learning is only the end point of trial and error.

2. **Learning in children and animals :** In case of children and animals, most of the learning is due to trial and error and not due to insight. Even many slow learners need to be taught through othre methods of learning.

Trial and Error Learning	Insightful Learning
1. Depends upon efforts of the learner.	1. Depends upon insight and intellecutal level of the learner.
2. Main stress is one physiological efficiency.	2. Main stress is on brain functions or intellectul factors.
3. Based on sensory motor co-ordination.	3. Based or perception.
4. Little scope for transfer of training.	4. Much scope for transfer of training.
5. Available to all.	5. Confined to those with comp-aratively higher intellectual level.
6. More useful in case of mentally deficient and children.	6. More useful to adults and persons having good intelligence.

Difference between Learning by Trial and Error and Learning by Insight :

5.7 LET US SUM UP

In this unit we have discussed the concept of Gestalt theory of Learning, experiments and Educational Implications of Gestalt theory of Learning.

Kohler Stressed that all learning takes place through insight. According to this theory, learning is not by random steps, learning is not by conditioning but by insight, introspection and understanding and the ability to see relationship among various factors involved.

5.8 SUGGESTED READINGS

1. Gestalt Psychology by Wolfgang Kohler
2. Gestalt Psychology : An Introduction to New Concepts in the Modern Psychology Wolfgang Kohler
3. Psychology of Learning & Instruction by Nambiar K. K. Ujayan
4. Psychological Foundation of Education by S. K. Mangal

Lesson No.-6 **Unit II**

APPROACHES TO LEARNING - BEHAVIOURISTIC & COGNITIVE

By - Dr. Netar Parkash Sharma

STRUCTURE

6.1 OBJECTIVE

After studying the present lesson script the students should be able

- To explain the meaning of learning
- To explain the concept of Behaviour according to the school of Behaviourism
- To explain the behaviourist approach to learning
- To explain the concept of behaviour according to the Gestalt Psychology
- To describe the cognitive approach to learning

6.2 INTRODUCTION

Dear students, in this part of lesson we will discuss a brief meaning of learning and two important approaches to learning i.e. Behaviouristic Approach and Cognitive Approach separately.

Approach we know that learning is a life long process which starts since the time of conception of the child in the womb of the mother and remains continous throughout the period of life. It is not restricted to the acquisition of knowledge, habits or skills but it is a continous process of bringing change or improvement in the behaviour of an individual with the view to enable him to make his adjustment in the new situations of life. In simple words, learning is a process of modification of behaviour of an individual. In the words of Woodsworth. R. S., "An activity may be called learning in so far as it develops the individual in any way, good or bad a makes his environment and experiences different from what it would otherwise have been. In the words of Guilford, J.P. "We may define the term very broadly by saying that learning is any change in behaviour resulting from behaviour".

Thus we may conclude that learning and modification of behaviour are the two sides of the same win which cannot be separated from each other.

Hence different schools of Psychology like Structuralism Functionalism, Behaviourism, School of Gestalt and School of Psychoanalysis have developed and adopted different approaches to learning. For example, school of Behaviourism adopted the behaviouristic or associationistic approach whereas the school of Gestalt adopted the cognitive depending on their concepts of behaviour. Therefore before discussing the approaches to learning it is worthwhile to discuss the concept of behaviour according to the school of Behaviourism and school of Gestalt.

6.3 CONCEPT OF BEHAVIOUR ACCORDING TO THE SCHOOL OF BEHAVIOURISM

John B. Watson (1878 - 1980) put forward an entirely new doctrine, named behaviourism which was quite contrary to structuralism and functionalism. Behaviourism as a method of studying behaviour focused its attention totally on the overt or observable behaviour. For this purpose, it tried to reduce all of man's activity, including his thinking, feeling and volition to the level of that behaviour which could be observed and objectively

recorded. J.A. Fodor (1981) attempted to express that extreme form of behaviourism exclude cognitive or thought processes as a form of behaviour. A strict behaviourist considers the behaviour of an organism to be solely its response to a stimulus.

In short behaviour according to the school of Behaviourism is the result of the interaction or connection between stimulus and response. The behaviourists advocate that there will be no response without stimulus and gave a slogan "Give stimulus get response, no stimulus no response". Behaviour of the individual can be as strengthened as the interaction or connection between stimulus and response is strengthened.

6.4 BEHAVIOURISTIC APPROACH TO LEARNING

The Behaviouristic approach to learning entirely depends on the concept of behaviour. According to the school of Behaviourism:-

a) Behaviour is composed of response and can successfully be analysed by scientific objective methods

b) Behaviour is composed of entirely of glandular secretions and muscular movements.

c) There is a strict cause effect determination in behaviour

Therefore modification in behaviour or learning can take place only by re-establishing and strengthening the connection or bond between the stimulus and response with the help of re-inforcement. Positive re-inforcement can contribute to encourage and strengthen the desirable behaviour by strengthening the interaction or connection between stimulus and response whereas negative re-inforcement can be useful in discouraging the undesirable behaviour by weakening the interaction between stimulus and response.

In Pavlov's phenomenon of conditional reflex be observed that the dog would secrete saliva not only when food is given but also when presented with a stimulus that was associated with food. Thus establishment of new bonds between stimuli and responses will result in the formation of new habits. Different types of human behaviour are acquired through a serial combination of simple reflexes. Thus the conditional reflex has become one of the principal methods and working concepts of behaviourism.

J.B. Watson himself conducted an experiment on an 11 months old baby and proved that the association of natural stimulus i.e. presenting a rabbit before the child and creation of loud thunder on the appearance of rabbit brought a change in the attitude and behaviour of that child as the result of the creation of fear in the child for every white object.

Moreover, B.F. Skinner's Operant conditioning also proves that re-inforcement in the form of reward and punishment when associated with the response of the organism can help the individual to learn or modify his behaviour accordingly. The Skinner's self-instructional strategy also supports the behaviouristic approach to learning because individual learns himself only with the help of conformation or rejection of the response given by him on the format of programmed learning.

Behaviouristis highlighted the role of environment in shaping and modifying the behaviour of the learner. They stressed on a greater need to provide the best possible learning situations and environment in home and school for harmonious growth and development of the learner.

6.5 CONCEPT OF BEHAVIOUR ACCORDING TO GESTALT PSYCHOLOGY

Another approach to learning which was quite opposite to the behaviourist approach was advocated by the Gestalt Psychology which was developed in Germany in 1912. The main exponents of this school are Max Wertheiner (1880-1943), Kurt Koffka (1886-1941), Wolfgang Kohler (1887-1967) and Kurt Lewin (1890-1947).

'Gestalt' is a German word, the nearest English translation of which is configuration or, more simply, an organized whole in contrast to a collection of parts. Therefore, Gestalt Psychology is opposed to the atomistic and molecular approach to behaviour. According to it an individual perceives the thing as a whole and not as mere collection of its constituents or elements. Gestaltists also rejected the mechanistic approach to behaviour as advocated by the behaviourists through a simple stimulus-response connection. They asserted that a sort of organization definitely exists between the stimulus and response which helps informing a new gestalt or an organised whole.

6.6 COGNITIVE APPROACH TO LEARNING

The Gestalt Psychology adopted and advocated the cognitive approach to enable the organism to learn or to bring modification or change in his behaviour because cognitive approach lays emphasis on understanding the situation as a whole but not by establishing mere mechanical connection between the stimulus and response by trial and error method the Gestaltists further claim that when the components of a thing are brought together by the mind, something new may emerge, re-inforcing the statement : "The whole is different from the sum of its parts".

As a result, human behaviour is characterized as a intelligent behaviour rather than a simple stimulus-response mechanism. An individual perceives the situation as a whole and after seeing and evaluating the different relationship in relation to the available environment takes the proper decision in an intelligent way although quite after he does so impulsively Gestalt Psychology used the term "insight" to describe this type of human behaviour and summarized the behavioural process as consisting of following three steps-

1) Perception of situation as a whole

2) Seeing & judging the relationship between various factors involved in the situation

3) Taking an immediate decision and behaviour accordingly

In order to justify the cognitive approach one of the propounders of Gestalt Psychology conducted some experiments which are given below -

Experiment I

Kohler conducted an experiment on a Chimpanzee with banana. Banana was hung from a cage. Two wooden boxes were placed near the cage. The Chimpanzee couldn't get the banana by standing on one box. If another box was placed overt the other, the Chimpanzee could get the banana. The Chimpanzee thought over the situation and developed restructuralisation and insight. It kept one box over the other and was able to reach the target.

Experiment II

Chimpanzee was put on a cage and the banana was placed outside the cage. Two sticks were kept in the cage. First the Chimpanzee tried to get a banana with the help the one stick. But in vain. The Chimpanzee made many frantic efforts. At last it joined the two sticks and reached the banana. It understood that it would reach the banana by closing up gaps with sticks. Hence a restructurisation of the perceptual field, so as to close up the gaps might have taken place in Chimpanzee thereby developing an insight to solve the problem.

6.7 CHECK YOUR PERFORMANCE

1. Briefly describe the meaning of learning
2. Briefly explain the concept of behaviour according to the school of Behaviourism
3. Briefly describe the Behaviouristic Approach to learning
4. Briefly explain the concept of behaviour according to Gestalt Psychology
5. Briefly describe the cognitive approach to learning
6. Briefly describe the Kohler's experiments on Chimpanzee to justify the cognitive approach to learning.

For the correct answers of the questions stated above, you can read

- For Q.1 - See paragraph 6.2
- For Q.2 - See paragraph 6.3
- For Q.3 - See paragraph 6.4
- For Q.4 - See paragraph 6.5
- For Q.5 - See paragraph 6.6

6.8 SUGGESTED READINGS

Author	Book
Chauhan, S.S.	Advanced Educational Psychology
Kundu, C.K. Tutoo, D.N.	Educational Psychology
Mangal, S.K.	Advanced Educational Psychology
Nambiar, K. K. Vijayan	Psychology of Learning & Instruction
Prakash, Dr. Prem	Psychological Foundation of Education
Sharma, R. N. & Sharma R.K.	Advanced Educational Psychology
Walia, J.S.	Foundations of Education

LESSON NO. 7 **UNIT-II**

TRANSFER OF TRAINING

By : Arti Durani

STRUCTURE

Objectives

After going through this lesson the students should be able to :

- Define meaning of transfer of training
- Discuss types of transfer of training
- Explain factors affecting transfer of training
- Discuss educational implications of transfer of training

- Explain important elements of transfer of training.
- Discuss the theories of transfer of training.

7.0 INTRODUCTION

It is matter of common observation that learning to do one thing makes it easier to perform some other action. The son of the trader is some times good at the arithmetic in class because he is required to look after the accounts of his father's establishment. When learning from one purpose is also utilized in other situation not originally envisaged in training, it is called transfer of training. In this manner, knowledge of mathematics helps in the study of Physics and Chemistry. Similarly, if one has learned to play tennis one find it easier to learn badminton or ping pong. In this way learning or training in one situation influences learning or training in other situation. This influence usually refers to carry over of learning from one task to another. The learning or skill acquired in one task is carried over to the other tasks. Not only the learning of tricks of trade or knowledge and skill is acquired in a particular school subject is transferred to other situations, but also the habits, interests and attitudes get transferred and try to influence the activities of the individual in future.

7.1 MEANING OF TRANSFER OF TRAINING

- **Crow and Crow** express it in following words : "The carry-over of habits of thinking, feeling, and working of knowledge or of skills, from one learning area to another usually is referred to as transfer of training."
- **Sorenson** also takes the same stand when he explains the meaning of transfer in the following words : "Transfer refers to the transfer of knowledge, training and habits acquired in one situation or other."
- **In the view of Peterson** "Transfer is generalization, for it is extension of idea to a new field.
- **Guthrie and Powers,** "Transfer may be defined as the process of extending and applying behaviour."

From the above definitions we conclude that the transfer of training occurs when the results of learning in one situation affect our performance in different situations or when training in one activity affects other forms of activity. In simple word it implies carrying over of learning from one situation to other. For example, if learning the riding of a horse is found to be helpful to the learning of riding a bicycle, we can say that there is transfer of training from horse riding to cycling. If one is not going to help another, there is no carry over or transfer from one area to another.

7.2 TYPES OF TRANSFER OF TRAINING

1. **Positive Transfer :** When learning of one activity facilitates the activity of other activity, it is known as positive transfer. For example if writing of English facilitates writing of Hindi, transfer is positive in nature.

2. **Negative Transfer :** When previously learnt activity interferes with the learning of the other activity, it is known as negative transfer. Negative transfer is illustrated by the child, who has learnt that the plural of 'book' is 'books' applies this knowledge in such a way that 'the plural of 'sheep' comes to be 'sheeps'. The negative transfer is also called as habit interference.

3. **Zero Transfer :** When learning of one activity never facilitates nor interferes with the learning of new task, it is said to be zero transfer. There may be zero transfer between language and mathematics. This type of transfer generally does not exist.

7.3 FACTORS AFFECTING TRANSFER OF TRAINING

(i) Meaningfulness of the Contents : Transfer of training will be more if the contents are meaningful.

(ii) Similarity of the Contents : Transfer of training is possible when there are some similar contents between the two situations e.g. in civics and political science many contents are similar, similarly in history and geography some topics are similar.

(iii) Similarity of Techniques and Principles : If the techniques and the fundamental ideals are similar in two situations, transfer will be more. For

example in foot ball and hockey many techniques are common.

(iv) **Methods of Teaching :** Transfer of teaching to a great extent depends upon methods of teaching. So transfer of training occurs if the methods of teaching are like, interesting and effective.

(v) **Meaningful Learning :** The more meaningful is the learning the greater are the chances of its transfer i.e. transfer depends upon understanding, that is why rote learning is not desirable.

(vi) **Intelligence :** The amount of transfer is closely related to the intelligence of the learner. Brighter children tend to transfer their learning more effectively than average or dull children.

(vii) **Deliberation :** Transfer very much depends upon a deliberate effort on the part of learner to interpret a new situation in the light of the past.

(viii) **Generalization :** Generalization is said to be the crux of transfer of training. The more we generalize our reactions the more are the chances of transfer from one situation to another.

7.4 EDUCATIONAL IMPLICATIONS OF TRANSFER OF TRAINING

The educational implications of transfer of training can be divided into two categories suitable curriculum and role of teacher.

7.4.1 Suitable Curriculum

There is an urgent need to bring desirable changes in the present curriculum. It is un psychological, unprogressive, narrow, rigid and divorced from actual life. Improvement is needed in the curriculum from the point of view of transfer of training.

(i) **Integrated Curriculum :** Curriculum should be the integrate whole so that there are many positive transfers of training. Hence correlation should be given due weightage while determining the curriculum. Special attention should be paid to the following types of correlation :

(a) Correlation long different subjects of the school curriculum.

(b) Correlation of school subjects with physical and social environment

(c) Correlation of different topics within the same branch.

(ii) Practical and Utilitarian Curriculum : Curriculum should be of some practical use to the students. It should be attached to the day today interests and needs of the learners. It should be directly related to the vocational interests, health and safety needs, citizen ship and recreational activities of the pupil and social environment.

(iii) Guidance in Selection of Curriculum: The students must be guided in the selection of such courses which has maximum transfer value.

7.3.2 Role of Teacher in Transfer of Training

Effective methods of teaching should be used for increasing the possibilities of transfer. The following suggestions are offered in this direction:

(i) Emphasis on Correlation: Emphasis should be laid on correlation so that previous knowledge may be used in the new tasks. For example grammar of mother tongue should be related to the grammar of the foreign language.

(ii) Coordination between Theoretical Knowledge and Practical Experience: Students should be encouraged to apply their class room techniques to practical situation.

(iii) Use of Illustrations and Audio Visual Aids: Effective use of charts, models, maps, graphs, diagrams, black-board and other audio-visual material should be made while teaching. Proper use of verbal illustrations like analogies and comparisons, stories and anecdotes, similes and word pictures should be made.

(iv) Emphasis on Intelligent Method of Learning: Intelligent method of learning should be encouraged. Rote learning should be discouraged.

(v) Use of Life Like Methods: Methods of teaching should be made life like, psychological, child centred, interesting and effective. There should not be a gap between the theory and practice.

(vi) **Use of Practice:** Provide practice in transfer. Also provide practice in guarding against old expectants or mental set.

(vii) **Attitude of Transferability:** Attitude of transferability should be fostered among students.

(viii) **Special Attention towards Intelligent Students:** Amount of transfer is closely related to thtdntelligence oflearner. Brighter children tend to transfer the learning more effectively than average or dull children. The brighter children will be quicker to recognize the elements of similarity. Hence the teacher should pay special attention to intelligent students from the point of view of transfer of training.

(ix) **Use of Generalization:** To generalize is to summarize which is common to the number of principles, ideas and situations. Generalization formulated by the people themselves in their own words, are more useful and appropriate. The teacher should keep in mind that for maximum transfer, the generalization should be thoroughly mastered and completely understood. The teacher should provide wide variety of opportunities for applications and generalization. This would enhance meaningfulness, understanding, completeness of knowledge and through ness of the learning.

(x) **Law of Association:** The teacher should make use of best laws of association for providing different types of knowledge.

(xi) **Use of Concentration:** The teacher should concentrate on both the process and product ofleaming. He should keep and develop the logical thinking in constant focus.

(xii) **Deliberate and Purposeful Efforts:** There should be deliberate and purposeful efforts on the part of teacher to secure definite transfer value. As we have pointed out the students should be given a chance to make and use generalizations. Orata, P. T. has remarked, "First, the teacher should know what it is that she wants the children to transfer to other fields; second she must learn by experience or experiment how to teach for transfer, and the third to go ahead and do it.

7.5 IMPORTANT ELEMENTS OF TRANSFER OF TRAINING

(i) Subjects of Learning Differ in Respect of their Transference Value: Experiments upon the transference of the subjects that are taught in the school seem to indicate that these subjects have different transfer values. Modern psychology does not believe that anyone subject can serve to discipline the mind, yet there is no denying it that the transfer of value of Mathematics and Science is very high. Then come the language and social science. History and English have no transfer value. Cooking, Stitching and Dancing have negative transfer value by which is meant that knowledge of them makes it difficult to learn other subjects.

(ii) Transfer is Particular, Not General: From the facts used in preceding illustrations it should be concluded that the knowledge of language or science helps in the learning of every subject. It has further been pointed out that the transfer of training takes place only if there is identity in circumstances or elements. Sanskrit may be helpful in learning either Hindi or Bengali, as Sanskrit words are numerously used in these languages but the knowledge of Sanskrit Cannot be of conceivable use in learning Urdu or Persian. It is more probable that pronunciation may be adversely influenced by these languages.

(iii) Transfer Depend Much on Learner's Intelligence and Innate Ability: Transfer is considerably influenced by the learner's intelligence. Experiments indicated that the ability of the best one percent students of the high school as far as transference is concerned, is something like twenty percent more than that of worst one percent students. Similarly, an individual can make use of his knowledge only through innate ability, and transfer is possible only if there is proper utilization of knowledge.

(iv) For Achieving Transfer it is Essential to Study Subjects that Admit of Transfer: Accordingly if training in Sanskrit is to be transferred, then Hindi or Bengali should be taught, while proficiency in Latin can be utilized in Teaching of English.

(vi) Transfer Depend upon the Use of Information: No knowledge of subject that has been grasped can be transferred unless it is first utilized in practice. Moral teaching in school can only be transferred to social education if student makes use of it in his day today life.

(vi) Transfer is Due to Similarity of Material and Methodology: It, too, has been frequent earlier that transfer of training can only be achieved in the learning of at particular subject which has, some affinity with the first in respect of matter as well as methodology. Arithmetic can be transferred to book keeping.

7.6 CHECK YOUR PROGRESS

Q 1. Define transfer of training.

Q2. Discuss different types of transfer of training.

Q3 What are the various factors that effect the transfer of training?

Q4 Discuss in detail the educational implications of transfer of training. Q What is the role of teacher in transfer of training?

Q5 Elaborate different elements of transfer of training.

7.7 CONCLUSION

From this description of transfer of training it is apparent that it depends upon the learner's intelligence, innate ability, knowledge, practical ability and use of acquired information in practice. Transfer takes place in particular subject that have similar material and similar methodology, and in teaching of such subjects. Transfer takes place in different quantities in different subjects. There is no transfer in some while as it is negative or obstructive in others.

7.8 SUGGESTED FURTHER READINGS

1. Flecher, J.M., Psychology in Education, New York: Odyssey Press.
2. Sharma R.N .,(1974) Educational Psychology, Rastogi Publication Meerut, Second Edition.
3. Skinner C.E., (1950) Elementry Educational Psychology, Revised Edition New York Prentice Hall, Inc.
4. Stroud, J.B., (1935) Educational Psychology, New York: The Macmillan Company.

LESSON No. 8 **UNIT-III**

INTELLIGENCE

By: Raj Singh Narania

STRUCTURE

8.1 INTRODUCTION

The elementary-school teacher describes a youngster as 'bright' if he learns his lessons easily ; the machine-shop foreman calls an apprentice 'a promising young fellow' if he is apt and skillful with his hands and his tools ; and the store manager regards a saleswoman as 'clever' if she can size up her customers quickly and anticipate and meet their needs. The teacher, the foreman and the store manager would all agree that what they are reporting is efficient or intelligent behaviour.

Efficiency in meeting everyday situations or solving everyday problems is perhaps as useful a working definition of ''general intelligence''. The concept of general intelligence is too broad to be of much practical value. In this unit, you will deepen your understanding about the concept of intelligence by understanding various theories of intelligence. You will also study about the nature of Intelligence Quotient (I.Q.), its classification and its benefits for the teachers, psychologists, and guides—who have to help the pupils to grow and develop to their maximum.

8.2 OBJECTIVES

After going through this unit, you shall be able to :

- define intelligence ;
- explain the nature of intelligence in reference to major theories ;
- describe the concept of I.Q. ;
- classify various individuals on the bases of their I.Q. ;
- illustrate the utility of the knowledge of I.Q.s of the students in educational field.
- explain the theories of intelligence.

8.3 INTELLIGENCE

Try asking half a dozen or so of your friends what they mean when they use the word intelligence. You are likely to end up with a half dozen different definitions. Although the word is regularly batted around in conversation as if everyone agreed on its meaning, psychologists who have spent a life time trying to pin down a definition are not at all certain. Seventy years ago, 17 eminent scholars attended a symposium during which they were asked to express their ideas about intelligence—and they produced nearly that many distinct opinions (Thorndike et al., 1921). The views of today's scholars are not quite so varied, but there is still far from uniform agreement (Weinberg, 1989).

Perhaps the most practical definition of intelligence was proposed by David Wechsler, who constructed a number of today's most widely used intelligence tests. He defined intelligence as the capacity to understand the world and the resourcefulness to cope with its challenges. It means, you are intelligent if you know what is going on around you, learn from your experience, and therefore act in ways that are successful in your particular circumstances. It is implied, of course, that individuals differ in the degree of their intelligence just as they do, for example, in heart rate or weight.

Clearly, what is rational and worthwhile will vary with where and when we live. One problem plaguing all investigators is that intelligence can mean different things to different people and has done so from time to time and place to place throughout the human history. The ancient Greeks considered intelligence to mean talent for oratory. The Chinese, until the 20th century, judged it to mean mastery of the written word. Some tribes in Africa attribute intelligence to a person with hunting ability and even in our country India, intelligent behaviour can mean different things to college teachers, doctors, engineers, actors, politicians etc.

8.3.1 Definitions of Intelligence

'Intelligence' as per dictionary means—the capacity to acquire and apply knowledge. Many definitions have been given by various psychological experts but many few agree upon any single concept. It is why, Boring defined intelligence as—Intelligence is what intelligence tests test. To make it easy, to understand various views of experts in group form, **Vernon** classified all the definitions of intelligence under three broad categories—biological, psychological and operational. **Freeman** also tried to classify all definitions into three categories but his approach differs from Vernon.

Vernon's Classification

Biological Approach

This category of definitions emphasizes the adaptive nature of human beings. Intelligence according to this approach, is the capacity to adapt relatively in a new situations of life. This approach is criticised from practical point of view in the study of individual differences within a culture. For example many great men like Pascal, Kafka were ill adjusted/ill adapted in their social and physical environment.

Psychological Approach

This approach includes the views related to effect of heredity and environment in the development of intelligence. C. Burt, an English psychologist defined

intelligence as— innate, general, cognitive ability. D. O. Hebb and R.B. Cattell have distinguished two kinds of intelligence—calling them intelligence 'A' and intelligence 'B' or 'fluid' and 'crystallized' intelligence. Whereas, 'A' is thought as genetic/innate potentiality, 'B' is generally result of experience, learning and environmental factors.

Operational Approach

Under such approach, the operations (actions or procedures) are used to measure a concept. We define a concept operationally by stating what procedures will be used to measure it. By selecting test items, a psychologist clears in a very direct way, — 'this is what I meant by intelligence'. The measurement of IQ (intelligence quotient) by applying formula of $\frac{MA}{CA} \times 100$ is clear example of operational approach of defining intelligence. This approach is considered to be most acceptable due to its scientific nature.

Freeman's Classification

Adjustment or Adaptation Ability

Definitions in this category stress upon adjustment ability of a person. The individual is thought intelligent in proportion to his ability to adjust to new situations and face problems of life successfully. Stern defined intelligence as a—general capacity of an individual, consciously to adjust his thinking to new environment.

Ability to learn

Learning ability, in general, is considered to be an important index of one's intelligence. **Buskingham** says—Intelligence is the learning ability.

Ability to carry on abstract thinking

This approach lays emphasis on the effective use of concepts and symbols in dealing with situations, especially, presenting a problem to be solved through the use of verbal and numerical symbols. **Terman** defined intelligence by saying

that—An individual is intelligent in proportion as he is able to carry on abstract thinking.

Two comprehensive definitions of Intelligence —

David Weschler :

''Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment.

Stoddard :

''Intelligence is the ability to undertake activities that are characterized by (1) difficulty, (2) complexity, (3) abstraction, (4) economy, (5) adaptiveness to a goal, (6) social value and (7) the emergence of originals, and to maintain such activities under conditions that demand a concentration of energy and a resistance to emotional forces.''

8.3.2 Important elements of intelligence

Table 5.1 shows results from a survey of 1020 experts on intelligence. At least three quarters of this group agreed that listed items are important elements of intelligence (Snyderman and Rothman, 1987)

Table 1

Important Elements of Intelligence

Description	Percent of agreement
Abstract thinking or reasoning	99.30
Problem solving ability	97.70
Capacity to acquire knowledge	96.00
Memory	80.50
Adaptation to one's environment	77.2

Adapted from Snyderman and Rothman, 1987.

Check Your Progress - 1

Notes : (a) Write your answers in the space given below

(b) Compare your answers with those given at the end of the lesson.

A. (i) Intelligence is the capacity to.....relatively in a new.....of life.

(ii) Intelligence is the ability to carry on.....thinking.

(iii) Intelligence is the aggregate or.....capacity of the individual to act ..... to think ..... and to deal ..... with his environment. (Weschler)

(iv) Intelligence is the ability to undertake activities that are characterized by difficulty, ..., abstraction, ..., adaptiveness to a goal, ...and the emergence of originals. (Stoddard)

B. Reproduce any comprehensive definition of intelligence.

LESSON NO. 9 **UNIT - III**

Charles Spearman's Two Factor Theory

By: Dr. Netar Parkash Sharma

STRUCTURE

9.1 OBJECTIVES:

After studying this lesson script, the students should be able -

- To describe the two factor theory of Intelligence.
- To explain the meaning of 'G' factor shown in the theory.
- To explain the meaning of 'S' factor shown in the theory.
- To explain the role of 'G' & 'S' factors.
- To explain the characteristics of 'G' factor shown in the theory.
- To explain the characteristics of 'S' factor shown in the theory.

9.2 INTRODUCTION:

Dear students, in this part of the lesson we will discuss Charles Spearman's Two Factor Theory of Intelligence and characteristics of 'G' factor as well as of " S-Factor.

Total capacity of the mind of an individual which enables him to acquire knowledge and apply that knowledge for solving various problems of life in order to make his adjustment in different situations of life is generally known as Intelligence. Since the time immemorial different thinkers made serious attempts to define the term intelligence and to develop the tools and techniques for measuring the intelligence accurately. An English Psychologist "Charles E. Spearman" also made a serious attempt to explain the nature of intelligence and to measure the intelligence correctly by developing a theory of intelligence called Eclectic Theory or Two Factor Theory of Intelligence.

9.3 DESCRIPTION OF THE THEORY:

Among the theories of intelligence, Spearman's Two Factor Theory is historical background on mental testing. The logical premise behind this theory was placed on the understanding or co-relation between two tests which implicit a factor common to both and the role of specific factors as many as two, at least, were convicted. Spearman presented his famous Two Factor Theory of Intelligence in the book entitled "The Two Factor Theory of Intelligence" published in 2 volumes in 1904. In this work he has concerned with describing the nature of intelligence and how far it may be tested. According to him a current approach to intelligence will be federative. This approach sees unity in difference. According to Spearman federative theory is "an eclectic approach" which is better than other approaches. He advocates that intelligence consists of 2 types of factors i.e., 'G' factor and 'S' factor. 'G' stands for general intelligence and 'S' stands for specific abilities. 'S' factors are many which represent different abilities like verbal ability, mechanical ability, numerical ability, spatial ability, inductive ability, deductive ability, imaginative ability etc.

According to Spearman the amount of each 'S' is different from others. Memory testing indicates another type of specific intelligence than learning. We find that in addition to 'G' there are so many 'S' factors found in a person. Viewed from the practical performance an individual is guided by both 'G' and 'S'. Every activity involves some amount of 'G' factor and one of the 'S' factors. The mass of 'S' is unlimited. Theoretically

each individual demonstrates endless types of 'S'. On the one hand amount of 'G' is fixed and permanent in an individual whereas the strength of 'S' factor depends on experience and training of an individual. All actions are determined by both 'G' and 'S'. Amount of 'G' varies from individual to individual but it is fixed in each person whereas amount of 'S' factor varies within the individual.

In this way Spearman found high degree of co-relation between 'G' and 'S' factors but very low degree of co-relation among different 'S' factors within the individual.

9.4 CHARACTERISTICS OF 'G' FACTOR:

(i) 'G' factor/General Intelligence is inborn which do not change as the result of training and education.

(ii) It is a central factor which supplies energy to all the 'S' factors.

(iii) It is constant in the sense that for any individual in respect of all the co-related abilities it remains the same.

(iv) The amount of 'G' differs from individual to individual.

(v) It is used in every life activity, therefore, success or failure of an individual in life is greatly determined by the amount of his 'G' factor.

9.5 CHARACTERISTICS OF 'S' FACTOR :

(i) 'S' factor is learned and acquired in the environment.

(ii) The amount of 'S' factor can be improved through experience and training.

(iii) The amount of different 'S' factors varies within the individual.

(iv) 'S' factor serves as the base for the aptitude and interest of an individual for a particular kind of work or occupation.

(v) 'S' factors determines the field of life of an individual.

9.6 EDUCATIONAL IMPLICATIONS:

Following steps should be taken in Education on the basis of the theory of intelligence:

1. **Giving Intelligence Test -** In order to know the level of general intelligence of the students teacher should administer the standardized test of intelligence on the students.

2. **Differential Aptitude Test Battery -** In order to know the strength of 'S' factors among different students teacher should administer the Differential Aptitude Test Battery upon the students.

3. **Classification of Students -** The students should be classified in different sections on the basis of their level of general intelligence as well as on the basis of 'S' factor strong among them. In simple words the students having the strong mechanical ability should be kept in one group. Students having good verbal ability should be kept in other group and students having strong numerical ability should be kept in other group.

4. **Diversified Curriculum -** In order to cater the educational needs of the students having different levels of general intelligence as well as different specific mental abilities, a diversified curriculum should be introduced so that all the students may opt for the subjects and activities as per their abilities.

5. **Psychological Methods of Teaching -** Teacher should apply the psychological methods of teaching keeping in view the level of general intelligence of the students as well as the strength of their 'S' factor.

6. **Co-curricular activities -** Various types of co-curricular activities suitable to the children having different levels of general intelligence as well as having different types of specific mental abilities should be organized in the educational institutions.

7. **Admission to various courses -** Admission to various courses should be given to the students on the basis of the level of their general intelligence as well as their specific mental ability or 'S' factor.

8. **Guidance and Counseling -** In order to help the students in making the right selection of the subjects, activities and opportunities at right time as well as for helping them in solving their personal, social and educational problems efficiently. Different types of guidance and counseling services should be organized in the

educational institutions.

9. **Provision of Training to the Teachers -** Necessary training should be imparted to the teachers for educating the students having different types of specific mental abilities.

9.7 CHECK YOUR PERFORMANCE :

1. Give the name of the Psychologist who gave Two Factor Theory of Intelligence?
2. Give a brief description of Two Factor Theory of Intelligence.
3. Briefly explain the meaning of 'G' factor.
4. Briefly explain the meaning of 'S' factor.
5. Briefly explain any five characteristics of 'G' factor.
6. Explain the five characteristics of 'S' factor.

For the correct answers of the questions stated above, you can read

For Q1. See paragraph 9.2

For Q2, 3 & 4 See paragraph 9.3

For Q5 See paragraph 9.4

For Q6 See paragraph 9.5

9.8 SUGGESTED READINGS :

Author	Book
Chauhan, S.S.	Advanced Educational Psychology
Kundu, C.L.; Tutoo D.N.	Educational Psychology
Mangal, S.K.	Educational Psychology
Sharma, R.N. and Sharma, R.K.	Advanced Educational Psychology
Walia, J.S.	Foundations of Education

LESSON NO. 10 **UNIT III**

L.L. THURSTONE'S PRIMARY MENTAL ABILITY THEORY

By Dr. Netar Parkash Sharma

STRUCTURE

10.1 OBJECTIVES:

After studying this lesson script, the students should be able -

- To explain the Thurstone's view for Spearman's Two Factor Theory and Thorndike's Multifactor Theory.
- To describe the Thurstone's Primary Mental Ability
- To explain seven primary mental abilities shown in the theory.
- To explain the steps to be taken in Education on the basis of Thurstone's primary mental ability theory of Intelligence.

10.2 INTRODUCTION:

Dear students, in this part of the lesson we will discuss the approach of a prominent American Psychologist 'L.L. Thurstone" for describing the concept of Intelligence Which is quite different to those of the Spearman and Thorndike. Thurstone adopted a scientific approach to understand the concept of intelligence which is the result of the factor analysis of a variety of tests on a variety of sample.

10.3 DESCRIPTION OF THE THEORY:

An eminent American Psychologist 'L.L. Thurstone" advanced a theory of intelligence called Primary Mental Ability Theory of Intelligence in 1938. Thurstone was of the opinion that intelligence is neither the combination of 'G' and 'S' factors as propounded by Spearman nor a haphazard collection of several mental abilities as advanced by Thorndike.

Thurstone gave this theory after using 56 different tests ranging from 2 to 20 minutes in duration of 240 students of Chicago University. On the basis of factorial analysis, he found that intelligence is comprised of seven primary mental abilities. Thurstone concludes that certain mental operations have a common primary factor that gives them psychological and functional unity and also differentiates them from other mental operations. These mental operations constitute a group. A second group of mental operations has its own unifying primary factor and so on. In all there are seven such groups which cover the entire range of mental abilities. Each of these primary factors is independent of others.

10.4 DESCRIPTION OF PRIMARY MENTAL ABILITIES:

According to Thurstone, these seven primary mental abilities are-

(i) **Verbal Comprehension -** It is the ability to understand and use verbal relations, words and ideas. In other words it is the ability to use words in planning, thinking and communication.

(ii) **Numerical Ability -** It is the ability to do calculations quickly and accurately.

(iii) **Word Fluency -** It includes the use of vocabulary and communication skills.

(iv) **Memorising Ability -** It is the ability to retain the learnt material in the mind for long time and recall it spontaneously.

(v) Spatial Ability - It is the ability to perceive objects accurately.

(vi) Perceptual Ability - It is the ability to perceive objects accurately.

(vii) Reasoning Ability - It is the ability to understand or judge the things with the help of signs and symbols. It may be inductive or deductive.

a) Inductive Reasoning Ability - It is the ability to proceed from specific to general.

b) Deductive Reasoning Ability - It is the ability to proceed from general to specific.

10.5 EDUCATIONAL IMPLICATIONS :

In the light of Thurstone's Primary Mental Ability Theory of Intelligence following steps should be taken in Education -

1. **Giving the Intelligence Tests -** In order to see the strength of different primary mental abilities in the students teacher should administer the standardized intelligence test on the students.

2. **Classification of the Students -** The students should be classified in different categories/sections on the basis of their primary mental abilities.

3. **Diversified Curriculum -** In order to help the students to opt for the subjects and activities according to their primary mental abilities a diversified curriculum should be introduced in the educational institution.

4. **Co-curricular activities -** In order to develop the different primary mental abilities among the students various types of co-curricular activities should be organized in the educational institutions.

5. **Providing Freedom -** In order to give full expressions to the innate potentialities, talents and abilities maximum freedom should be given to the students.

6. **Introduction of creative activities -** Some creative activities like art and craft, drawing, painting, music, singing, dancing, dramatics, clay modeling and such other activities should be introduced in the curriculum for developing different primary mental abilities of the students.

7. **Admission to various courses -** Admission to various courses should be given on the basis of the strength of the primary mental ability of the students.

10.6 CHECK YOUR PERFORMANCE

1. Who propounded the Primary Mental Ability Theory of Intelligence?
2. In which year the primary mental ability test was advocated?
3. Briefly describe the Primary Mental Abilities Theory of Intelligence.
4. Briefly explain the primary mental abilities test of Intelligence shown in the theory.
5. Briefly explain the steps to be taken in Education on the basis of Thurstone's Primary Mental ability theory of intelligence.

For the correct answers of the questions stated above, you can read

For Q1.	See paragraph 10.2
For Q2 &3	See paragraph 10.3
For Q4	See paragraph 10.4
For Q5	See paragraph 10.5

10.7 SUGGESTED READINGS

Author	**Book**
Chauhan, S.S.	Advanced Educational Psychology
Kundu, C.L.; Tutoo D.N.	Educational Psychology
Mangal, S.K.	Educational Psychology
Sharma, R.N. and Sharma, R.K.	Advanced Educational Psychology
Walia, J.S.	Foundations of Education

LESSON NO. 11 **UNIT - III**

USE OF INTELLIGENCE TEST

By: Arti Durani

STRUCTURE

OBJECTIVES

After going through this lesson the students should be able to:

- Discuss the uses of intelligence tests
- Explain the limitations of the intelligence tests

11.0 INTRODUCTION

Intelligence is measured through a complicated process. It involves a comparison and establishment of relationship between C.A (Chronological Age) and M.A. (Mental Age). This relation is expressed by the term I.Q. (Intelligence Quotient). When the mental age is divided by the chronological age and the quotient is multiplied by 100, the result is I.Q.

$$I.Q.=M.A/C.Ax1OO$$

So to measure this mental age and chronological age we are having intelligence tests. Intelligence tests are classified according to the activities prescribed in them. These are as follows:

(a) Verbal Tests

(b) Non- Verbal Tests

As the name itself suggests, verbal tests make use of language while non verbal tests includes such activities which do not necessitate the use of language. Both these types are suitable for individual as well as group. Consequently, verbal and non verbal tests are capable of further sub division into two classes - individual and group. Thus finally there are four groups of intelligence test:

(i) Verbal Individual Intelligence Test

(ii) Non- Verbal Individual Intelligence Tests

(iii) Verbal Group Intelligence Tests

(iv) Non- Verbal Group Intelligence Tests

11.1 USES OF INTELLIGENCE TESTS

Intelligence tests are valuable instruments but their value is dependent upon competent use and interpretation. When carefully selected, administered and interpreted, they provide the teacher with significant data.

Intelligence Tests help the teacher in the following ways :

Homogenous Grouping : A class consisting of students with widely different abilities, is difficult to handle. Such a class is not suitable to both the bright and the dull pupils. To overcome this problem, homogenous grouping of pupils has been suggested. This can be done on the basis of knowledge pertaining to I.Q. category of different pupils which can be determined through intelligence tests. For example, those students with very superior intelligence can be grouped in Golden Section. Those with normal I.Q. can be placed in Section 'B' and those with below normal I.Q. can be placed in group 'C'. This will save the time as well as energy of the teacher.

Measuring General Learning Readiness : Prof. Chauhan has rightly endorsed this view when he says that the knowledge of I.Q. can be used to indicate the level of capacity at which the pupil has arrived. Numerous investigations have been made to discover the relationship between I.Q. and school marks at different levels of schooling. All researches have proved, beyond doubt, that I.Q. can be used to measure the readiness for learning at different levels.

Diagnosing pupils' Difficulties : Intelligence Tests can also be used successfully in diagnosing the psychological difficulties of the students. The backwardness of certain students in studies (certain school subjects) is not always due to their inherent capacity. Sometimes backwardness in studies is due to unsatisfactory school environment and disturbed home conditions. When the teacher finds discrepancies between I.Q. scores and achievement of a pupil, he can study the case to examine the possible reasons for lack of achievement on the part of the child. The teacher can take steps to provide remedial measures to the difficulties. The teacher may find that the child needs motivation or that child is lacking in adjustment or that an improvement in teaching is necessary.

Educational Guidance : At the higher-secondary level of education, we have provision of diversified courses. The students, at this stage can be guided to select the proper/suitable courses or subjects suiting to their intelligence level. For example, there are certain subjects like languages and mathematics considered to be more closely related to intelligence levels of the students.

Vocational Guidance : An important use of Intelligence Tests lies in giving vocational guidance to students. Occupational success is related to intelligence. Thus intelligence test scores can indicate the possibility of entering into an occupation and succeeding in it in future.

Guidance for various Co-curricular Activities : Alongwith guiding the students to select various subjects and courses suiting to their intelligence

level, we can also help them to select or to participate in various other activities in the school. For example, some bright students may be motivated to involve them in activities like debates, symposia, declamations, seminars etc. whereas pupils having low I.Q. may be guided to involve themselves in various physical activities like games and sports.

Reporting to Parents : Under 'Continuous and Comprehensive Evaluation Scheme', we generally prepare a report of each student concerning his academic and curricular achievements and send the same to parents from time to time. But, it seems better, to evaluate a pupil's level of achievement in terms of his/her capacity as per his/her I.Q. determined by intelligence tests. If there is great discrepancy in the intelligence and achievement scores, parents should be informed accordingly so that they may consult the teachers, the headmaster or the counsellor concerned.

I.Q. as base of Admission : While admitting pupils in the first grade, it is desirable to consider their mental age (MA) rather than Chronological Age (CA). Children need a mental age of 6 years or thereabout to learn efficiently and happily the work of first grade. They must reach a definite level of mental development before we try to teach them about reading and writing. Moreover, achievement of the child in different subjects is correlated with his intelligence level. This enables the teacher to judge his success in courses of study.

Improving the Learning Process : I.Q. of the child can help a teacher to discover what the child can learn and how quickly he can learn, as well as the teaching methods that should be applied and the learning content that should be utilized to guide the learner to use his mental potentialities to their utmost. Gifted children need enriched curriculum as compared to average or below average children. Without the knowledge of I.Q., the teacher may force the below average child to do what is beyond his capacity and fail to assist the gifted to develop to the maximum of his capabilities. Similarly students having high I.Q. need to be taught by more stimulating methods as they have higher level of enquiry, exploration

and critical thinking than average or below average children.

Use in Selection : In the industrial field, intelligence tests are often used for the purpose of making selection of suitable candidates for various jobs to ensure future success. A right man at the right place leads to maximum output.

Use in Research Work : Finally, I.Q. of pupils can be used in carrying out the research in educational field. For example, we can try to find out, (a) whether differences in mental capacities are the result of heredity or environment ; (b) whether delinquency or problematic behaviour is caused by inferior intelligence ; (s) The relationship of intelligence with cerativity ; (d) how mental capacities grow with age, experience or training etc.

Establishing a proper level of Aspirations : One of the most important ends served by Intelligence tests is that of assisting the individuals to establish a level of aspirations that is realistic in terms of intellectual potential.

Hence, the information about mental abilities of the students help the teacher and researcher to find various cause and effect relationships in the field of education, psychology and sociology. With this type of knowledge, teachers can help the students to gain much experience and training with the right or better approach. The educational and vocational guidance, help students to adjust themselves in school atmosphere and also in their future lives perfectly.

11.2 LIMITATIONS OF INTELLIGENCE TEST

It would be a great mistake to think that these tests are all in all in measuring the various aspects of learner's personality. Intelligence is one of the factors. Too much reliance cannot be made on the evaluation tool. It is to be used in conjunction with other tools. Following are the limitations of intelligence tests:

(i) Intelligence tests seek to measure intelligence which in itself is not a clear concept. Psychologists differ readically on the meaning and nature of intelligence.

(ii) Intelligence test fails to measure the depth, strength, weakness and quality of the individual relating to his emotional stability.

(iii) Intelligence tests fail to evaluate the ethical, moral and spiritual qualities of the individual.

(iv) Intelligence tests fail to take into the account the environmental factors. The tests may include items/materials with which the children of certain socio-economic groups have more experience than those of weaker sections.

(v) Use of intelligence tests needs a good deal of care and caution on the part of the test user.

(vi) There is shortage of standardized intelligence tests. The result is that we cannot predict the future success of the child in any educational ,or vocational course with great certainty.

(vii) Intelligence tests are not reliable. They are not exact measures of intelligence.

(viii) Once the teacher knows the I. Q. of the child he treats him through his I.Q. Thus he becomes partial.

11.3 CHECK YOUR PROGRESS

Q1 Define Intelligence Quotient.

Q2 How is Intelligence Quotient calculated?

Q3 Define Verbal and Non-Verbal Tests of Intelligence?

Q4 Explain in detail the uses of Intelligence tests?

Q5 What are limitations of Intelligence tests?

11.4 CONCLUSION

Thus we conclude that intelligence is not the idea, an abstraction. It is not a thing-therefore; intelligence cannot be measured in the same way as we measure a piece of cloth, wood or temperature of our body. In measuring piece of cloth or wood we use scales made up of absolute units, such as inches, centimeters etc. Similarly in measuring temperature of the body we use thermometers used as degrees as units of measurement. In such type of measurement we use scales made up of absolute units and the instrument gives reliable and valid results. But in case of intelligence measurement we do not have such scales. Here as Griffiths states, "The standard of measurement is a group performance."

Whereas in case of piece of cloth absolute measurement is possible, in case of intelligence test we have relative measurement. When we measure the intelligence of an individual with the help of an intelligence test we try to interpret the scores in the light of the norms established by-the author of the test. Thus an individual's intelligence is determined relatively to the classified group to which he belongs.

The measurement of intelligence is not as simple, valid, reliable and definite task as the measurement of the piece of cloth or temperature of a body. In case of a piece of cloth and temperature of the body it is convenient to use the measuring instrument when ever we like, but it is difficult to use intelligence test with similar convenience. The administration and the interpretation of the intelligence tests require sufficient skill, labour and competency on the part of examiner.

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LESSON NO. 12 **UNIT - III**

CONCEPT OF INTELLIGENCE QUOTIENT

By : Raj Singh Narania

STRUCTURE

12.1 CONCEPT OF INTELLIGENCE QUOTIENT (IQ)

By this time you must have come to know that individuals differ in their growth and development patterns and learning abilities. In this section, we shall discuss individual differences in intelligence.

Individual differences in intelligence create problems for the teachers to satisfy all individual students to the maximum. In every class, in general, some students are above average, many average and some are below average. To make justice to all students without favouritism and predjudices, grouping of students was recommended by many psychological experts even at the beginning of the 20th century. To make this process of grouping easy Alfred Binet—a French psychologist, developed a test designed to measure potential ability at school tasks rather than performance in school—and to produce same scores regardless of the personalities or prejudices of those who gave or took the test.

Binet's test was first published in 1905. In fact, all modern intelligence tests bear a considerable resemblance to Binet's original work. In U.S.A., one of the

best-known current versions of the original test is the Standford–Binet Intelligence Scale.

Although Binet was the father of intelligence tests, a German Psycologist William Stern was the first man to formulate the concept of IQ in 1912. Today, IQ is the generally accepted means of expressing intelligence. I.Q. speaks of the degree of brightness possessed by an individual. It is defined as the ratio of mental age to the chronological age multiplied by 100. To understand the concept of I.Q, it is necessary to understand the concept of mental age and chronological age.

Mental Age

The age–ranked questions of the original Standford Binet allowed a person's mental age to be measured. Mental age is the average mental ability displayed by people of a given age. For example, at the age of 8 or 9, very few children can define the word 'connection'. At the age of 10, ten percent can and at the age of 13, sixty percent can. In other words, the ability to define 'connection' indicates mental ability equal to that of an average 13-year-old and gives a mental age of 13 (on this single item).

If some child excelled in the performance of a certain task compared to the performance of the majority of the children of his age, he was said to be of a higher mental age. If, for instance, the performance of an eight-years old child on certain task is equal to that of a majority of 10-year old child, then he is supposed to have a mental age (MA) of ten years. But, on the other side, if another child of 8 years age shows performance equal to that of the majority of six year old, on the same task/s–he would be considered as having mental age of 6 years only. Hence, mental age of a person is his level of mental ability.

Chronological Age (CA)

Mental age is a good measure of actual ability. But this says nothing about whether overall intelligence is relatively high or low. To the meaning of mental age, chronological age (age in years) must also be considered. In simple words, chronological age (CA) is the actual age of a person in years right from his birth till he appears in test to check his intelligence level or I.Q.

I.Q. (Formula)

To find or calculate intelligence scores of various individuals Dr. William Stern suggested the way to divide the mental-age score by chronological-age score of a person. Later on this was widely used by Terman. The formula of I.Q. then was known as I.Q. $= \frac{MA}{CA}$, which meant the ratio between MA and CA. In order to avoid the complexities of the decimal fraction–it was suggested to multiply the score for MA/CA by 100.

The formula of I.Q., Thus states as :

$$\text{I.Q.} = \frac{MA}{CA} \times 100$$

An advantage of I.Q. is that we can compare the intelligence of various children with different chronological and mental ages.

For instance, a 10–year old child with a mental age of 12 has an I.Q. of 120 :

$$\frac{(MA)\,12}{(CA)\,10} \times 100 = 120\,(1\,Q)$$

A second child having a mental age of 12, but with a chronological age of 12 would have an 1Q of 100 :

$$\frac{(MA)\,12}{(CA)\,12} \times 100 = 100\,(I\,Q)$$

The I.Q. shows that the younger child is brighter than his 12-year-old friend, even though their intellectual skills are actually the same. Notice that I.Q. equals 100 when MA=CA. An IQ score of 100 is therefore defined as average intelligence.

12.2 CLASSIFICATION OF I.Q.

Various attempts have been made to classify intelligence according to I.Q. Table 5.2, 5.3, 5.4 and 5.5 illustrate the relationship between I.Q. and degree of brightness on the basis of the experiments of various psychologists.

Table : 2 Distribution of I.Q. scores on Standford Binet Test

1Q	Classification	Percentage of People
Over 139	Very superior	1
120–139	Superior	11
110–119	High Average	18
90–109	Average	46
80–89	Low Average	15
70–79	Borderline	6
Below 70	Mentally retarded	3

Table : 3 Classification of I.Q. according to Terman and Merril

S. No.	I. Q. Intelligence	Classification of Intelligence	Percentage
1	140 and above	Genius	2.5
2	130–139	Very superior	4.0
3	120–129	Superior	6.0
4	110–119	Above Average	15.0
5	90–109	Normal or Average	45.0
6	80–89	Below Average	15.0
7	70–79	Dull or Borderline	6.0
8	50–69	Feeble minded	4.0

9	25–49	Moron (Educable) Imbecile (Trainable)	
10	24 and below	Idiot (untrainable)	2.5

The distributions of I.Q. scores under above given four tables, shows almost the same picture about percent of people falling in different categories under different I.Q. ranges. But, it is suggested here to keep in mind that classifications used are arbitrary and should not be considered as rigid labels.

Check Your Progress - 2

Notes : (a) Write your answers in the space given below.

(b) Compare your answer with those given at the end of the lesson.

A) What do you mean by M.A. and C.A. ?

B) Illustrate the formula of I.Q.

LESSON NO. 13 **UNIT - IV**

MEMORY AND FORGETTING

By : Dr. Raj Singh

STRUCTURE

13.1 INTRODUCTION

In the present unit, the purpose is to help you to understand the nature of memory and forgetting. Memory is a psychological gift of heredity and it plays a vital role in learning and education as well as actual life of human being. Every person has a specific power of collecting experiences which differ from person to person, because experiences are collected either in the conscious or subconscious part of human mind and are called memory or

remembering. But it is common experience that people do not remember their experiences completely and a major part is not even remembered. Thus remembering and forgetting are matters of everyday experience. The difficulty or inability, of a subject in being remembered or coming to the consciousness is the mental activity due to forgetting.

Memory plays a key role in the development of the personality of an individual whereas forgetting contradicts remembering and is totally against the attributes of memory. Therefore ,in this chapter we will discuss the meaning of memory and forgetting.

13.2 OBJECTIVES

After going through this unit, you are expected to

- Explain the meaning of memory.
- Reproduce definitions of memory.
- Explain the meaning of forgetting.
- Explain the definitions of forgetting.

13.3 MEMORY

Memory helps an individual to remember important facts, name and other items of information completely. Memory is the function of mind by virtue of which it records, retains and produces ideas gained by its own activity, In other words memory is the capacity of the individual to bring back or recall to mind the past experiences.

13.3.1 MEANING OF MEMORY

Imagine what would be like if you lost the ability to remember new experiences. You wouldn't be able to remember meeting people, or what you did last night, or even what you had for breakfast this morning. In a few minutes, you would not even remember having contemplated this problem. Such is the fate of a man who received brain surgery to relieve his epilepsy.

Look at the arrangement of 36 numbers shown below for a minute or so and try hard to remember as many as you can, row by row:

111467

783124

180279

617453

391655

326789

Like most of the people , you probably can recite only a fraction of the total array of active system that receives, stores, organizes, alters, recovers information(Baddeley,1990) .In some ways memory acts like a computer Incoming information is first encoded or changed into usable form, This step is like typing data into computer. Next information is stored or held in the system .Finally memories must be retrieved or taken out of storage to be useful.

13.3.2 DEFINITIONS OF MEMORY.

It is very difficult to define memory, According to stout, old experiences are awakened through memory .According to spearman to collect a learnt thing or an incident is a sign of memory. Different persons have different degrees of memory. Some persons learn things in one attempt while others have to make more efforts .Some important definitions of memory are as under:

1. William James: Memory is "the knowledge of a former state of mind after it has already once dropped from consciousness ; or rather it is the knowledge of an event, or fact which meantime we have not been thinking with the additional consciousness that we have thought or experienced it before" numbers from memory. Remarkably a young psychology major, Rajan Mahadevan, can recall with ease all the numbers in perfect order after only a brief look.He is also able to recall as many as 64 digits that are read to him at one per second- or about 55 or so more than the norm (Thompson, 1989).And he can tell you his room number and the bill he paid at a hotel ten years ago. Such prodigious feats of memory are rare indeed. Mahanevan is regarded as one of the unique persons with hypermnesia or the extreme capacity to remember. Another famous case was the great conductor Arturo Toscanini, who could remember every note for every instrument of ones

250 orchestral compositions, still another was the Russian Journalist Shereshevskii, who could remember all his conversations, word for word.

Since the late 1960s most psychologists have viewed memory as a form of information processing, in which memory processes occur in much the same way as they do in computer A computer receives information through the keyboard or mordem, processes it in software, stores it on the hard disk and then retrives that information when requested to by the user or another program.

2. Woodworth and Marquis:

a) "Memory consists in remembering what has previously been learned".

b) "Memory consists in learning, retaining and remembering what has previously been learned."

c) "Retention is inactive, remembering is active and both are included under memory

3. James S.Ross: "Memory as a complex process involving the establishment of dispositions, their retention and the recall of the experiences that have left the disposition behind them"

4. Ross: "A memory is a new experience determined by the disposition laid down by the previous experiences the relation between the two being clearly understood"

5. Alexander: "Memory like learning is a fundamental process of adjustment .One of the most cardinal features of adequate adjustment is the ability to profit by past experiences; and it is obvious that, in the absence of memory, this ability would be impossible .These is no phase of human living untouched by memory"

6. Wood worth:

"Memory is the direct use of what is learned"

On the basis of above definitions we can observe following characteristics of memory.

- Memory originates from learning.
- Memory is a complex process involving, learning, retention,recall and recognition.
- Memory reproduces the past experiences (reproductive)
- Memory is constructive.
- Memory plays an integral and central part in the process of refinement.

CHECK YOUR PROGRESS 1

NOTES :- (a)Write your answer in the space given below

(b) Compare your answers with those given at the end of unit.

(A)Give the meaning of Memory?

_____

_____

_____

(B) Write any two definitions of memory?

_____

_____

(C) Fill in the Blanks by putting right words.

i. Memory is a _____ gift of heredity.

ii. Experiences collected in _____ and _____ part of human brain are called _____. .

iii. Memory is complex process involving learning, _____ and _____

iv. Extreme capacity to remember is known as _____

v. "Memory is the direct use of what is learned" is said by _____

13.4 FORGETTING.

In the preceding section of this unit we discussed the concept of memory .In this section of this unit, we shall discuss the concept of forgetting.

Memory and forgetting are interrelated terms. Both are opposite side of the same coin. We learn something, that is, we store some piece of information in our memory. Sometimes this information persists and we can recall it whenever we need it. In this case we say that we remember whatever we had learned. Sometimes the information seems to disappear or elude us- and we find ourselves not able to recall the learnt or experienced matter- this is the case of forgetfulness or forgetting. The question arise Why do we remember something and forget another?

13.4.1 MEANING OF FORGETTING.

Forgetting contradicts remembering and adversely effects retention and recall, thus it is totally against the attributes of memory .Generally speaking ,most forgetting occurs immediately after memorization .In a famous set of experiments, Herman Ebbinghaus (1885) tested his memory at various times after learning, so he memorized nonsense syllables. These are meaningless 3-letter word such as GEX, CEF AND WOL .The importance of using meaningless words is shown by the fact that VEL, FAB and DUZ, are no longer used in memory tests.Subjects who recognize these words as detergent names find them very easy to remember.

According to Ebbinghaus, Forgetting is a passive mental process.The activity continues automatically with the passage of time and the mind does not interfere with it. The activity of forgetting proceeds with speed for some four to six hours after the learning of meaningless material but by the time 5 to 7 days have passed, the enthusiasm dies out and the activity is very low, so much so that the difference between the forgetting of the 10the and 21st day is almost imperceptible. Some psychologists have not accepted the opinion expressed by Ebbinghaus. They think that forgetting is an active mental process implying that the mind too takes a hand, the other being the passage of time , in forgetting.

Forgetting is effected in no small measure by mental processes which take place in the interval between remembering and forgetting.

Traditionally, we hold that we learn by practice (law of disuse), Forgetting occurs only when some learning took place. If there is no learning there is no forgetting. So we can say that forgetting is an inevitable concomitent of learning.

13.4.2 DEFINITIONS OF FORGETTING.

i. According to Freud : "Forgetting is voluntary for it is on account of unwillingness to recall"

ii. Adams: "True learning is judicious forgetting"

iii. James Drever: "Forgetting means failure at any time to recall an experience when attempting to do so, or to perform an action previously learned"

iv. Munn: "Forgetting is the failing to retain or able to recall what has been acquired"

v. Bhatia: "Forgetting is the failure of the individual to revive in consciousness an idea or a group of ideas without the help of the original stimulus"

In all these definitions," Forgetting" is termed as a failure. The power of long retention and rapid reproduction (recall and recognition)make a good memory .It counts towards the success of an individual in the task of learning or memorizing forgetfulness on the other hand, contributes toward 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 eventually a failure in the ability to reproduce learned material.

CHECK YOU PROGRESS 2

NOTE: (a) Write your answer in the space given below?

(b) Compare your answers with those given at the end?

A. What do you mean by forgetting?

_____

_____

B. Write any two definitions of forgetting?

_____

_____

13.5 LET US SUM UP

Learning is a life long process, but true learning has its transfer value .We can apply our mind and learned experience to solve various day to day problem only it we are capable enough to retain the matter learned or experienced for a long period of time-So that we can use the same during the hour of need .The process of memory includes learning, retention ,recall and recognition as mental activities but from all other activities, effective learning plays a very important role to develop good memory.

The concept of forgetting has been also discussed in this unit In brief it can be referred as 'Lack of retention' or lack of revival of the learned material at the required time.

13.6 MODEL EXAMINATION QUESTIONS

1. Discuss the concept of memory?
2. Explain different definitions of memory?
3. Explain the concept of forgetting?
4. Discuss forgetting by giving different definitions?

13.7 SUGGESTED READINGS

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Chauhan,S.S(1955) Advanced Educational Psychology Vikas Publishing House Pvt.Ltd,New Delhi.

13.8 ANSWERS TO CHECK YOUR PROGRESS

1) A. Refer section 13.3.1

B. Refer section 13.3.2

C. (i) Psychological

(ii) Conscious and Subconscious, Memory

(iii) Retention, recall and recognition.

(iv) Hypernesia

(v) Woodworth

(2) A. Refer to section 13.4.1

B . Refer to section 13.4.2.

LESSON NO. 14 **UNIT-IV**

COMPONENTS OF MEMORY

By : Dr. Raj Singh

STRUCTURE

14.1 INTRODUCTION:

In the previous lesson we studied meaning and definitions of memory and forgetting. It is clear that memory is the function of mind by virtue of which it records, retains and

produces ideas gained by its own activity. It is a complex process involving learning retention, recall and recognition .Hence it is essential to understand various components of memory which affect one's memory and their relative influence. In this chapter we will discuss components of memory in detail.

14.2 OBJECTIVES:

After going through this unit, you are expected to.

- Understand the meaning of learning as a component of memory.
- Understand the meaning of recall.
- Understand the process of retention.
- Understand the meaning of recognition as a component of memory.
- Describe favorable conditions of recall, retention and recognition.

14.3 LEARNING:

Learning is one of the most important component of memory .Sometimes leaning is used as a supplement word to memory because it is the basic characteristic of memory .If learning is good, memory will also be good. Thus the methods which assist learning do the same for memory. Learning creates memory traces on the mind on the basis of which recollection is effected. The memory of a person depends on how effective, it is retained for a longer time and can be recalled easily. Many factors of learning e.g: active participation, intelligent study, kind of material, age of learner, learner's attitude and capacity, length and meaningfulness of material etc, theories of learning like trial and error, insight, classical conditioning, operant conditioning and different laws deduced from these theories like law of readiness, law of exercise and law of effect have significant influence on learning. Memory is also affected by method of learning like space Vs unspaced method, Whole Vs part method. No doubt role and recitation method also help sometimes to retain the material but for good memory intelligent understanding and problem solving approach is considered to be more effective.

14.4 RETENTION:

The memory means nothing without retention. There are individual differences in

the power of retention. Some have more retention power, while some possess it in lower measure .That is why some persons forget things very soon. The children possess retention power in a large measure .So it is not difficult for them to learn. On the basis of tests the conclusion has been drawn that retention power generally develops more up to the age of 14 or 15 years. Often the development of retension power is at its peak at the age of 25 years. Afterwards a gradual deterioration starts. Those persons who prepare for B.A or M.A examinations after the age of 25years often complain about the weakness of their retention power .If a person has a good health and keeps interest in his subject, his retention power may remain strong for a considerably long period. Mind health and taste influence the retention power. Memory is related to the conscious part of the brain. The mind makes selection from the experiences it receives from various sensory organs. These are an individual difference in this selection power. An individual selects different things according to his taste and power. The other function of the mind is to store the experiences after selection. The pictures of experiences get marked on the mind's screen with the help of these impressions .These pictures are known as images .Retention power is born of these images. Health greatly affects the retention power. If a person is unhealthy or weak, his retention power may become weak.

14.4.1 Favorable conditions in retention

Many experiments have been carried out on the subject of retention and many Physiological conditions have proved useful. Some of the main conditions which are favorable in retention are:

1. Nature of Material: The following characteristics in the material to be retained help in its retention

- Intensity:- The intensity of the stimulus assists in the retention of the subject weak or indistinct stimuli do not stick in the mind for any length of time
- Distinctness:- Distinct stimuli like strong light, striking beauty or ugliness and such like can be retained for a long time.
- Recency:- Recent experiences are retained for a longer time and a diminution in their retention occurs with the passage of time.

- Meaning:- Meaningless experiences do not linger long in the mind while meaningful ones can be retained for long with little effort.

2. Duration:- A stimulus which continues for a long time can be retained for a longer time in the mind while a stimulus of shorter duration is retained for a shorter duration.

3. Amount of Learning:- The extent of retention is directly related to amount of learning for a longer period but with interest causes good retention while devoting less time to learning causes short memory.

4. Method of Learning-: Methods of learning sometimes suit the needs, interest and abilities of the learners and help good learning and good retention while these are not as per above requirements we can't retain the material learnt for a long time.

5. Speed of Learning:-The faster the learning the better is the retention .Thus the people learning faster seem to retain the subject learnt for longer periods as compared to slow learners.

6. Feeling:- Freud and other psychologists assert that we retain pleasant experiences for a longer time than painful ones.

7. Mental Set:- Retention is greater if mental set or intention is to retain the material for a long time than when it is studied with the set to learn it only for immediate recall.

- Attention
- Sleep
- Intention
- Recency of impressions
- Frequency of impressions.

But it cannot be concluded from this that any learning carried out for retention will be necessarily retained. It only implies that retention is better if these is intention to retain the subject than when there is no such intention.

14.5 RECALL:

What is the name of the first song on your favorite compact disc? Who won the World Series last year? Who wrote Hamlet? If you can answer these questions you are demonstrating recall. To recall means to supply or reproduce facts or information tests of recall often require word for word memory. If you study a Poem or a speech until you can recite it without looking you are recalling it. If you complete a fill-in-blank question, you are recalling it .Recall is very essential for memory. The extent and ease to recall or reproducing the learnt material help us to judge the level of one's memory. In other words recall is to remember the learning retained in mind.

Ebbinghaus experimented to see whether recall is creative or reproductive .He taught some senseless stanzas to some people and asked them to recall these stanzas after different time intervals. From the result he concluded that recall is reproductive Bartlett and his followers did not agree with this view and to prove their point they experimented with the recollection of a story. A student was made to read the story with care and was asked to recall it after fifteen minutes later. This reproduced story was given to another student to read and he too, was asked to recall it. In this way, students were made to recall a story by this chain method and it was found that in the last recall, the conclusion and even names of the characters had been changed.

14.5.1 FACTORS OF RECALL:

The two types of recall are spontaneous recall and deliberate recall. In former, one is able to recall memory traces one after another without any effort and in latter recall is possible through deliberate effort. The important conditions or factors of recall are:

- Favorable Mental and Physical Conditions:- Recall is comparatively easy both when the mind and body are healthy and fresh and adverse and indifferent physical and mental conditions hinder recall.
- Perfection of Clues:- Recall is done with the help of clues which are simulator of recall .For example, if we learn a poem, we can not recall it without the help of title, the first line or the clue to some past of it.
- Mental Set: The mental set of the individual, too affects recall. A religious minded

person remembers religious subjects easily while a sensuous person find it easy to remember things associated with sex.

- Context:- Context too help recall. While writing an essay, or talking, things pertinent to the context keep on flowing to the focus of attention.
- Motives:- When a person is under the influence of motive, he has such clear recall of related incidents that he sometimes has hallucination.
- Feeling:- Recall is affected by the feeling of pleasure and pain .Incidents and experiences attached with the feelings of pain and pleasure are recalled more easily then those attached with indifferent feelings.
- Effort:- This has a very significant effect on recall. Unless the extreme limit of effort has been passed, recall generally increases with the effort. When this limit has been exceeded recall becomes difficult .But if on the other hand, the effort is made with confidence keeping in view the clues, recall will be affected favorably.
- Absence of Inhibition: - recall is better in the absence of any inhibition, because inhibition obstructs it. A student forgets everything in the examination because he is nervous.
- Anxiety
- Emotional State
- Nervousness

14.6 RECOGNITION:

If you tried to write down all the fact you could remember from a class taken last year, you might conclude that you had learned very little however, a more sensitive test based on recognition could be used for instance you could be given a multiple choice test on facts and ideas from the course since multiple-choice test only require you to recognize the correct answer, we would probably find evidence of considerable learning.

Recognition memory can be amazingly accurate for pictures, photographs, or other visual input. Recognition is superior to recall. This is why police departments use photographs to identify criminal suspects.

Recognition is a common experience but it is a complex and a somewhat mysterious process. The entire process takes place quite automatically. To study recognition in the laboratory we have to distinguish between correct and faulty recognition .We do this by giving the subject a series of items, such as a set of 60 photographs. Later we list recognition by mixing the original 60 with additional ones of the some general kind and have the subject sort out those seen previously. We can obtain a score in the same manner as we do for a true-false examination corrected for guessing the formula is

Recognition score = (Right-Wrong)/Total X 100

Recognition often demonstrates retention when recall draws a blank Multiple choice tests measure recognition.

Recognition may be either definite or indefinite. A person recognizes a friend as soon he sees and is perfectly aware of everything about this person, is an example of definite recognition. The inability of a person to remember the time, place and context in which he first heard a story which has just been related to him in spite of the fact that he recognizes it is an example of indefinite recognition.

Recognition mean, literally, cognizing again, and it is therefore the cognition of some subject cognized earlier. Thus recognition come after cognition. If means 'consciousness of familiarity' in a sense recognition grants completion or perfection to the process of memory when it occurs after learning retention and recall.

14.6.1 FAVOURABLE CONDITIONS IN RECOGNITION

As a general rule, the conditions found favorable for retention and recall are equally favorable to recognition, and in a view of this fact following conditions are mentioned here

- Mental set- Recognition is assisted by the mental set, in the manner in which other factors assist memory. Recognition correct when the mental set is favorable and it is incorrect when mental set is unfavorable.
- Confidence:- This too, is an indispensable element in recognition in its absence even correct recognition becomes infested with doubt and mistake occurs

- Motivation For Recognition
- Collection of association of the original experience
- Kind of matter in the past experiences.

In short, you have come to know that learning ,retention, recall and recognition are important components of memory

CHECK YOUR PROGRESS

Notes :- (a) Write your answers in the space given below

(b) Compare your answers with those given at the end

A Put tick mark on 'T' for True and 'F' for False

i. Learning is most important factor of memory(T/F)

ii. During recognition a part of the whole situation is evolved(T/F)

iii. During old age the mind is more sharp than during earliar stages (T/F)

iv. Rention means the preservation of the experience in the subconscious mind after they have been perceived (T/F)

v. Recall does not require the reproduction of the learnt material(T/F)

vi. Recognition means 'Consciousness of familiarity'(T/F)

A. Discuss learning as a factor of memory.

_____

_____

B. Explain favourable factors of recall.

_____

_____

C. What do you mean by recognition.

_____

_____

14.7 LET US SUM UP

Dear students, in this unit you have learnt about the components of memory. You have been enlightened about learning, retention, recall and recognition which play a very important role to develop good memory.

The teacher and parents always try to help and guide the students to learn well and make proper adjustments in their future life. It becomes very important then, to understand the memory level of the students and then help them accordingly to improve their memories or power of retention. Various factors which are favorable for learning, recall,retention and recognition are also discussed. It has been classified that good learning is the base of good memory, so along with applying various methods to improve memory and avoid forgetting, learning is being stressed more.

14.8 MODEL EXAMINATION QUESTIONS

1. Discuss learning as a component of memory?
2. What do you mean by Retention? Explain favorable conditions in retention?
3. What is recall? Discuss factor of recall?
4. Discuss the concept of recognition? Explain favorable factors of recognition?
5. Discuss briefly various components of memory?

14.9 SUGGESTED READINGS :

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5. Coon Dennis (7th ed):Introduction to Psychology Exploration and Application,west Publishing company,USA

14.10 ANSWERS TO CHECK YOUR PROGRESS

A. (1)True (2) False (3) False (4) True (5) False (6) True

B. Refer Section 14.3

C. Refer Section 14.5.1

D. Refer Section 14.6

LESSON NO. 15 **UNIT-IV**

MEMORY

By : Dr. Raj Singh

STRUCTURE

15.1 INTRODUCTION

In the preceding lesson you have studied meaning of memory and forgetting. Various components of memory like learning, retention, recall and recognition are discussed in detail. In the present unit the purpose is to acquaint you with the various types of memory, signs of good memory, methods of memorizing and factors responsible for causing forgetting.

Memory plays a key role in the development of the personality and also helps us

to adjust effectively in the ever changing environment .It becomes very essential for the learners and for those who are interested in the learning and progress of the learners ,to know completely about the process of memory and the steps to be taken to avoid forgetting and improving memory.

15.2 OBJECTIVES

After going through this unit you are expected to

- Explain various types of memory
- Describe signs of good memory
- Explain various methods of memorizing
- Describe factors responsible for causing forgetting

15.3 TYPES OF MEMORY

Memory is the process by which we encode, store and retrieve information. Memory has been classified into various kinds are as under:-

- **SENSORY MEMORY**

Let's say a friend asks you to pick up several things at a market. How do you remember them? Incoming information first enters sensory memory. Sensory memory holds for a few seconds or less, an exact copy of what is seen or heard. For instance if you look at an object and then close your eyes, an ikon (eye-icon), or fleeting image ,will persist for about one - half second afterward .Without sensory memory, a movie would look like a flickering series of still pictures. Similarly information you hear is held as a brief echo in sensory memory for up to 2 seconds .In general sensory memory holds information just long enough to transfer it to the second memory system.

- **Short term Memory**

Not everything seen or heard is kept in memory .Lets say that a radio is playing in the background as your friend reads you her shopping list. Do you remember what the announcer says too? Probably not, because selective attention controls what information moves on to short - term memory (STM) .Short term memories are also brief, but longer

lasting then sensory memories. Short term memories can be stored as images .But more often they are stored by sound, especially in recalling words and letters. Short term memory acts as a temporary store-house for small amounts of information. Short term memory prevents one'd minds from collecting useless names, dates, telephone numbers etc. At the same time it provides a working memory where we do much of our thinking .Dialing a phone number, doing mental arithmetic, remembering a shopping list and the like all rely on STM

- **LONG TERM MEMORY**

Information that is important or meaningful is transferred to third memory system, called long term memory (LTM).Long term memory act as a permanent storehouse for information .LTM has a nearly limitless storage capacity. Thus LTM is the memory system used for relatively permanent storage of meaningful information .It is the memory where the past lives long-term memory has two categories one is procedural memory (skill memory) and the other is declarative memory (fact memory).

Procedural memory includes memories of conditioned responses and learned skills. Declarative memory involves remembering specific information ,such as names ,faces words, dates, and ideas .It is expressed as words or symbols .Declarative memory is further divided into two other types called sematic and episode.

Semantic Memory is a subpart of declarative memory that records impersonal knowledge about the world. It serves as a mental dictionary or encyclopedia of basic knowledge .Episode memory is also a subpart of declarative memory that is linked with specific times and places. It stores life events or episodes day after day and year after year.

- **Explicit Memory and Implicit Memory**

Explicit memories are past experiences that a person is aware of recall ,recognition and the tests you take in the school rely on explicit memories .In contrast implicit memories lie outside of awareness .That is, we are not aware that a memory or record of past experience exists

- **Habit Memory**

Habit memory is related to a thing learnt through cramming .The crammed thing is very weakly related to mind because it does not study it in an analytical manner. The real memory is that where a person fully understands or studies the principles or thoughts contained in it and applies then correctly when an occasion arises.

- **Image or True Memory**

Image memory has been named as the true memory by psychologists. The signs of an image memory take deep roots in the mind and permanent in nature.

- **Rote Memory and logical Memory**

Rote memory is mechanical repetition of the material until it becomes automatic. In rote memory, the things are learnt without understanding their meaning; some children have good rote memory. In logical memory meaning and understanding are essential elements. Organization of the material that makes assimilation possible is an important aspect of the logical memory.

CHECK YOUR PROGRESS-1

Notes a) Write your answers in the space given below.

b) Compare you answers with those given at the end of the unit.

A) Fill in the blanks by putting right words

i) The process by which information is ;initially stored in memory is known as _____

ii) _____ is the process by which elements of memory are brought into awareness and used

iii) There are two types of long term memory_____ memory, which is memory for knowledge and facts, and _____--memory which is memory for personal experiences.

iv) _____ memory is called as dictionary or encyclopedia of basic knowledge

v) _____ holds information fifteen to twenty five seconds

B) Write a short note on long term memory?

C) What is Rote memory and logical memory?

15.4 SIGNS OF GOOD MEMORY

Signs of good memory help us to differentiate between the individuals having sharp memory and those who lack it. There are many methods suggested for checking the level of memory and to improve the same but before describing all those we should be able to understand and differentiate individuals on the basis of their capacity to memorize. Various psychologists have tried to understand signs of good memory which are given as under:-

- **Rapid Learning**

  The quicker an object is observed, the quicker is its memorization. Rapidity in learning is influenced by the methods of learning, interest and ability to learn and in some subjects environmental effect. Klith personal interest in some subjects or topic, having ability in that field; a learner can concentrate well on the topic and learn the material quickly .This quick and accurate learning becomes a sign of good memory

- **Good Retention**

  The memory means nothing without retention. There are individual differences in the power of retention. Some have more retention power while some possess it in lower measure.' Power of retaining the ,learned matter for a long period of time can be considered as one of the important signs of good memory .The students having less capability of retaining the material learned generally face many difficulties during examinations.

- **Rapid Recall**

  Recall is an important activity in memory .This is the activity by which the residues of experiences are brought back to the conscious level. This is one of the important feature of good memory to recall quickly whenever one feels its need. There is no dearth of people who are often found saying that, something is on the 'tip of

there tongue' but they cannot recall it. Tip of the tongue phenomenon is the inability to recall information that one realizes one knows .This is the case of weak recall .On the other hand, there may be the individuals with good memory who can recall the past experience.

- **Rapid recognition**

  Recognition is superior to recall. Every recall must be accomplished by quick recognition of the definite idea needed for a certain occasion .Unless a person is able to recognize the idea which provides correct answer to a ticklish situation, he cannot said to have good memory and will not do well in that situation. A person with good memory immediately recognizes related experience and patterns.

- **Accuracy**

  The extent of accuracy of the recalled ideas and objects also help to judge memory level of a person. The individual may be able to recall or recognize any idea rapidly but the recollected material may not be accurate .So accuracy of recall and recognition also becomes a sign of good memory.

- **Serviceableness**

  This refers to the recall of right thing at the right time and place. In other words it should be useful for the individual concerned and may help him to adjust in his environment perfectly.

- **Forgetting unnecessary things**

  For a good memory it is necessary to forget unnecessary things .If a person continues to remember unpleasant incidents and unnecessary things , his memory will become weak in due course.

CHECK YOUR PROGRESS-2

Notes a) write your answers in the space given below

b) Compare your answers with those given those given at end if the unit

A) Fill in the blanks with appropriate words

i) _____ is the inability to recall information that one realizes that one knows

ii) The power of ____ the learned matter for a longer time is a sign of ___ memory.

iii) Every recall must be accompanied by a quick_____

iv) _____ refer to the recall of right thing at right time and place

v) _____ of recall and recognition is also a sign of good memory

B) Explain briefly characteristics of good memory

_____

_____

15.5 METHODS OF MEMORISING

One of the aims of school instruction is to expand the knowledge of learners. The teachers responsibility is to encourage the learners to acquire and retain the knowledge imparted for further use in facing the problems of life .But as we generally observe many students forget most of the school learning after a short lapse of time such students face many problems in their adjustment, success in examination and success in future life. So it becomes imperative for all of us Concerned with growth and development of the children /students to help them to strengthen their memory .Let us help them to strengthen their memory .Let us focus on some way of improving memory:-

Knowledge of Results

Learning proceeds best when feedback or knowledge of results allows you to check to see if you are learning .Feedback also helps you to identify ideas that need extra practice. A prime means of providing feedback for yourself when studying is recitation

Recitation

If you are going to remember something, eventually you will have to retrieve it. Recitation refers to summarizing aloud while you are learning .Recitation forces you to

practice retrieving information .when you are reading a text, you should stop frequently and try to remember what you have just read by restating it in your own words .In an experiment, Gates selected five groups of elementary school pupils and assigned than the task of memorizing short biographies of 175 words in length. All groups of students were given equal amount of time to learn .First group spent whole time in reading and re reading biographies the second group spend last 20 percent of the time in attempting to recall what they had read .They consulted their texts only when they were unable to proceed further. They adapted the method of 'attempted recall' or 'self recitation' The three remaining groups spent the last 40,60, and 80 percent of their study period in self recitation .At the end of the study period and after four hours of rest time (after study) the students were given 'recall tests'

Table 15.1 Shows the percentage of material correctly recalled under each set of conditions

Table 14.1 Advantage of recitation over reading in memorizing

Percentage of time given to recitation	Percentage of matter recalled Immediately	Percentage of matter recalled Four Hour Later
0	35	16
20	37	19
40	41	25
60	42	26
80	42	236

The findings of the table 14.1 clearly show that the children who spent more than 60 percent of allotted time in self - recitation suspended all the others recalling material whereas those who spent no time in recitation or avoided it, remembered the least, several studies have revealed, that recitation method is better then 'reading and re-reading ' method.

Rehearsal

The more you rehearse information as you read , the better you will remember it (Muth,etal,1998). Elaborative rehearsal in which you look for meaning and connections to

existing knowledge , is far better. Rehearsal is silently repeating or mentally reviewing information to improve memory.

Selection

The Dutch scholar Erasmus said that a good Percentage of matter recalled immediately should keep all the big fish and let the little ones escape. If you boil down the paragraphs in most textbooks to one or two important terms or ideas, your memory chores will be more manageable .Practice very selective marking in your texts and use marginal notes to further summarise ideas

Meaningfulness and Organization of Subject Matter

Assume that you have to memorize the following list of words: north, man, red, spring, woman, east, autumn, yellow, summer, boy, blue, west, winter, girl, green, south. This difficult list could be reorganized into chunks as follows :north-east-south-west, Spring ,-summer-autumn-winter, red-yellow-green-blue, man-woman-boy-girl. This simple reordering made the second list much easier to learn when college students were tested on both lists (Deese and Hulse,1967)

Whole versus Part Learning

If you have to memorize a speech, is it better to try to learn it from beginning to end or in smaller parts like paragraphs. Generally it is better to practice while packages of information rather than smaller parts. This is especially true for fairly short, organisd information. For very long or complex material, try the progressive part method .In this method, you break a learning task into short sections .At first, you study part A until it is mastered. Next, you study parts A and B, then A, B, and C and so forth. This is a good way to learn the lines of a play, a long piece of music, or a poem.

Spaced and Unspaced Methods

Both these methods help to retain the learned material in different situations. When a fairly long assignment has to be memorized the space method works well. It means completing the study of the given task in more than one sitting -leaving space in between two settings. It is psychologically sound to space the learning time if the lesson is quite long. But if the lesson is small and interesting it is better to use unspaced method of learning

.It then meas,learning the whole material in one sitting avoiding intervals.

Serial Position

Whenever you have to learn something in order be aware of the serial position effect. As you will recall, this is the tendency to make the most errors in remembering the middle of a list.For example, if you are introduced to a long line of people , the names you are likely to forget will be those in the middle ,so you should make an extra effort to attend them. The middle of a list, poem or speech should also be given special attention and extra practice.

Cues

The best cues for remembering are those that were present during encoding (Reed, 1992).For example, students in one study had to recall a list of 6000 words .as they read list, the students gave three other words closely related in meaning to each listed word. In a test given later, the words each student supplied were used as cues to jog his or her memory. The students recalled 90 percent of the original word list.

Over learning

Numerous studies have shown that memory improved when study is continued beyond mastery. In other words, after you have learned material well enough to remember it once without error, you should continue studying over learning is your best insurance against going blank on a test because of nervousness.

Sleep

Remember that sleeping after study reduces interference. Since you obviously can't sleep after every session or study everything just before you sleep, your study schedule should include ample breaks and free time in a schedule is as important as living up to your study periods

Review

If you have spaced your practice and overlearned, review will be like icing on your study cake. Reviewing shortly before an exam outs down the time during which you must remember details that may be important for the test. When reviewing hold the amount

of new information you try to memorize to a minimum.

Mnemonic Devices

There are many incidental aids that deserve mention .One is the grouping and rhythm. Poetry is more easily memorized than prose because of natural rhythm and grouping of verses. Rote Percentage of matter recalled immediately is sometimes improved by the use of arbitrary and artificial association called mnemonics.

Mnemonic device attaches some meaning to the material that is use of VIBGYOR whose letters represent the colors of rainbow the word 'home' recalls the names of five great lakes in Canada .Most of Such systems are forced or unnatural but they help to retain and recall something due to their meaningful words or things.

Principle of Learning By Doing

The teacher in lower classes should follow the principle of learning by doing. The learners should be encouraged to participate actively in the learning process and learning various experiences .Practical activities provide first-hand information and the learners' body and mind both remain alert throughout the study.

Some of other methods of good memorization are formation of clear concepts, drill, willful forgetting etc.

CHECK YOUR PROGRESS 3

Notes a) write your answers in the space given below.

b) Compare your answers with those given at the end

(A) Put tick mark on 'T' for true or 'F' for false

i) To improve memory, it is reasonable to spend as much or more time reciting as reading T OR F?

ii) Organizing information while studying has little effect on memory because long term memory is highly organized T OR F?

iii) The progressive part method of study is best suited to long and complex learning

tasks T OR F?

iv) Sleeping immediately after studying is highly disruptive to the consolidation of memories T OR F?

v) As new information is encoded and rehearsed it is helpful to elaborate on its meaning and connect it to other information T OR F?

B) Describe recitation method of memorizing?

_____

_____

C) Explain whole versus part method of memorizing?

_____

_____

D) Name various methods of memorizing?

_____

_____

15.6 FACTORS RESPOSIBLE FOR CAUSING FORGETTING

Generally speaking, most forgetting occurs immediately after memorization. We learn something -that is we store some piece of information in our memory. Sometimes this information persists and we can call on it whenever we need it .We say that we remember. Sometimes the information seems to disappear or elude us -and we say we have forgotten. Why do we remember some things and forget others? Following are the factors which are responsible for causing forgetting

Encoding Failure

The most obvious reason for forgetting is encoding failure, i.e. memory was never formed in first place. If you are bothered by frequent forgetting, it is wise to ask yourself," Have I been storing the information in the first place" When 140 college professors were

asked what strategies they use to improve their memory, the most frequently recommended was to write things down (Park, et al, 1990).Making notes ensures that information will not be lost from short term memory before you can store it more permanently.

Theory of Decay

One view of forgetting holds that memory traces (changes in nerve cells or brain activity) fade, weaken, or decay, over time .Decay appears to be a factor in the loss of sensory memories. Short term memory therefore operates like a "Leaky Bucket". New information constantly pours by still newer information.

Theory of Disuse

It is possible that the decay of memory traces also explains long term forgetting? That is could long term memory traces fade from disuse and eventually become so weak that they cannot be retrieved .The theory of disuse postulates that any learnt activity or accumulated knowledge will be gradually forgotten if it is not regularly practiced .Psychologists who do not agree with this view assert that forgetting is due not only to discuss but also to the activities after learning.

Retroactive Inhibition

Some learning tends to contradict some previous learning , a tendency entitled retroactive inhibition , meaning the total effect of interpolated activity on learning.This theory was first proved by Muller and Pilzecker, Retroactive inhibition is specially effected by the following four things:-

1) Similarity between past learning and interpolated learning

2) Difference in quantities of past learning and interpolated learning

3) Temporal relation of the interpolated activities

4) Intelligence and age of learner

Failure of Retrieval

Some memory traces, once established as part of long-term memory, may persist for long as we live .But the information may be unavailable for recall. We cannot retrieve it,

and we say that exists.Thus, forgetting may not be due to the loss of a memory trace but rather a failure of retrieval (Kintsch, 1977)

Theory of Interference

Another important cause of forgetting is that our ability to remember any given piece of information is interfered with by other information stored in the memory .There are two types of interference:-proactive and retroactive

i) Proactive interference-when old information causes us to forget new information the process is called proactive interference

ii) Retroactive interference-When new information causes us to forget old information, the process is called retroactive interference.

Repression

Psychoanalysts believe that the major cause of forgetting is repression i.e. the pushing of experience or thoughts into the unconscious. Frend maintained that it is natural in human beings to repress sorrowful thoughts because of the pain they cause if remembered.

Motivated Forgetting

The fact that we seem to forge some things deliberately .Many theorists believe that at times we also forget information stored in long term memory because we want to forget it, whether consciously or not .This is motivated forgetting .It is also known as wishful forgetting.

Motivated forgetting has been widely studied by psychoanalysts who have found that it often plays a part in dealing with anxiety.

They believe that people can be motivated not only to forget upsetting events but to distort their recollection to make them more bearable.

Consolidation Theory and Retrograde-Amnesia

Consolidation theory is a new explanation of forgetting. It emphasizes the importance of undistributed period for memory traces to become durable and permanent. If new formed traces is given for consolidation they will be wiped out .The memory traces take

time to harden. Retrograde amnesia or backward forgetting supports the consolidation theory

Lack of Exercise

Thorndike has opined that lack of exercise is the major cause of forgetting. Repeated exercise helps in memorization, while in the absence of repetition or exercise forgetting occurs more easily.

Deficiency of Mental Set

Mental set is another factor of assistance in the retention and recall of a subject so that its greater concurrence will reduce forgetting.

Brain Injury

Often when a person suffers a brain injury he forgets many incidents and experiences and the extent of the forgetting depends upon the seriousness of the injury

Use of Stimulants

Wine and other stimulants have a detrimental effect on the brain, because they weaken the memory traces .Thus forgetting will be increased if such intoxicants are used.

Besides the causes mentioned above the factors which influence retention and recall may also cause forgetting .In brief, every factor which hinders memorization causes forgetting.

CHECK YOUR PROGRESS 4

Notes a) write your answers in the space given below

b) Compare your answers with those given at the end of the unit

(A) (i) which explanation seems to account for the loss of short term memories.

a) Decay b) discus c) repression d) interference

ii) You are asked to memorize long list of telephone numbers .You learn a new list each day for 10 days when tested on list 3, you remember less than a person who only learned the first three lists. You larger memory loss is caused by:-

a) Disuse b) Retroactive interference

c) Repression d) Proactive interference

iii) When learning one thing makes it more difficult to recall another, forgetting may be caused by_____.

B) Explain motivated forgetting in three lines

_____

_____

C) What does the theory of interference means in forgetting?

_____

_____

15.7 LET US SUM UP

Psychologists still have much to learn about the nature of memory and how to improve it. For now one thing stands out clearly people who have good memories excel at organizing information and making it meaningful. Every effort has been made to acquaint you with various types of memory and signs of good memory.

It is equally important to understand various methods of memorizing .The study of methods of memorizing help the students to adopt these methods in day to day life to increase their memory and power of retention .Factors which are responsible for causing forgetting are also discussed in detail. It has been classified that good learning is the base of good memory.

15.8 MODEL EXAMINATION QUESTIONS

1. Explain briefly different types of the memory

2. Differentiate between long term memory and short term memory.

3 Describe characteristics of good memory or signs of good memory

4. Explain various conditions /factors /methods of memorization

5. Why we forget. Explain in detail various factors which are responsible for forgetting

6. How can we help learners to strengthen their memory or power of retention?

15.9 SUGGESTED READINGS

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15.10 ANSWERS TO CHECK YOUR PROGRESS

1 (A) i) Encoding

ii) Retrieval

iii) Semantic, episodic

iv) Short term memory

(B) Refer to Section 15.3

C) Refer to Section 15.3

2. (A) i) Tip-of-the tongue

ii) Retaining, good

iii) Recognition'

iv) Serviceableness

v) Accuracy

(B) Refer to Section 15.4

3. (A) (i) T (II) F (III) TIV) F (V) T

(B) Refer Section 15.5

(C) Refer section 15.5

(D) Refer section 15.5

4. (A) i) a and d

ii) b

iii) Interference

(B) Motivated forgetting is wishful or desired forgetting .Many times we forget information stored in long term memory because we want to forget the same.

(C)Theory of interference tells us about a very important cause of forgetting.Whenever the interference of a new piece of Knowledge or old piece of knowledge hampers the recall or recognition at any moment, it is known as forgetting due to interference.

LESSON NO. 16 UNIT - IV

EMOTIONS

By : Dr. Raj Singh

STRUCTURE

16.1 INTRODUCTION

Learners you know that the scope of the educational psychology is very wide. It is concerned with the behavior of the learners in educational situations. So far you have learnt about characteristics of learners as they pass through different stages of growth and development, individual differences and relative importance of the heredity and environment in the individual differences, learning process, role of attention, interest and motivation in

learning process and intelligence. This chapter explores how emotions influence the human experiences, including where they come from and how emotions influence cognition and behavior helps is to gain in right into what makes us mentally and physically healthy. Emotions are fundamental part of human experiences. They warns of danger, create bonds between people and bring joy to life.

16.2 OBJECTIVES

After going through this lesson you shall be able to:

- Explain meaning of emotions
- Describe various definitions of emotions
- Discuss characteristics of emotions
- Describe social factors influencing emotional development of the individual
- Describe psychological factors influencing emotional development of the individual

16.3 MEANING OF EMOTIONS

Almost everyone has an intuitive sense of what is meant by the term emotion, but it has proven difficult concept to define precisely. For psychological scientists emotion refers to feelings that involve subjective evaluation ,physiological processes and cognitive beliefs .Emotions are immediate responses to the environmental events such as been cut off in traffic are getting a nice gift. It is useful to distinguish emotion from mood, since the two are often used equivalently in everyday language. Moods are diffuse and long lasting emotional states that influence rather than interrupt thought and behavior.

Imagine what it would be like if we didn't expressive emotion no depths of despair, no depression, no remorse, no happiness, joy or love. Obviously life might be considerably less satisfying and even dull, if we lacked the capacity to sense and express emotion .Etymologically the word emotions is derived from the Latin Word "Emorse " which means Stir up"," to agitate". So emotions are stirred up or disturbed state of an organism whenever feelings become intense and excited they become emotions.

According to behaviouristic school of thought emotion is general feeling of excitement of whole body. It was an exciting or agitating thought of situations and

surroundings of that time that produced "Monaliza" like unique masterpiece of art into the world. Again it is an agitating expressive of the life of "sidhartha" that produced "Lord Budha" in this world .Thus we can say that emotions are personal psycho-physical phenomenon that is revealed through expressive and action.

Lefton defined emotion as," a subjective feeling or response generally accomplished by a physiological change and usually associated with a change of behavior "

R.S Woodworth defines," emotion is moved up or stirred up state of an organism"

According to **Crow and Crow**, " An emotion is an affective experience that accompanies generalized timer adjustment and mental and psychological stirred up states in the individual and that show itself in his own behavior"

C.W.Vallentine explains," When feelings become intense we have emotions"

Morris Charles defines," An emotion is a complex affective experience that involves diffused physiological changes and can be expressed in characteristic behavior pattern".

After going through these definitions it can be concluded that the root of the word means" to move" and emotions do indeed move us. Emotions are actually disturbed affective processes which originate in a psychological situation and are rewarded by marked bodily changes in the glands and smooth muscles .Like 'juice in fruit' emotions are present in every activity of human beings .It is because of that cause as to say we were "moved " by a play a funeral or an act of kindness.Robest Plutchik(1980,1990) has identified eight primary emotions fear, surprise, sadness,disgust,anger,anticipation,joy and acceptance

16.4 CHARACTERISTICS OF EMOTIONS

- **Emotions differ from person to person:**

  Emotional experiences are subjective. As we know Emotions are code of heart and are revealed through mind,so different people with their own heart and mind experience and feel strongly certain things and react accordingly.

- **Emotions have three basic aspects:**

  Emotions according to Mc Dougall have three aspects as instincts have :

1. Cognitive 2. Affective 3. Connative, Cognitive means knowing or perceptual aspect, Affective means feeling or emotional aspect, Connative means doing or striving aspect.

- **Emotions arise abruptly but die slowly:**

  An Emotion once aroused persists and does not die at once. It persists and leaves behind emotional mood. An angry man remains angry for a long time and express his anger on every other person without any consideration whether he is guilty or innocent

- **Emotions are subject of displacement:**

  Emotions are displaced in the sense that an angry person in angry mood, if insisted by some one else to do something in that moment transfers his anger to him who insists. Usually a weak husband is seen to transfer the anger of his work place associates in his wife at home and the anger of wife on children and servants.

- **Occur at any stage:**

  Emotions can occur at any stage .They have a wider range .They occur in childhood stage in young age as well as in adult age. They occur at all stages of mental development.

- **Create multiple impulses:**

  One Emotion gives rise to another emotion of different nature. Emotions have swings, if disappointment is caused due to any reason from any person, it is followed by emotion of fear and dejection .For example any employee working in an office tries his best to work honestly and sincerely .His associates because of jealousy poison boss or head of the institutions ears and his sincere and honest efforts are neglected and instead of appreciation he gets disappreciation. He is dejected and this dejection arouse the emotion of anger towards his boss as well as associates .Anger gives rise to disappointment .Thus we can say that emotions have swings

- **Accomplished by feelings:**

  Emotions are always accomplished by feelings. The feelings are core of emotion.

The emotions of pleasure ,joy,affection arouses feelings of relaxed and soothing mood which is expressed through loveful discussions and understandings.

- **Emotions arise by different stimuli:**

  Different stimuli are responsible for creating an atmosphere of different emotional sets. For example abrupt loud noise causes fear. Strange animals faces dark places and strange voices abruptly arises feeling of anxiousness and uneasiness. On the other hand places like dancing clubs ,gardens,outings,soothing musical concert create emotion of joy which causes merriment in the system.

- **Connative urge is a derive to emotion :**

  Strength of emotion depends upon the strength and force of urge.Conative urge is always present in an emotion .For example anger is aroused in a dog or a cat when some one interferes with its young ones. On the contrary if some one provides some suitable eatable to them, it gives them joy

- **Emotional reactions influence externally as well as internally :**

  An external situation like thunder and abrupt lightening engenders abrupt fear in children and they shrink their bodies close eyes put fingers in their ears simultaneously several times. They wet their bed and feel vomiting sensation internally

- **Intelligence thinking and imagination negatively correlated:**

  Dear students to be more precise and give you more clear picture of characteristics of emotions we can say that emotional spell suspends thinking and imaginative process and hinders intellectual exercise. It is that agitating state when one can not think beyond it. One is completely involved physically as well as emotionally in emotional state of feelings .Even biologically one feels temporary changes i.e shoot up of blood pressure, upset stomach and more heart beats and pulse rate creates biological disorder.

Check Your Progress 1

(a) Write your answers in the space given below

(b) Compare your answers with those given at the end of the lesson

(i). What do you mean by emotions

_____

_____

(ii). Explain any two definitions of emotions

_____

_____

(iii). Enlist the characteristics of emotions

_____

_____

(iv). Emotional excitement creates multiple problems" How?

_____

_____

16.5 FACTORS INFLUENCING EMOTIONAL DEVELOPMENT OF THE INDIVIDUAL

Emotional development is also got affected by a variety of significant factors such as physical, social, psychological, emotional, moral, economical etc. We will discuss about two major factors social and psychological.

16.5.1 Social Factors Influencing Emotional Development of the Individual

(1) **Parenting:** Parents usually have the earliest and strongest influence on a child.People appear to have a preferred style of interacting with their children and these parental variations in style affect children's emotional development. The best Known studies of Parenting styles have been done by Diane Baumrind (1973).Her research identified three main styles -clarity of parent -child communication, Parents maturity demands and nurturance. Authoritarian parents value obedience even at the expense

of Childs autonomy. In contrast permissive parents give their children as much freedom as possible and place few expectations of them. Authoritative parents are both warm and demanding. Give freedom but except their some rules to be followed whereas authoritarian parents have completely dominant rule.

(2) **Peer Relationship/Friendship :** The peer group (child's equals) strongly influence emotional development at childhood stage .Children interact with each other as equals .They discuss argue different viewpoints and assert them selves. An emotional bond grows and develops among them making them emotionally mature person. Friendship is centre of social and emotional relationship .It is a relation based more on emotional attachment than reasoning (Damon 1977). Friends goes on changing due to change in expectations and level of inspiration which provides strength to the involved persons to live a happy successful life.

(3) **Play /Games/Sports:** Children spend a major portion of their time playing. Play contributes to development as a whole and characterize as follows (Krashor & Pepler, 1980,Rosenblatt, 1982, Damon,1983)

- Play is voluntary,pleasurable,spontaneous and self initiated
- Promotes new still and abilities
- Pursued for its own sake-a joyous activity
- It contains elements of reality with fantasy
- It provides pleasure and satisfaction and relieves the child off his/her tensions in day today life

(4) **Co-curricular Activities :** The children who take active participation in variety of co curricular activities viz debates, discussions, symposium, seminars, dramas ,dancing, singing etc are extrovert type having more self -confidence and self control than others .For maximum development and to excel in one's own field of work one should be mature enough to perform his/her duties with head and heart be experessive, energetic, enthusiastic, initiator, democrator, risk-taker etc and participation in various non academic and cultural activities provide the needed

help.

(5) **Teacher:** Teacher is a model of a society .If majority of the teachers are well qualified and well trained in their job having knowledge of child psychology - surely they will benefit the society in general and the students community in particular .By his matured performance /behavior he should become an example for his students .He should be democratic, philosopher and guide for his students, Emotionally balanced person and strictly upright one. He should be role model. Today many students commit suicide not able to bear failure; many indulge in delinquent activities -because of lack of discipline and emotional maturity. In majority of schools teachers lack model code of conduct .If they encourage students to take participation in various activities suiting them - they can serve the society well by providing an emotionally matured class of students.

(6) **School:** Teacher is one major element of school itself. Many people consider it as a temple of learning and it is a fact also. There is no better formal place of learning which can replace the school. But curricular and co-curricular aspects along with infrastructural facilities help students to grow as mature citizens of the society. Morning assemblies, national anthem, the prayer, attitude of the head and the teachers have really a great impact on the emotional side of the personality of the students.

(7) **Neighborhood/community/society:** The social agencies like neighborhood , the community and the society of which an individual is a member , also exerts significance influence on his emotional aspect of development .These agencies affect his behavior as he picks up variety of traits from these viz; fearlessness, courage, kindness, jeoulogy, arrogance, outburst of anger ,love and affection etc. Such behavioural tendencies cast a positive or negative influence on the personality of a person.

16.5.2 Psychological Factors Influencing Emotional Development of the individual

Behavioural responses and reactions of individuals depend upon how they perceive themselves and the phenomenon outside them. Their learning ability, self-concept, level's of aspiration, confidence, complex, mental health-all influence their emotional set up. Following are some of the important psychological factors which affect emotions of a

person significantly:-

- **Intelligence:**

  Intelligence or intellectual level of a person affects his behavior everywhere at every time. A person with high level of intelligence is capable enough to understand the situation/event well and react accordingly in a positive way. On the other side a person with low intellect level is not able to judge /perceive the situation properly and may behave negatively showing sudden outburst later on after some sense prevail.

- **Self - Concept :**

  A person having positive /independent self concept behave in positive, confident and creative way-so faces success in his life often .The person with negative dependent self concept /lacks self confidence and patience and often frames higher goals wrongly faces failure and tension in his life. Self concept and level of aspirations should always have balanced ground.

- **Inferiority complex:**

  Complex of any kind is always inferiority complex. Complexes always create tension, feeling of helplessness; insecurity etc.Boastful behavior is the outcome of inferiority complex. A person with such complex lacks quality of deciveness and courage and develops a feeling of ill will against others .His behavior is escapist type always shifting responsibility of his failures on others

- **Language/communication skill :**

  To be successful in life one should have mastery over various language because language is the medium of expression .Many students fear from examination and interviews because they lack skill of expressing their views in clear terms fluently .Moreover it is communication skill which makes one popular among friends or otherwise

- **Memory and forgetting :**

  A strong memory helps the individual to be more successful in his life whereas

lacking goals memory degrades the same. Success in various fields makes ones life as celebration a life full of confidence joy and happiness. Forgetting is also necessary element but if it is on higher side becomes a case of embracement for the affected person

- **Problem solving ability :**

  To adjust oneself in ones life successfully one needs ability to solve day to day problem .One should be intelligent enough to be able to solve his own problems bravely .The person lacking such ability face many problem and remain unhappy.

- **Adjustability :**

  Adjustability is another aspect of intelligence .One is considered to be as intelligent as he is able to adjust in his/her changing atmosphere .To be able to adjust in constantly changing environment one needs ability to perceive the things in the right perspective and react properly paves the way for proper adjustment happiness and success.

- **Education and training:**

  Education in considered to be the 'panacea'-one medicine for all disease. Proper education and training makes a person civilized, mature and confident. An educated person knows how to take the things in their right perspective how to react properly how to express emotions rightly and how to control and sublimate one's emotions. It is only education which helps us to behave in proper harmonious development

Check your progress-2

Notes (a) write your answers in the space given below

(b) Compare your answers with those given at the end of the lesson

i. Name any five important psychological factors influencing emotional development

_____

_____

ii. Name any five important social factors influencing emotional development

_____

_____

iii. Intelligence is key factor of emotional development. Write three lines

_____

_____

16.6 LET US SUM UP

Dear students in this section we have discussed the derivative meaning and few definitions of emotions .Emotions is a dynamic internal adjustment that operates for the satisfaction, protection and welfare of the individual .Emotions like love, anger, fear etc play a great role in the development of child s personality. We have also discussed various psychological and social factors which influence the emotional development of an individual.

Emotions of children in general and of adolescents in particular should be satisfied. Satisfied emotions of adolescents design color and polish the youth of nation and channelise their growing and bubbling energies into the best suited designs of the society. Emotionally sound youth are the assets of a nation. Healthy and balanced youth are precious and prestigious glory of a nation .Education is a vital force to motivate, direct and control emotional development

16.7 MODEL EXAMINATION QUESTIONS

1. What do you mean by emotions?
2. Enlist the characteristics of emotions.
3. Explain psychological factors which affect the emotional development of an individual.
4. Discuss various social factors influencing emotional development of an individual.

5. What is the role of teacher in the emotional development of a child.

6. How education is powerful instrument to control emotional extremity.

16.8 SUGGESTED READINGS

1. Aggarwal, JC(1995): Essentials of Educations Psychology, Vikas Publishing, New Delhi

2. BhatiaA,HR (1997)A text book of Educational Psychological , the Macmillan company of India Ltd, New Delhi

3. Kundan, C.L. and Tutoo D.N.(1998):Education Psychologists, Sterling Publishers Pvt Ltd New Delhi

4. Mangal, S.K.(200):Psychological Foundation of Education ,published by Parkash Brothers, Ludhiana

5. Crow and Crow (1986):Educational Psychological Eurasia Publishing House (P)Ltd, New Delhi

16.9 ANSWERS TO CHECK YOUR PROGRESS

1. (i) Refer to 16.3

   (ii) Refer to 16.3

   (iii) Refer to 16.4

   (iv) Refer to 16.4

2. (i) Refer to 16.5.2

   (ii) Refer to 16.5.1

   (iii) Refer to 16.5.2

LESSON NO. 17 **UNIT - V**

STATISTICS

By : Dr. Raj Singh Narania

STRUCTURE

17.1 INTRODUCTION

In the preceding units, we have discussed a number of psychological concepts like human growth and development, learning, intelligence and personality etc. You must have understood that the individuals differ in their growth and development, learning, intelligence and personality etc. The knowledge of their concepts is very important for the teacher.

The teacher must be interested in studying the social groups composed of individuals differing from one another. He should be able to compare one group with another, as well as one individual with another individual or the individual with norms for his age, class etc. He/ She may be interested to know the impact of a number of environmental/ hereditary factors on the academic achievement and over all development of the personality. For all this, he/she needs to collect data, analyse it and interpret the same. Statistics as a subject of study helps the teacher in doing all these activities. As such, Statistics has much utility in the field of education.

17.2 OBJECTIVES

After going through this lesson, you shall be able to :

- explain the meaning of the word 'Statistics'.
- describe the importance of Statistics in Education ;
- discuss about the primary and the secondary sources of educational data.
- illustrate the use of Educational Statistics.

17.3 STATISTICS

Early in the development of Psychology as a science, psychologists began to measure mental processes. James Mckeen Cattell (1860-1944), trained in Germany, was one of the first experimental psychologists in America to make frequent use of measurement in his research. From 1880 to about 1915, Cattell and his students conducted a long series of experiments on reaction time. Of his psychological work, Cattel wrote : "I think that these experiments show that it is possible to apply scientific methods to the investigation of mind." The eminent educational psychologist Edward L. Thorndike (1874-1949) was one of Cattell's first graduate students. Thorndike followed Cattel in relying on quantitative methods in psychological research. As his guiding principle, he held that whatever exists, exists in some amount, and can, therefore, be measured. Thorndike was a pioneer in the application of statistical measurement to the field of learning, intelligence and educational achievements.

17.3.1 Meaning of Statistics

The word 'statistics' conveys a variety of meanings to people. To some, it is an imposing form of mathematics , whereas to others it suggests tables, charts and figures which one commonly finds in newspapers, journals, books, various reports, class room lectures T.V. etc. The statements containing figures are highly convenient forms of communication and are at the same time, quite clear, precise and meaningful. An analysis of such statements can help in framing suitable policies. To most of the people, statistics refers to -data/information about an activity or a process whether it be production, population, national income etc., that is expressed in numbers.

In addition to meaning as data, 'statistics' refers to a subject dealing with numbers just as 'mathematics' refers to a subject as well as to symbols, formulae and theorems and 'accounting' refers to principles and methods as well as to accounts, balanced sheets and income statements. In this sense, 'statistics' refers to a body of methods of obtaining and analysing data in order to base decisions on them. Combining both views about meaning of 'statistics' we can say that the word 'statistics' refers either to quantitative information or to a method of dealing with quantitative information.

17.3.2 Definitions of Statistics

There have been many definitions of the term 'statistics'-indeed scholarly articles have carefully collected together hundreds of definitions. Some have defined it as 'statistical data' (plural sense) where as others as 'statistical methods' (singular sense).

(a) Webster defined statistics as : "The classified facts representing the conditions of the people in a state, especially those facts which can be stated in numbers or in tables of numbers or in any tabular or classified arrangement.

(b) Yule and Kendall : They defined statistics as, "By statistics we mean quantitative data affected to a marked extent by multiplicity of causes".

(c) Prof. A.L. Bowley : He defined statistics in following different ways :

(i) "Statistics may be called the science of counting."

(ii) "Statistics may rightly be called the science of averages."

(iii) "Statistics is the science of the measurements of social organism, regarded as a whole in all its manifestations ."

(d) Boddington : He defined statistics as, "The science of estimates and probabilities".

(e) Croxton and Cowden opined : "Statistics may be defined as the science of collection, organisation, presentation, analysis and interpretation of numerical data."

17.4 IMPORTANCE OF STATISTICS IN EDUCATION

The fact that in the modern world statistical methods are of universal applicability is in itself enough to show how important the science of statistics is. Statistical methods are common ways of thinking and hence are used by all types of persons. The scope of statistics is so vast and ever expanding that it is difficult to find any area of human activities which is not being affected/guided by statistics. Robert W. Burgess has beautifully summed up the function of statistics as,

"The fundamental gospel of statistics is to push back the domain of ignorance, rule of thumb, arbitrary of premature decision, traditions and dogmatism and to increase the domain in which decisions are made and principles are formulated on the basis of analysed quantitative facts".

In the light of the above definition, we can say that the importance of science of statistics can be well understood by its following functions in various fields :

(i) It presents facts in a definite form.

(ii) It simplifies mass of figure.

(iii) It facilitates comparisons.

(iv) It helps in formulating and testing hypothesis.

(v) It helps in prediction.

(vi) It helps in the formulation of suitable policies.

The following are some important points under which we can discuss the educational importance of statistics :

(a) Schloastic Performance :

Numerous statistical studies have demonstrated that a high and postitive correlation exists between scholastic performance and co-curricular activities. Findings of these studies have led to a vast expansion of co-curricular activities in educational institutions and ways and means have been devised for encouraging the students to participate in them.

(b) Group comparison :

The achievements of a class are not uniform in every subject. It is found that one class is progressing faster in one subject, while another in different one. Even various sections of a particular class do not progress uniformly. The causes underlying this fact are discussed and decisions are made for betterment with the help of applications of statistical methods.

(c) Individual differences :

There are various standardised tests which help us to gather data about individual differences relating to various aspects of personality viz. physical, mental, social, emotional, aesthetic etc. Statistics, here again, helps us to collect data regarding extent of individual differences (finding averages and deviations) and then to find the effect of various remedial techniques applied by the teacher in the class and school.

(d) Educational experimentation and research :

With the change in place, time and circumstances, the aim, curricula and methods of education keep on changing. Many researches and experiments are constantly being conducted in education to evaluate the reality and meaningfulness of these changes. The work of research and experimentation cannot become reliable and valid without statistical inferences.

(e) Professional efficiency of the teachers :

One of the main factors of good learning is good teaching. To be a good teacher, it is very important to adjust oneself according to the nature of group of students. To be a successful teacher, he/she has to assess his/her achievement alongwith achievement of his students. The achievement standard of the students helps the teacher to modify his teaching behaviour accordingly. Statistical inferences help him/her to know the extent of his failure/

success in his/her field.

(f) Educational and vocational guidance :

The educational system of a country is directly related to the needs and aspirations of that country. It is very essential for the teachers and psychologists to guide the students to take various subjects and courses as per their own abilities, scope of the subjects and needs of the society and nation. The statistical findings help the teachers to guide the students accordingly.

(g) Evaluation records of the students :

It is very essential for any educational institution to prepare and save the educational records of the students. This evaluation record helps school authorities to devise various measures and methods to improve the school system for the betterment of the students. Educational statistics helps us to collect as well as maintain and compare the same with earlier records, as for example, finding percentage of successful candidates subject-wise, pass percentage etc.

(h) Utilisation of funds :

To run the business of schools, funds are the major requirement. How much funds are to be allotted school-wise, streamwise; maintaining required records and understanding future requirements–all such questions are answered by statistics.

(i) Promotion of the students :

Various statistical techniques mean/average score, extent of deviations, percentages etc. help us to develop policy for promotion of the students to next grade. As earlier said, it is the assessment of the achievements of the students, which motivates us to change our policies for the improvement.

(j) Framing general conclusions :

Educational statistics or statistics in education, helps the school authorities to frame general conclusions. After going through various statistical inferences, the rules and policy of the school can be changed. For example, the knowledge of students interest in various subjects, reports about efficiency of teachers, adjusting subject periods in morning or afternoon sessions, using various kinds of methodology in favour of students–all such

knowledge helps us to come to certain conclusions and to change our policy suitably.

Keeping in view the above stated points relating to importance of statistics in the field of education, it can be concluded that like in all other fields, the statistics helps us to collect information, maintain it, analyse it and interpret the same in an efficient way in educational field also. It gives a definite direction to the process of teaching and learning.

17.5 SOURCES OF EDUCATIONAL DATA

To solve various problems in various fields of life we need to conduct surveys or experiments. Surveys and experiments provide the required information to us; ..... by exploiting which, we can get various findings or solutions. In order to apply the statistical methods to any type of enquiry it is essential that statistical data be collected as statistical analysis is not possible in absence of quantitative data.

The data here, means the scientific information or evidence which helps us to find new methodology to face various significant problems. However, the collection of data is not an easy task as the universe from which data have to be collected may consist of a number of characteristics and we may be interested in knowing about only one or some of them.

Like many other fields, education also faces many unique problems and challenges. These, may be related to students' learning problems, teachers' teaching problems, discipline problems, problems related to harmonious development of child's personality etc. In general, the data is classified in two categories—the primary data and the secondary data. The primary data are those which are collected for the first time and are thus original in character, whereas the secondary data are those which have already been collected by some other persons and which have passed through statistical procedures at least once.

The factors which affect the methods of collecting the primary data or the secondary one are the nature, object and scope of the enquiry. The method selected should be such that it suits the type of enquiry that is being conducted.

Methods of Collecting Primary Data

The most common methods of collecting the primary data are :

(a) direct personal investigations

(b) indirect oral investigation

(c) local reports

(d) schedules and questionnaires

(a) Direct Personal Investigation

While applying this method, the investigator collects the information personally from the sources concerned. He visits the places of enquiry and meets or communicates with the persons concerned to have on spot scientific information. In educational field, the researcher or the investigator visits the schools, colleges or the university to collect data from the students or teachers concerned. This method of direct personal investigation is suitable only for intensive investigations. It involves enormous cost and usually requires a long time.

(b) Indirect Oral Investigation

When method of direct personal investigation cannot be used either on account of the reluctance of persons to part with information when approached directly or on account of the extensive scope of the enquiry or on account of some other reasons an indirect oral investigation can be made from the persons concerned through indirect sources. This method suggests to have indirect talk with the persons once or more than once and then to compile the responses in an objective way. While consulting they should :

— know full facts of the problem under investigation.

— not be prejudiced.

— be capable of expressing himself correctly-giving a true account.

— not be motivated to give colour to the facts.

(c) Local Reports

Here, the data is collected from the local correspondents or agents, or leaders in their own fashion and to their own likings. Obviously such data cannot be very reliable and as such this method is used in those cases where the purpose of investigation can be served with rough estimates only and where high degree of precision is not necessary. This method is least expansive.

(d) Schedules and Questionnaires

In this method, a list of questions relating to the problem under investigation is prepared and printed and information is collected from persons in any of the following ways :

— by sending the questionnaire to the persons concerned and requesting them to respond to the questions/statements and return the same.

— by sending the questionnaires through enumerators to help the respondents to provide the needed information.

— collection of Secondary data.

We know that secondary data are those which have already been collected and analysed by someone else, and as such the problems associated with the original collection of data do not arise here. Secondary data may be either published or unpublished. The sources of published data are usually :

(a) official publications of the central, state and the local governments.

(b) official publications of the foreign governments or international bodies like U.N.O. and its subsidiary bodies.

(c) reports and publications of various educational experts; the professors, the research scholars etc.

(d) articles published in various educational journals.

(e) articles published in various newspapers.

(f) reports submitted by various Education Commissions and Committees.

(g) subject related books, encyclopedias and journals.

The sources of unpublished data are of various kinds and as such materials may be found with scholars and research workers, educational institutes like schools, colleges, DIETs, SIEs etc. Many enquries and surveys related to educational programmes and policies and their findings remain unpublished. But, we can utilise such unpublished documents to our benefit to analyse and finalise our research findings to solve various

problems in the education a field.

The secondary data should possess the following attributes :

— it should be reliable.

— it should be suitable for the purpose of investigation, and

— it should be adequate in nature.

17.6 USE OF EDUCATIONAL STATISTICS

The term statistics has been defined by different experts in their own way. Some have defined it as numerical data while others have defined it as statistical methods. Statistics as an independent subject has been proved a most useful subject for understanding the existing conditions and suggesting improvement programmes for the future progress.

Educational Statistics simply means using statistical techniques to solve various problems in the field of education. In other words, we can say that educational statistics is one of the branches of statistics. Like its influence in various other fields of life, statistics has a significant influence on educational system. We can discuss the use of Educational Statistics under the following heads :

(a) Collection of educational data

To have surveys of various kinds and to collect information regarding various educational problems, educational statistics helps us to collect such information from various samples of the population. It helps us to select the exact number of the population or the sample and then to apply various statistical tools to collect the required information.

(b) Organisation of data

After the data is collected, it is to be organised systematically. The work of tabulation and classification is done by applying various measures of central tendency or using graphical representation of data in the shape of frequency polygon, the historgram or the ogive etc.

(c) Analysis and interpretation of data

At this stage, the classified data is analysed as per the objectives and hypotheses framed by applying various measures of central tendency, variability or correlation etc. After drawing conclusions the interpretation is done so that the findings may be applied in

educational field to have further improvements in the system.

(d) Scholastic Performance

Numerous statistical studies in educational field had revealed that there is a high positive correlation between co-curricular activities and scholastic performance of the students. Findings of such studies have led to a vast expansion of co-curricular activities in educational institutions and ways and means have been devised for encouraging students to participate in them.

To improve the scholastic performance many other factors play their respective roles. It is educational statistics which finds out the positive and negative affects of such factors on learning and teaching. It tells us whether the influence is significant or insignificant in nature.

(e) Public Opinion

General impressions about public opinion are often misleading. Carefully designed statistical analysis has been very helpful in arriving at accurate conclusions. To know the impression of teaching styles of the teachers on students' minds or to have opinion of the parents about working style of an institution, we can conduct surveys or have opinion polls. In a democracy, public opinion has to be respected at all costs. So, here educational statistics helps us to have first hand knowledge about the opinion of the public about the system. We can also have suggestions of various kinds to improve the system.

(f) Admissions and Classification

While admitting the students for various classes, we should be very much clear about the exact number of students to be admitted in a particular class. After having admission process completed, once again we need to classify the students, within a class, as normal, below normal and above normal students as per their academic achievement standard or intelligence level. This has to be done to provide effective learning experiences to each child/student as per his/her capability. The classification process cannot be completed with out the application of statistical techniques.

(g) Time Table

While preparing the time-table in schools and alloting various subjects it should be

kept in mind that the subjects which are more difficult should be adjusted first in the morning or first after the recess period. A teacher has to be given various subjects to teach having positive correlation value, so that he/she can easily handle the subjects. Adjustment of co-curricular activities is also very important. All such challenges can be met by having required information through the application of statistical techniques.

(h) Making the teaching more effective

To make the teaching more effective, a teacher must have knowledge of child psychology as well as knowledge and art of using statistical techniques. Educational statistics helps us to know about the relationship between strict discipline and scholastic achievement; intelligence level and academic achievement; emotional maturity and adjustment in the school; participation in co-curricular activities and leadership, physical and mental diseases and then affect on academic performance of the students. Various findings of various educational research and experimentation help us to utilise various new methods suiting to the interest and abilities of the students to bring about desired changes in their behaviour.

(i) Spread of Education

Educational data, relating to number of people studying in rural areas, number of people studying in urban areas; number of male students, number of female students; number of adults, number of handicapped people as well as other kinds of people, is through statistical measures. The comparison is made by calculating percentages and then educational policies, new schemes and allotment of funds is completed properly. The adult education scheme; education for handicapped people, education for economically backward sections etc cannot be properly implemented in absence of servant data-which is provided by statistics. No educational programme can be successful without the involvement of statistics in it.

(j) Evaluation Process

To improve our educational system—the teaching as well as learning process, we need constant evaluation of our efforts. The feedback received after the evaluation helps us to delete something from our work process; continue with some policies and to add some new programmes to achieve the desired targets of improvement. Educational statistics helps us to know our percent of success as well as failure. The result percentage of the

teachers is the simple example. We can find out the most efficient teacher and can provide him/her the added incentives for his/her proper guidnce accordingly.

In conclusion to above, we can say that educational statistics is very useful to improve our existing educational system. Like other fields of life, we cannot imagine even a single element or aspect of education, remained unaffected by statistics or its findings. The scope of educational statistics is unlimited. Every scheme, every policy or programme concerning education needs some observations which are provided only by statistics.

Check Your Progress - 1

Notes : (a) Give your answers as instructed.

(b) Compare your answers with those given at the end of the lesson.

A. Fill in the blanks :

i) the two major kinds of data are ..... and ..... data.

ii) Direct personal investigation comes under ..... data.

iii) The data already collected by some one and analyzed if consulted is known as ..... data.

iv) Educational statistics is a ..... of statistics.

v) Statistics helps us to collect, organise, analyze and ..... the data.

vi) Educational statistics helps us to find out the causes of various problems and also to find out ..... measures.

B. Name few important sources of primary and secondary data.

_____

_____

C. Enlist important fields/areas of education where statistics has direct influence.

_____

_____

D. Write three lines about the importance of statistics in education.

_____

_____

17.7 LET US SUM UP

In this lesson, we started with the description of statistics. The word statistics conveys a variety of meanings to variety of people. To some it is imposing form of mathematics, to others it suggests tables, charts, figures etc. But the most general meaning of statistics is that it is science of numbers. The word 'statistics' has been derived from the Latin word 'status' or the Italian word 'statista' or the German word 'Statistik'—each of which means a political state.

While describing the importance of statistics in education, it is mentioned that as in modern world statistics has universal applicability—it is equally important in educational field also. No field of education can work well in absence of statistical procedures and application of its finding. Right from admission to evaluation the performance of teachers as well as students is judged by statistical measures and then by applying its various techniques we improve our educational standards.

The data is the information collected by various sources and the two major kinds of data are—the primary data and the secondary one. Primary data is obtained directly by consulting the people directly whereas secondary data is indirect data collected from published work, indirects information etc.

In the last position the use of Educational Statistics is discussed. Here, once again, it is classified that the direct use of statistical findings in educational field, gave birth to a new branch of statistics i.e. Educational statistics. Educational statistics is very helpful for those who want to raise the standard of education—both qualitatively as well as quantitatively. The data provided by statistics, helps us to frame our programmes & policies regarding admission at various levels, allotment of funds, understanding scholastic performance level of students, adjusting our teaching styles as per intelligence needs and interests of the students, devising various evaluation techniques etc. In nutshell, educational statistics plays a very significant role in improving our educational system.

17.8 MODEL EXAMINATION QUESTIONS

1. Define the word 'statistics' and discuss its importance in educational field.
2. What is data ? Explain various sources of primary and secondary data.
3. "Educational Statistics plays a very important role in raising the standard of education"—Explain in detail.
4. Write short notes on :
   (A) The Data
   (B) The Primary Data
   (C) The Secondary Data
   (D) Statistics in Education.

17.9 SUGGESTED READINGS

1. Damral B.D. and Dash, B.M. (2003) : *Psychological foundations of Education,* Kalayani Publishers, Ludhiana.
2. Garrett, H.E.(1981) : *Statistics in Psychology and Education*, Vaklis Feffer and Simons Ltd. Bombay.
3. Guilford, J.P. and Fruchter, B. (1985) : *Fundamental Statistics in Psychology and Education*, McGraw-Hill Book Company Singapore.
4. Verma L.K. and Sharma, N.R. : *Basic Statistics in Education and Psychology,* Radha Krishna Anand and Co. Jammu.
5. Verma, Romesh (2003) : *Text Book of Statistics, Psychology and Education,* Annual Publications Pvt. Ltd. New Delhi, India.

17.10 ANSWERS TO CHECK YOUR PROGRESS—1

A. (i) primary, secondary
   (ii) primary
   (iii) secondary
   (iv) branch
   (v) interpret

(vi) remedial

B. See 17.4.1 and 17.4.2

C. See 17.5

D. See 17.4

LESSON NO. 18 **UNIT - V**

Data :- Concept, Collection of Data, Types of Data (Grouped and Un-grouped), Graphical Representation of Data:- Histogram and Frequency Polygon

By: Mohd. Zubair

STRUCTURE

18.1 OBJECTIVES:

To enable students:-

- To understand the concept of statistics.
- To understand the concept of Data, Collection of data, Types of Data and Graphical Representation of Data.

18.2 INTRODUCTION:

The word Statistics have been derived from the Latin, word 'Status' meaning a (political) state. In its origin, therefore statistics was simply the collection of numerical data by the kings on different aspects useful to the State. With the passage of time, however its scope began to include collection of numerical data pertaining to almost every endeavor calculations of percentages etc. and presentation of data in tables and charts. By the end of the 19th century, statistics began to concern itself not only with the collection and presentation of data but also with interpretation and drawing inferences from the data.

Today 'Statistics' is the scientific study of handling quantitative information. It embodies a methodology of collection, classification, description and interpretation of data obtained through the conduct of surveys and experiments. The essential purpose is to describe and draw inferences about numerical properties of populations.

Statistics is concerned with the quantifiable properties of populations that is, the properties to which numerals can in some manner be assigned. Populations are generally very large in size leading to impossibility of producing numerical estimates or statistics based on all elements or members. Study of a complete population may be too expensive, time-consuming and full of hazards of inaccuracy. Hence, the statistician draws a sub-group or sub-aggregate or portion of the population by using some appropriate method. It is called a 'sample'. Investigator studies the sample and proceeds to generalize the results over to the whole population from which the sample was drawn to solve various problems in different areas of day to day life.

18.3 DATA:

Data means information, the information in terms of numerical values or scores in statistics. It forms the basis of mathematical calculations to make inferences about the population from which samples are taken

In nut shell, data means observed facts or evidence. The word data is used in plural sense, whereas in singular form it is known as 'Datum'. In general terms, the data designates, the facts for describing a group or a situation, but in a particular sense, it is commonly used for the numerical facts for example, heights, weights, length, width, scores on achievements and intelligence tests etc. However, the data is the information especially

the numerical or quantitative one, to be exploited by Statistics, to find out the useful results, rather it means the scientific information or evidence which helps the researcher to find out the new methodology to face various significant problems. We require to conduct certain surveys or experiments. Surveys and experiments provide the required information to researchers, by exploiting which one can get various findings or solutions. In order to apply the statistical method to any type of enquiry it is necessary that statistical data be collected as statistical analysis is not possible in absence of quantitative data.

18.4 Collection of Data:

This is the preliminary stage of statistical investigation or experiment. Infact, the collection of data in not an easy task as the universe from which the data have to be collected, it may consists of a number of characteristics and researcher may be interested in knowing about just one or some of them. Data may be collected from primary and secondary sources.

Primary Data:

The first hand collection of data by a researcher with the help of his personal observation in the field is called primary data.

Secondary Data:

When the data is collected from published sources, from other persons who have already completed the collection of dat without direct engagement of investigation in the field, is known as the secondary data.

Obviously, the collection of primary data requires more time, energy and expenditure in comparison to the secondary data. However the method selected should be such that, it suits the type of enquiry that is being conducted. Only then one can adequately process for organization, presentation, analysis and finally to interpret.

18.5 Types of Data:

The data as information or facts may be classified in different categories as subjective data and objective data, primary and secondary data, qualitative and quantitative data etc. but in statistics we generally use the quantitative data The two main types of such data are; Grouped and Ungrouped Data.

Grouped Data:

When we have a large numbers of scores for example, more than 30, it is then better to group these scores under various class- internal and state respective frequencies against each of the class-internal.

Un -Grouped Data:

When we have deal with a small number of cases i.e. less that 30 for instance, 5,7,12 and so on, the data is considered to be ungrouped data. In such cases, we use simple statistical techniques for comparison and analysis. For example, if we have to find out the mean or average of the scores of 10 students. 7,8,10,12,8,15,11,16,6 and 7 we can simply add all the given scores and divide the sum of number of scores i.e. 10 by applying formula of mean for ungrouped data i.e.

Example :- . 7+8+10+12+8+15+11+16+6+7= 100/10 = 10

In nutshell the term data means factual information especially in quantitative form. The sample and population are two main terms in any research. For example sample or populations is small, no grouping is required and data is considered to be ungrouped, on the contrary, if the sample is large, the grouping is required. The researcher present the data in group form or prepare a frequency table, showing class intervals and their respective frequencies.

18.6 GRAPHICAL REPRESENTATION OF DATA:

Graphical treatment generally helps us to analyze the frequency distribution in an easy way. The advertiser has long used of graphic methods because these devices catch the eye and hold the attention of the client. For this and other reasons, the investigator utilize the attention- getting power of visual presentation and at the same time, seeks to translate numerical facts often abstract and difficult of interpret into more concrete and understandable form. The graphic representation of data proves quite an effective and economic device for the representation, understanding and interpretation of the collected statistical data.

There are many different forms of graphical representation some of them which are as i) Histogram and ii) frequency Polygon.

Histogram:-

A histogram is a set of vertical bars with equal base but different heights. Therefore, it is also known as bar graph. It is known as frequency histogram too. The mechanics of its construction will be explained with reference to the data of table 1. plotted as histogram in Fig. No.1

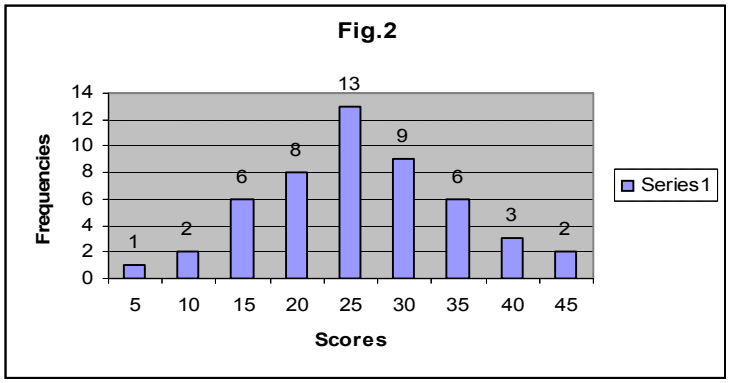
Cumulative Frequency and Cumulative Percentage Frequency in Frequency Distribution.

Table 1.

C.I	Exact Limits	Frequency	C.F	C.F(Percentage)
45-49	44.5- 49.5	2	50	100.00
40-44	39.5- 44.5	3	48	96.00
35-39	34.5- 39.5	6	45	90.00
30-34	29.5- 34.5	9	39	78.00
25-29	24.5- 29.5	13	30	60.00
20-24	19.5- 24.5	8	17	34.00
15-19	14.5- 19.5	6	9	18.00
10-14	9.5 - 14.5	2	3	6.00
5-9	4.5- 9.5	1	1	2.00
		N=50		

In figure No. 1 the base line is labeled with the score intervals rather than with the exact limits. Thus, the first interval in the histogram actually begins at 4.5 the exact lower limit of the interval and ends at 9.5, the exact upper limit of the interval. The one score or frequency in the interval 5-9 is represented by a rectangle, the base of which is the length of the scores or frequencies on the next interval, 10-14 are represented by a rectangle with a length of one interval and height of 3Y units. The highest rectangle is on interval 25-

29 which has a frequency of 13. The numbers written at the top of each rectabgle wil in the initial stage facilitate reading of the frequencies. However, these are not always necessary. In selecting scales for the X axis and Y axis the consideration of an approximate ratio 3:5 between the height and length should be kept in view.



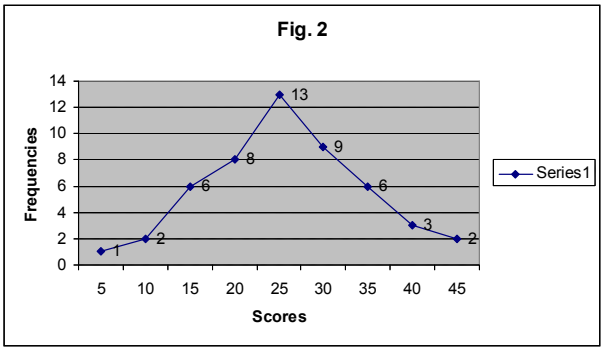
The histogram is composed of rectangles with different heights. It is not necessary to project the sides of the rectangles down to the base as is done in above given figure. Still it will bring out the important fact of the rise and fall of the frequencies from interval.

Frequency Polygon:-

A polygon is defined as a many - sided figure. When a many sided figures is drawn on the basis of frequencies given in a frequency distribution; the figure is called a frequency polygon. Since a polygon is a complete figure, its end should touch the baseline. For this purpose, each end of the distribution assume one additional class interval, with zero frequency. In table No.2 there are 9 class intervals and with the assumption two additional class intervals, this number will go up to eleven, such as 0,5,….50,55. The height of the figure may choose as it will be divisible by the maximum frequency of 13 in our data.

The next step is to locate the mid point of the class intervals. It can be done by averaging either the exact or the stated limits of each class interval.

Fig. 2



In our case for class interval 5-9, the mid-popint is (5+9)½ or 7, and so on and so forth.

Now we have to plot the dots for the frequency polygon. For the first C.I. (additional one), 0-4, the frequency is zero. Hence the dot is placed at the mid point of the class interval on the base line. For the next class interval of 5-9, the dot is placed at the mid point of the class interval of 5-9, the dot is placed exactly above the score 7 and at perpendicular distance from the relevant frequency of 1. dots for the other C.I.s are to be plotted in the same manner keeping the relevant frequency in view. The dot for the last (additional) class interval will be on its mid point on the base line.

Now join the dots with straight lines. The curve so drawn is the frequency polygon as shown in Fig.2

In short the meaning and procedure of constructive frequency polygon and frequency histogram are clarified enough graphical figures and quite helpful for researcher to understand the pictorial forms of the figures. It can be drawn on the same ordinate line, axis and also make it easy to understand the figural treatment of both polygon and histogram.

18.7 PROBLEM SET:

1. State briefly the purpose by the graphical representation of a frequency distribution.
2. Define the following concepts

   a. Histogram b. Frequency Polygon
3. Prepare a) Histogram b) Frequency polygon for the following frequency distribution of grades in a final examination.

Class	Frequency	Class	Frequency
10-19	6	50-59	12
20-29	12	60-69	8
30-39	20	70-79	6
40-49	14	80-89	2

4. Prepare histogram for the following frequency distribution.

Classes :	10-20	20-40,	40-50,	50-70,	70-80,	80-90
Frequency:	7	20	25	18	11	6

LESSON NO. 19 **UNIT - V**

MEASURES OF CENTRAL TENDENCY

By : Dr. Amit Sharma

Structure:

19.1 INTRODUCTION :

The average represents a whole series and as such, its value always lies be the minimum and maximum values and is generally located in the centre or middle of the distribution.

The tendency of the observations to concentrate around a central point in a series is known as central tendency.

Measures of central tendency give us an idea about the concentration of the distribution about the central part of the distribution. The measures which tell us the location or position of a central point in series are known as measures of locations or measures of position or measures of central tendency.

The measures of central tendency are often called averages. Thus, averages are the values around which other items of the distribution congregate. These values give us an idea about central part of the distribution or position of a central point in a series.

19.2 OBJECTIVES:

The following are the main objectives of this lesson:

- To introduce the concept of measures of central tendency.
- To know the concepts of arithmetic mean, median and mode.
- To learn about the computational methods for arithmetic mean, median and mode.
- To understand the merits and demerits of these methods.
- To understand their practical utility especially in the field of education.

19.3 CHARACTERISTICS OF AN IDEAL MEASURE OF CENTRAL TENDENCY

According to Prof. Bowley "*Averages are the statistical constants which enable us to comprehend in a single effort the significance of the whole".*

So an average of a statistical series is the value which is the representative of the whole series.

Prof.Yule suggested that a good average should posses the following characteristics.

1. It should be rigidly defined i.e., definition should be clear and unambiguous so that it leads to one and only one interpretation by different persons.
2. It should be easy to understand and calculate even for a non mathematical person.
3. It should be based upon all the observations.
4. It should be suitable for further mathematical treatment i.e., it should possess some important properties so that its use in statistical theory is enhanced.
5. It should affect least by fluctuations in the sampling.
6. It should not be affected much by the extreme values i.e., a few very small or very large observations should not unduly affect the value of a good average.

19.3.1 ARITHMETIC MEAN

ARITHMETIC MEAN : It is defined as the sum of set of observations divided by the total number of observations.

If $X_1, X_2 .....X_n$ are n observations, then their mean is denoted by $\overline{X}$ and is given by

$$\overline{X} = \frac{Sum\ of\ observations}{Total\ number\ of\ observations} = \frac{X_1 + X_2 + ... + X_n}{n} = \frac{1}{n}\sum_{i=1}^{n} X_i$$

If the data is given in the form of frequency distribution which has n observations $X_1, X_2 .....X_n$ with corresponding frequencies $f_1, f_{2,} f_3 .....f_n$. then arithmetic mean is given by

$$\overline{X} = \frac{f_1X_1 + f_2X_2 + ... + f_nX_n}{f_1 + f_2 + ... + f_n} = \frac{1}{\sum_i f_i}\sum_{i=1}^{n} f_iX_i = \frac{1}{N}\sum_{i=1}^{n} f_iX_i$$

Where $N = \sum_{i=1}^{n} f_i$ is the total of frequency

In case of grouped or continuous frequency distribution 'X' in above defined formula is taken as the mid value of the corresponding class interval.

Let us take deviations from some arbitrary point 'A' and define

$d_i = X_i - A$,

Where A is the value usually taken from middle part of the distribution Then A.M is given by

$$\overline{X} = A + \frac{1}{N}\sum_{i=1}^{n} f_i d_i$$ (Assumed mean method)

In case of continuous distribution, arithmetic calculations can be reduced further by taking $d_i = \frac{X_i - A}{h}$, where h being the magnitude of the class interval. Then

$$\overline{X} = A + \frac{1}{N}\sum_{i=1}^{n} f_i d_i \times h$$

(Step Deviation method)

19.3.2 MERITS AND DEMERITS OF ARITHMETIC MEAN

Merits of Arithmetic mean

a) It is rigidly defined.

b) It is easy to understand and calculate.

c) It is based upon all the observations.

d) It is suitable for further mathematical treatment.

e) Of all averages A.M is affected least by fluctuations in sampling that is why it is called stable average.

Demerits of arithmetic mean

a) It cannot be located by inspection or graphically.

b) A.M cannot be used while dealing with qualitative characteristics.

c) It cannot be obtained if even a single observation is missing or lost unless we drop it out and calculate mean of the remaining values.

d) In case of extreme values it gives distorted picture.

19.3.3 PROPERTIES OF ARITHMETIC MEAN

1. Algebraic sum of deviations of a given set of observations from their arithmetic mean is always zero. i.e, if we are having n observations $X_1, X_2 .....X_n$ with corresponding frequencies $f_1, f_{2,} f_3 .....f_n$. Then

$$\sum_{i=1}^{n} f_i (X_i - \overline{X}) = 0$$

or for $X_1, X_2 .....X_n$ observations $\sum_{i=1}^{n} (X_i - \overline{X}) = 0$

PROOF: We have $$\sum_{i=1}^{n} f_i (X_i - \overline{X}) = \sum_{i=1}^{n} f_i X_i - \overline{X} \sum_{i=1}^{n} f_i$$

$$= \sum_{i=1}^{n} f_i X_i - N\overline{X} \qquad \text{(i)}$$

Now $$\overline{X} = \frac{\sum_i f_i X_i}{\sum_i f_i} = \frac{\sum_i f_i X_i}{N} \quad \Rightarrow N\overline{X} = \sum_i f_i X_i$$

Using in (i) we get

$$\sum_{i=1}^{n} f_i (X_i - \overline{X}) = N\overline{X} - N\overline{X} = 0 \qquad \text{As } N = \sum_{i=1}^{n} f_i ,$$

Hence proved.

2. Sum of squares of deviations of a given set of observations is minimum when taken about mean

3. Arithmetic mean is independent of change in origin and scale.

4. Mean of a combined series.

3. Next we find cumulative frequency which is just greater than N/2, corresponding value of the observation will be median.

CALCULATION OF MEDIAN FOR FREQUENCY DISTRIBUTION :If we are given grouped frequency distribution the lowest class for which cumulative frequency exceeds N/2 is called as median class. If we assume that median class are distributed uniformly throughout the interval then median is given by

$$\text{Median} = l + \left(\frac{\frac{N}{2} - C.f}{f} \right) \times h$$

Where

h = magnitude or width of the median class

l = lower limit of the median class

f = frequency of the median class

C.f = cumulative frequency of the class preceding the median class

N = total of frequency

19.4.2 MERITS AND DEMERITS OF MEDIAN

Merits :

1) It is rigidly defined.

2) It is easily computed and easily understood.

3) Unlike arithmetic mean, the median can be calculated where the data is incomplete. e.g., irregular class-intervals, or open class-intervals.

4) Its value is not affected by the items on the extreme.

5) It can be located merely by inspection in many cases

6) It can be located graphically.

7) It is best for qualitative data such as beauty, intelligence etc

If n_1 and n_2 are the sizes of two sets of observations with means $\overline{X}_1$ & $\overline{X}_2$ respectively.

Then the mean $\overline{X}$ of the combined series is given by

$$\overline{X} = \frac{n_1\overline{X}_1 + n_2\overline{X}_2}{n_1 + n_2}$$

19.4 MEDIAN

The numeric value separating the higher half of a sample, a population, or a probability distribution, from the lower half is called median.

It is that value of the variable that divides the data into two equal parts, one part comprising all the values greater than it and the other part with values less than median or it may be defined as that value which exceeds and is exceeded by the same number of observations.

Median is the middle number in a list of numbers that have been arranged in order.

19.4.1 METHODS FOR CALCULATING MEDIAN

CALCULATION OF MEDIAN FOR INDIVIDUAL SERIES: If the number of observations is odd then median is will be the middle value after arranging these values in either ascending or descending order.

If the number of observations is even, then there is no single middle value; the median is the arithmetic mean of two middle observations after arranging the in either ascending or depending order.

CALCULATION OF MEDIAN FOR UNGROUPED FREQUENCY DISTRIBUTION: If $X_1, X_2 \ldots\ldots X_n$ are n observations with corresponding frequencies $f_1, f_2, f_3 \ldots\ldots f_n$ then median is calculated in following steps

1. First we prepare less than cumulative frequency distribution
2. Then we locate N/2, where $N = \sum_{i=1}^{n} f_i$

Demerits:

1) Median may not be representative of a series in many cases. This is specially, when there are wide variations between the values of different items.

2) It is not suitable for further algebraic treatments.

3) Median cannot be calculated, if the frequencies of the class intervals are not uniformly spread over the values in the class interval.

4) Median is more likely to be affected by the fluctuations of sampling than

Arithmetic mean.

5) When there is suspected heterogeneity median is used in place of mean

USES: Median can be used as a measure of location when a distribution is skewed, when end-values are not known, or when one requires reduced importance to be attached to outliers,

Remarks

(i) Sum of absolute deviations of a given set of observations is minimum when taken about median.

(ii) If the class intervals in grouped frequency distribution are given in inclusive form it is necessary to convert the class intervals into exclusive form for calculation of median.

(iii) It can be easily located graphically with the help of a curve called the cumulative frequency curve or ogive.

19.5 MODE

Mode may be defined as the value which occurs most frequently in a set of observations and around which other items of the set cluster densely.

In other words, mode represents that value which is most frequent or typical or predominant. *Mode means the number that occurs most frequently.*

19.5.1 CALCULATION OF MODE

Mode is calculated as follows

For individual series: In this case mode will be the value corresponding to maximum frequency.

For example, in a series 1, 5, 2, 4, 7, 3, 8, 9, 5, 5, 4, we note that 5 occurs most frequently, therefore 5 is the mode.

For discrete series: If there is a single maximum frequency then mode will be the value corresponding to maximum frequency. If the values cluster at more than one point or the frequencies are distributed irregularly then to find out the single value by using grouping method.

For grouped series: If there is a single class with maximum frequency we call it as model class and within this class mode is obtained by using the formula

$$\text{Mode} = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$$

Where

l = lower limit of the modal class

f_1 = frequency of the model class

f_0 = frequency of the class preceding the model class

f_2 = frequency of the class proceeding the model class

h = width of the model class.

If the entire class interval are not of equal and in the case of moderately asymmetrical distributions we use the formula

Mode = 3 Median - 2 Mean

Remarks:

1) There may be more than one mode in a frequency distribution .A frequency distribution with two modes is called bimodal, with three modes trimodal.

2) If each value occurs only once then there is no mode or all the values are modes.

3) If the values cluster at more than one class interval we decide the modal class by grouping method and then use the formula given above. If this formula fails, then we use

Mode = 3median-2mean

4) We can locate mode graphically by using a histogram.

19.5.2 MERITS AND DEMERITS OF MODE

Merits of mode

1. It is readily comprehensible and rigidly defined

2. It can be located from graph and in some cases it can be located by mere inspection.

3. It is not affected by extreme values provided they are not in the model class.

4) Like median, mode is unaffected by the dispersion of the series.

Demerits of mode

1. It is not always possible to find clearly defined mode we may come across the distributions with two modes.

2. It is not based upon all the observations and not suitable for further mathematical treatment.

3. As compared with mean, mode is affected to a greater extent by fluctuations of sampling.

Uses: Mode is especially useful in finding the most popular size in studies relating to marketing, trade, business and industry. Mode is the average to be used to find ideal size e.g., in manufacturing of readymade shoes, garments etc.

19.6 SUMMARY /CONCLUSION

In the present lesson we have discussed the concept of central tendency along with three of its measures viz., arithmetic mean, median and mode.

In addition to basic concepts of these measures, we have also discussed have relative merits and demerits. Computational techniques for these measures have also been elaborated.

Arithmetic mean is easy to understand and calculate and has its further utility, moreover it is affected least by fluctuations in sampling that is why it is called stable average. But in case of extreme values it gives distorted picture.

Unlike arithmetic mean, the median can be calculated where the data is incomplete. e.g., irregular class-intervals, or open class-intervals and its value is not affected by the items on the extreme. Moreover it is best for qualitative data such as beauty , intelligence etc.

When there is wide variation between the values of different items, median may not be representative of a series in many cases. Median is more likely to be affected by the fluctuations of sampling than arithmetic mean.

Like median, mode is unaffected by the dispersion of the series. As compared with mean, mode is affected to a greater extent by fluctuations of sampling.

19.7 GLOSSORY

1. MEASURES OF CENTRAL TENDENCY: These values give us an idea about central part of the distribution or position of a central point in a series.
2. ARITHMETIC MEAN: It is defined as the sum of set of observations divided by the total number of observations.
3. Algebraic sum of deviations of a given set of observations from their arithmetic mean is always zero.
4. MEDIAN: the middle value of the data.
5. Median can be used as a measure of location when a distribution is skewed, when end-values are not known, or when one requires reduced importance to be attached to outliers.
6. MODE: The most frequent value in the data.

19.8 SAQ/CYP/Possible Answers

QUESTION NO 1: Find the arithmetic mean of the marks obtained by 14 students of a class in subject Education in an examination.

The marks obtained are :12,14,20,17,18,19,14,13,11,15,14,17,16,8.

Solution: Arithmetic mean is given by

$$\overline{X} = \frac{Sum\ of\ observations}{Total\ number\ of\ observations}$$

$$= \frac{12+14+20+17+18+19+14+13+11+15+14+17+16+8}{14} = \frac{208}{14} = 14.8571$$

QUESTION NO 2: Find the arithmetic mean from the following frequency distribution

Marks(x)	0	1	2	3	4	5	6	7	8	9
No. of Students(f)	0	2	4	7	14	16	12	10	9	6

Solution: Here the data is given in the form of frequency distribution (ungrouped) having 9 observations $X_1, X_2 \ldots\ldots\ldots X_9$ with corresponding frequencies $f_1, f_2, f_3 \ldots\ldots\ldots f_9$ then arithmetic mean is given by

$$\overline{X} = \frac{f_1X_1 + f_2X_2 + \ldots\ldots + f_9X_9}{f_1 + f_2 + \ldots\ldots + f_9} = \frac{1}{N}\sum_{i=1}^{9} f_iX_i$$

As given below in the calculation table

x	0	1	2	3	4	5	6	7	8	9	Total	
f	0	2	4	7	14	16	12	10	9	6	80	
fx	0	2	8	21	56	80	72	70	72	54	435	

$$\overline{X} = \frac{1}{N}\sum_{i=1}^{n} f_i X_i = \frac{1}{80} \times 435 = 5.4375$$

QUESTION NO **3**: Calculate A.M of the following frequency distribution

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
No. of Students(f)	10	21	24	27	19	16	12	11	10

Sol: We are given grouped and continuous frequency distribution then 'X' in above defined formula (Question2) is taken as the mid value of the corresponding class interval. Where A.M is given by

$$\overline{X} = \frac{f_1 X_1 + f_2 X_2 + ... + f_n X_n}{f_1 + f_2 + ... + f_n} = \ = \frac{1}{N}\sum_{i=1}^{n} f_i X_i$$

In order to calculate various quantities required we make following calculation table

Marks	Mid value (x)	Frequency(f)	fx
0-5	2.5	10	25
5-10	7.5	21	157.5
10-15	12.5	24	300
15-20	17.5	27	472.5
20-25	22.5	19	427.5
25-30	27.5	16	440
30-35	32.5	12	390
35-40	37.5	11	412.5
40-45	42.5	10	425
Total		150	3050

$$\overline{X} = \frac{1}{150} \times 3050 = 20.3333 \qquad \text{(i)}$$

If we take deviations from some arbitrary point 'A' and define $d_i = X_i - A$, where A is the value usually taken from middle part of the distribution Then A.M is given by

$$\overline{X} = A + \frac{1}{N} \sum_{i=1}^{n} f_i d_i$$

Mid value(x)	Frequency (f)	$d_i = X_i - 22.5$	$f_i d_i$
2.5	10	-20	-200
7.5	21	-15	-315
12.5	24	-10	-240
17.5	27	-5	-135
22.5	19	0	0
27.5	16	5	80
32.5	12	10	120
37.5	11	15	165
42.5	10	20	200
Total	150		-325

$$\overline{X} = A + \frac{1}{N} \sum_{i=1}^{n} f_i d_i$$

$$= 22.5 + \frac{1}{150} \times (-325) = 20.3333 \qquad \text{(ii)}$$

Arithmetic calculations can be reduced further by taking $d_i = \frac{X_i - A}{h}$, where h being the magnitude of the class interval. Then

$$\overline{X} = A + \frac{1}{N} \sum_{i=1}^{n} f_i d_i \times h \qquad \text{As illustrated below}$$

Mid value(x)	Frequency (f)	$d_i = \frac{X_i - 22.5}{5}$	$f_i d_i$
2.5	10	-4	-40
7.5	21	-3	-63
12.5	24	-2	-48
17.5	27	-1	-27
22.5	19	0	0
27.5	16	1	16
32.5	12	2	24
37.5	11	3	33
42.5	10	4	40
Total	150		-65

$$\overline{X} = 22.5 + \frac{1}{150} \times (-65) \times 5 = 20.3333 \qquad \text{(iii)}$$

From (i),(ii) and (iii) we see that arithmetic mean is independent of change in origin and scale.

QUESTION No 4: Calculate median of the below given data

(i) 2,9,14,3,6,8,1, 5, 12, 7,4

(ii) 3,9,1,10,17,6,18,7,19,13,8,4

(iii)

X:	0	2	3	4	5	6	7
f:	5	8	9	10	4	3	3

(iv)

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45
No. of Students (f)	10	21	24	27	19	16	12	11	10

Solution:

(i) First we arrange the given observations in ascending order 1,2,3,4, 5,6, 7, 8,9, 12,14,.Since the number of observations N is odd (11) so $\frac{(N+1)}{2} = \frac{(11+1)}{2} = 6th$ term will be the median. Hence median is 6.

(ii) First we arrange the given observations in ascending order as given below

1,3,4,6,7,8,9,10,13,17,18,19

Since the number of observations is even (12) so median will be the arithmetic mean of two middle terms viz., (6th and 7th) terms. Hence median is $\frac{(8+9)}{2} = 8.5$

(iii) Here we are given seven observations with corresponding frequencies (discrete frequency distribution) then median is calculated in following steps

1. First we prepare less than cumulative frequency distribution

2. Then we locate N/2, where $N = \sum_{i=1}^{n} f_i$

3. Next we find cumulative frequency which is just greater than N/2, corresponding value of the observation will be median as given below.

X	1	2	3	4	5	6	7
f	5	8	9	10	4	3	3
C.f	5	13	22	32	36	39	42

Here N/2=42/2=21 and c.f just greater than N/2 is 22 and corresponding value of x is 3, hence median is 3.

(iv) Here we are given grouped frequency distribution so first we calculate cumulative frequency as given below.

Marks	No. of Students (f)	Cumulative frequency c.f
0-5	10	10
5-10	21	31
10-15	24	55
15-20	27	82
20-25	19	101
25-30	16	117
30-35	12	129
35-40	11	140
40-45	10	150
Total	150	

Here N/2 is 150/2=75 and c.f just greater than it is 82 so,15-20 is the median class, hence l=15,f=27, c.f=55 and h=5 so median is

$$Median = l + \left(\frac{\frac{N}{2} - C.f}{f} \right) \times h = 15 + \left(\frac{75 - 55}{27} \right) \times 5 = 15 + (0.7407) \times 5 = 18.7037$$

QUESTION NO 5: A Ready made garment shop had sold 80 T-shits in a certain day with the following distribution:

Size of T-shirt:	36	38	40	42	44	46
No. of Pieces:	12	18	20	16	8	6

Find the mode of the distribution.

Solution: By inspecting the frequency distribution we see that size 40 has maximum frequency (20) frequency. Therefore, 40, is the mode of the distribution.

QUESTION NO 6: Find the mode of the following grouped frequency distribution.

Class Interval	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	12	18	19	36	33	16	18

Solution: Here we see that maximum frequency is 36 which occur in the class interval 15-20. So, model class is 15-20 and l=15, $f_1 = 36$, $f_0 = 19$ *and* $f_2 = 33$ where as h=5 as shown below in the table.

Class Interval	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	12	18	$19 \rightarrow f_0$	$36 \rightarrow f_1$	$33 \rightarrow f_2$	16	18

Hence mode will be

$$Mode = l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h = 15 + \frac{36-19}{2\times 36 - 19 - 33} \times 5$$

$$= 15 + \frac{17}{20} \times 5 = 19.5$$

19.9 EXERCISES

1. What do you mean central tendency? Discuss various of central tendency.
2. What are the requisites of an idea measure of central tendency?
3. Define arithmetic mean, Why it is superior other measures of central tendency.

3. Following is the distribution of marks in law obtained by 50 students:

Marks more than	0	10	20	30	40	50
No. of students	49	46	40	20	10	4

Calculate the median mark.

4. Define median and give its merits and demerits and also to calculate median from the following given below data.

Wages (Rs.)	No. of laborers
110-120	2
100-110	8
90-100	20
80-90	10
70-80	5
60-70	3

5. The following table shows the age of distribution of persons in particular regions:

Age(yrs)	No. of persons
Below 10	18
10-20	24
20-30	32
30-40	42
40-50	55

50-60	35
60-70	25
70-80	10
Above 80	4

Calculate the appropriate measure of central tendency;

6. Define mode and also give its merits and demerits. To calculate the mode from the following frequency distribution:

Marks Obtained	No. of Candidates
0 - 9	6
10-19	29
20-29	87
30-39	181
40-49	247
50-59	263
60-69	133
70-79	43
80-89	9
90-99	2

7 . Calculate mode by using empirical relation between mean, median and mode from the data given below:

Class interval	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	4	20	35	55	62	67

8. Define median and give its merits and demerits and also calculate median from the following given below data.

Wages(Rs.)	No. of laborers
80-70	13
70-60	15
60-70	20
60-50	16
50-40	8
40-30	2

19.10 SUGGESTED READINGS

1. Basic Statistics by Aggarwal
2. Fundamentals of Applied Statistics by S.C Gupta and VK Kapoor
3. Fundamentals of Mathematical Statistics by S.C Gupta and VK Kapoor

19.11 REFERENCES

1. N G Das 2009 :Statistical Methods combined edition (Vol. I &II), Tata Mc Graw-Hill.
2. S.C Gupta and VK Kapoor 2013: Fundamentals of Applied Statistics, S. Chand and Sons