Unit-8

HUMAN LEARNING & CLASSROOM TEACHING

8.1 OBJECTIVES

After completion of this unit, the student will be able to:

1. Describe experiments that led to the theories of Associative Learning and cognitive learning.
2. Differentiate between the associative and the cognitive learning theories.
3. Describe how teachers can use learning theories to help students learn complex skills.
4. Relate the importance of conditioning in learning.

8.2 OVERVIEW

Learning takes place in many ways. Sometimes it is international, as when students acquire information presented in a classroom or when they look something up in the encyclopedia. Sometimes it is unintentional, as in the case of the child's reaction to the needle. All sorts of learning are going on all the time. As you (the reader) are reading this chapter, you are learning something about learning. However, you are also learning that educational psychology is interesting or dull, useful or useless. Without knowing it, you are probably learning about where on the page certain pieces of information are to be found. You may be learning to associate the content of this chapter with unimportant aspects of your surroundings as you read it, such as the musty smell of books in a library or the temperature of the room you are reading in. The content of this chapter, the placement of words on the page, and the smells, sounds, and temperature of your surroundings are all stimuli. Your senses are usually wide open to all sorts of stimuli, but you are consciously aware of only a fraction of them at any one time.

The problem faced by educators is not how to get students to learn; students are already engaged in learning every waking moment. Rather, it is to help them learn particular information, skill, and concepts that will be useful in adult life. How do we present students with the right stimuli on which to focus their attention and mental efforts so that they will acquire important skills? That is the central problem of instruction.

For this we will present some learning theories in this unit, which will be helpful for the teachers and students to overcome these problems.

8.3 MEANING AND NATURE OF LEARNING

Learning means to bring changes in the behaviour of the organism. It is very difficult to give universally acceptable definition of learning because various theories developed by psychologists attempt to define the term from different angle. Learning in psychology has

the status of a construct. Construct means an idea or image that cannot be directly observed like electrons or genes but which is inferred from the behaviour of the organism. Melvin H. Marx says; "learning is a relatively enduring change in behaviour which is a function of prior behaviour" (usually called practice).

The words given above emphasize four attributes of learning as a process the first is that learning is a permanent change in behavior. It does not include change due to illness, fatigue, maturation and use of intoxicants. The second is that learning is not directly observable but manifests in the activities of the individual. The third attribute of learning is that it results in some change of enduring nature. The fourth and the last is that learning depends on practice and experience. Hilgard defined learning as, a change in a subject's behaviour to a given situation brought about this repeated experience in that situation, provided that the behaviour change repeated experiences in that situation, provided that the behaviour change cannot be explained on the basis of native response tendencies, maturation, or temporary states of the subject (e.g. fatigue, drugs, etc).

An Earlier View of Learning: An earlier view of learning regarded the teacher as a dispenser of information and the children as the passive absorbers. It was believed that the central nervous system could be developed through experience in much the same way as the muscular system reading and other communicable languages skills were taught principally by isolated drill in both phonics and phonetics. All this rendered learning somewhat distasteful task for the learner.

A Later View of Learning: A later view regarded learning "as a special form of activity in which children responded specifically to particular stimuli in certain prescribed situations." According to this view, commonly referred to as stimulus-response psychology, learning occurs as a result of modification of the synaptic connections of then neurons or as a synthetic process of forms of reflex behavior. Accordingly, the subject matter and the skills to be learnt should be organized specifically for instructional purposes. The stimulus-response theory, developed by E.L. Thorndike made use of certain laws of learning, namely, readiness, exercise, and effect. Motivation is primarily extrinsic and frequently places emphasis on rewards and penalties instead of the activity itself or its purpose.

A Recent View of Learning: One of the recently developed views of learning is based on the biological concept. Accordingly, the living organism develops by the process of individuation from the central (central nervous system) to the peripheral areas (arms, legs, hands, and feet). This view of learning is popularly known as the organismic, purposive theory. It is also referred to as one of the field theories of learning.

This leads us to define learning in the words of some of the experts on the subjects.

8.3.1 Learning Defined

Learning has been explained and defined in a number of ways. A few of the views regarding the nature of learning are given below.

(1) **Munn's Views:** According to Munn, "Learning is more or less permanent incremental modification of behaviour which results from activity, special, training or observation."

(2) **Skinner's View:** According to Skinner, "Learning is both acquisition and retention."

(3) **View of Gates:** According to Gates, "Learning is medication of behaviour through experience."

(4) **View of Daniel Bell:** In the words of Daniel Bell, "Learning is modification due to energies of organism and the environment impinging on the organism itself."

(5) **View of Thorpe:** Thorpe says, "We can define learning as that process which manifests itself by adaptive changes in the individual's behaviour as a result of experience."

(6) **Kimble's View:** G.A Kimble opines, "Learning refers to more or less permanent change in behaviour, which occurs as a result or practice.

(7) **View of Kingsley and Garrey:** Kingsley and Garrey emphasize that the act of adjustment of environment is the process of learning. According to them, learning is a "a process by which an organism, in satisfying his motivation, adopts or adjusts to a situation in which it must modify its behaviour in order to overcome obstacles or barriers.

Thus, the process of learning includes the following:

a. Acquisition of new experiences.
b. Retention of old experiences in the form of impressions, engrams or skills.
c. Development and modification of experience,
d. Synthesis and organization of the old and the new experiences, resulting in novel pattern called learning.

(8) **A very comprehensive definition is given by Crow and Crow as under:** "Learning is the acquisition of knowledge, habits and attitudes. It involves new ways of doing things, and it operates in an individuals' attempt to overcome obstacles or to adjust to new situations."

The following points will help us to understand the nature of learning as modification behaviour.

(i) **Learning versus Maturation:** All learning is change in behaviour but all change in behaviour is not learning. Certain changes in behaviour occur due to maturation, drug and fatigue, for example, after long hours of continuous work, individual shows deterioration in his performance. This change in the individual's performance is not due to learning but due to fatigue. When a man drinks alcohol or bhang, or takes some intoxicating drug, his behaviour is changed. This change in behaviour is not due to learning but due to the effect of drug or alcohol. Similarly when a housewife is angry or depressed she performs very poorly in her homework. This change in the performance of the housewife is due to her temporary, mental state.

Besides fatigue, drug or temporary." Mental state, maturation also palsy an important role in bringing out change in behavior. For example the first time the child walks or talks, is an indication that maturation is at work. The swimming of tadpoles and the flying of birds also demonstrate the effect of maturation on behaviour.

Whatever training you may provide to an infant of 6 months old, he will not speak the language. The infant will speak the language only when a vocal organ is mature. The child first creeps, then crawls, and then walks. But the first behaviour creeping occurs only when the infant is mature to do. All these examples make it clear that changes in behaviour also occur due to maturation. Maturation, in this sense, means development of anatomical and physiological structures of the body. Learning refers to those changes in behaviour, which occur due to training, practice observation and experience but not due to maturation, drug, fatigue or temporary mental states of the individual. Moore, Manning and Smith (1978) have very rightly said, "Learning is limited to those changes in behaviour which are a result of training or experience, and not a result of maturation or temporary physiological or psychological states of organism."

Certain changes in behaviour occur due to both maturation and learning. For example, a child cannot walk until his legs are strong enough to support his weight and until the development of proper neural structures takes place, but children do not walk in the same manner. The manner of walking is learned; similarly, a child cannot speak before the vocal organs develop. But children do not speak the same language. Those who speak the same language, speak in different ways. Speech is also a learned behaviour.

Maturation helps in the learning process. We cannot learn anything without our bodies taking part. The things we learn, the speed with which we learn them and our ability to retain them all depend on the interaction between our maturation process and our learning experiences. There are different ages or stages of maturation and each stage certain "kinds of learning take place. Just as healthy maturation contributes to learning, immature physical systems also contribute to deficit in learning. For example, the muscles and other structures of the newborn baby are not sufficiently mature to permit walking. Since he cannot walk and get around in the world, he can obviously know very little about it. Thus maturation determines learning.

(ii) **Permanence of Learning:** Changes in behaviour may be temporary or permanent. But any real learning leads to permanent changes in behaviour. Learning to speak a language or to write in the language is an instance of permanent change in behaviour. But most classrooms learning situations do not support the idea that learning is permanent. Students learn a subject or a chapter; and after the examination they forget most of what they were taught. This happens so, because

what is learned does not become a part of their daily life. By learning they mean 'memorization' or 'being able to pass an examination on the subject' it does not matter whether they remember the facts permanently or forget it after the examination.

(iii) Changes in behaviour may take place in the desirable direction or in the undesirable direction. For example, children learn good habits as well as bad habits, desirable attitudes as well as undesirable attitudes. Education must aim at teaching children certain desirable behaviours, habits or attitudes and modifying their undesirable habits, attitudes or bahaviour.

(iv) Learning can be both incidental and intentional, the school curriculum, teaching methods and learning systems must be oriented to both intentional and incidental learning.

(v) Learning involves both over acts and covert processes. Children learn attitudes and values, which are covert processes. When we define learning as change in behaviour, it includes both overt acts and covert processes.

(vi) Learning results from reinforced practice. Practice makes a man perfect. Practice, training or experience leads to improvement in present learning. But practice alone does not cause improvement. Children will learn to do those things for which they are rewarded (praised, honored, recognized) and will learn to avoid doing those things for which they are punished (blamed, or getting disproval). Some type of reinforcement should therefore, follow practice. Learning should always be associated with reinforcement.

(vii) Learning is both a process and a product. Learning as a process includes such things as how the child is learning (discovery learning, meaningful learning, rote learning, trial and error learning, conditioning, insightful learning etc), the nature of interaction between the child and the teachers, and many other factors such as coding and rehearsal which operate at the time of learning. Learning as a product includes the results or outcomes of learning. The outcomes of learning may be cognitive (learning a concept, a rule or principle, language, etc) affective (learning attitudes, emotions values etc,), or motor learning (learning skills such as typing, playing basketball, etc. Outcomes of learning, not only include the types of achievement but also the level of achievement such as mastery over the task, or learning just the essentials. In short, learning as a product includes the level and type of competencies attained by the child in relation to the learning task.

8.3.2 General Characteristics of Learning

The following are the general characteristics of learning:

(1) **Learning is Adjustment:** Learning involves adjustment of the individual to his environment. The individual must learn to adjust himself to the changes that take place around him.

(2) **Learning is Growth:** Learning must result in the growth of the child. An immature child is developed into a mature person through the process of learning.

(3) **Learning is Organizing Experience:** Learning is not like adding one experience to the other it is rather, organizing the new experience with the old ones, thus giving rise to a new form of behaviour. Thus, learning involves the proper organizing of experiences in manner.

(4) **Learning is Purposeful:** The more intense the purpose of the individual, the more rapid the learning. Lack of purpose in learning will hamper learning. Thus, purposeful learning is always more rapid and permanent.

(5) **Learning is Active.** Better learning will take place only if the learner is actively engaged in the learning process. Thus, active participation of the pupils is essential in the learning process.

(6) **Learning is intelligent and Creative:** Learning involves an intelligent interpretation of the situation, and some selectivity in the response. This necessarily involves intelligent and creative thinking.

(7) **Learning Affects the Conduct of Learners:** Learning affects individuals to adjust himself to the environment. This is brought about through some sort of change and modification of one's behavior. Thus the behaviour or conduct of the individual undergoes change on account of learning.

(8) **Learning is the Product of the Environment:** Learning is essentially an adaptation and adjustment to the environment.

Thus, environment has a great influence upon learning; learning cannot be divorced from the environment.

8.3.3 Laws of Learning

Learning is a fundamental ingredient in the education of a child. Therefore, a teacher must understand fully, how learning takes place in the best possible manner, in this connection, it is imperative that the teacher should know what are called 'Laws of Learning' as given by Thorndike and others. They must be accepted and fundamental laws of learning are:

(i) Law of Readiness
(ii) Law of Exercise
(iii) Law of Effect

In addition to these, certain other laws of learning will also be mentioned briefly.

(i) Law of Readiness: This law emphasizes the importance of readiness to learn. "When a person feels ready to learn or to act, he learns or acts, more effectively and with greater satisfaction than when not ready". This implies that the learner

must be mentally prepared to learn. This emphasizes the importance of motivation in learning. The learner must be brought in the proper frame of mind, and his curiosity must be increased for bringing about effective learning.

Educational Implications

1. Arouse child's readiness to learn, Herbart, the giver of Herbartian Steps, emphasized that the appreciative masses must be brought to the forefront before any learning takes place.
2. The law calls upon the teacher to motivate the child before he undertakes any teaching work.
3. The curricular activities should be according to the child's mental level of maturity. This will ensure readiness as well as arouse curiosity for new things to be learnt.

(ii) Law of Exercise: Broadly speaking, this law implies that learning takes place by exercising, i.e. by doing or by actively participating in the performance. We learn what we do, and we do not learn what we do not do. That is why this law is also called 'Law of Use' and 'Law of Disuse.

(i) **Law of Use,** 'When a modifiable connection is made between a situation and a response, that connections strength is decreased, this emphasizes the need and importance of practice. In other words 'Practice makes perfect'.

(ii) **Law of Disuse.** 'When a modifiable connection is not made between a situation and a response over a length of time, that connection's strength is decreased, this law implies the negative value of lack of practice.

The educational implications of the laws of exercise are great. This emphasizes the value of repetition, drill and practice for memorizing and mastering of something. This also emphasizes that much time should not elapse between one practice and the subsequent one, because long disuse may cause forgetfulness.

Educational Implications

1. If learnable acts are repeated, they become habit.
2. Bad habits can be eradicated. It is believed that if the children are made to practice consciously their bad habits, they automatically tend to leave them.
3. Forgetting can be delayed or diluted.
4. Skills like typing, shorthand, athletics and so on can be developed to the maximum.
5. The teacher must ensure that the act of repetition is carried out with a pleasant effect. An act of repetition, which is accompanied by a satisfying state, strengthens a connection.

(iii) Law of Effect: This law implies that if our efforts are accompanied by a feeling of achievement or satisfaction, we are further inspired to learn, and therefore, effective learning takes place, if our efforts are not accompanied by a feeling of satisfaction, not much of real learning will take place. In other words we may say that a response, which gives achievement of the goal and thus provides satisfaction, will be stamped in, while those, which are accompanied by dissatisfaction, will be stamped out.

Thorndike defines it as follows:
"When a modified connection between a situation and response is made, and is accompanied or followed by a satisfying state of affairs, that connection's strength is increased, but when made and accompanied by an annoying 'state of affairs, its strength is decreased".

Thus, the learners, feeling or emotional state affects learning. In other words success and failure condition the learning to a great extent.

Education Implications
1. Children get to form good habit and attitude by associating with reward, satisfaction and praise.
2. Undesirable attitudes or acts of behaviour can be removed by associating them with unsatisfying desirable condition.
3. The acts of rewarding and punishing take this law into consideration.
4. Behaviour problems can be improved by associating them with annoying state of affairs.
5. Interest is directly related to this law. Children get interested in things which bring pleasant results.

Law of Recency
Recency occurrences are most vivid in our mind. The process of forgetfulness sets in as more and more time is elapsed. We remember these things better, which are comparatively recent.

This emphasizes the importance of revision. The students should revise occasionally so that the things are again refreshed in their mind. Revision should be done after short intervals and also just before the examination. Without revision a student is apt to forget even the best assimilated matter.

Law of Intensity of Stimulus
The stronger the stimulus, the greater the learning. Thus, if stimulus is strong, the response will be strong. A student, who is more serious and enthusiastic about his studies, will make greater progress and achievement. The more serious and enthusiastic a student, the greater this achievement.

Thus, the function of the educator is to provide greater stimulus to the students. Setting high and lofty objectives before the students proves to be great stimulant. Genuine praise and appreciation also act as great stimulants. Periodic tests and examinations also serve the same purpose. Thus, we may say 'that the success or the achievement of an individual is directly, proportional to stimulus or the interest that he takes in his work.

8.3.4 Learning as Modification of Behaviour
Learning is a very comprehensive term. Learning does not mean only the acquisition of knowledge or skill; it means much more than that. Thus, it includes acquiring of attitudes,

values, likes dislikes, and a many other habits. A number of psychologists have defined learning as ‘change or modification of behavior. Thus, learning is the process by which an organism, as a result of its interaction with a situation, acquires a new mode of behavior, which tends to persist and affect the general behavioral pattern of the organism to some degree.

According to G.A Kimble, “Learning refers to a more or less permanent change in behaviour which occurs as a result of practice.”

Munn says. “Learning is more of less permanent, incremental modification of behaviour which results from activity, special training or observation.”

Thorpe defines learning as that “process which manifests itself by adoptive changes in individual’s behaviour as a result of experience”.

The above cited definitions emphasize that learning results in change or modification of behavior. But a pertinent question in tiffs connection is: Do all changes in behaviour occur due to learning? The answer is definitely ‘No’ there are so many other causes of change in behaviour e.g. fatigue, drugs, anxiety, emotion and so on. An individuals, after long hours of continuous work shows marked deterioration in his efficiency and performance. Radical changes in behaviour are noticed under the influence of intoxicants; a child in a state of fear and anxiety shows poor performance, and so on. In addition to these, there are other factors, which result in the change of behaviour e.g. the natural process of maturation.

Thus, all learning is modification of behavior, but all modification of behaviour is not learning. We may conclude by saying that learning is limited to those changes in behavior, which are a result of training or experiences, and not a result of maturing or temporary physiological or psychological states of the organism.

It must be noted that learning stands for relatively permanent change or modification of behavior. The temporary, changes and behaviour does not constitute learning.

Moreover, modification of behaviour may take place in the desirable direction or in the undesirable direction. For example, children learn good habits as well as bad habits. Of course, teachers and parents must always encourage children to learn desirable behaviour patterns.

It is not practice, alone which causes learning. In fact, learning occurs under conditions of reinforcement. Thus, learning is a relatively permanent change in behaviour and is the result of reinforced practice.

Basis of Behaviour

Human behaviour results from two basic forces: Forces ‘inside’ the individual, and forces ‘outside’ the individual. The ‘inside’ forces mean man’s physical hungers, and his psychological urges the ‘outside’ forces are one’s aims and objectives, expectation of

rewards, and other requirements of the society. An individual tries to modify his behaviour to meet his internal and external needs. Needs and requirements therefore are the basic causes of learning. These needs can also be classified in the following way:

(1) Basic needs food, shelter, sex, etc.
(2) Psychological needs satisfaction of urges and desires, pleasures and happiness.
(3) Normative needs, attainment of aims and objectives, observing norms and values, acting according to the standards set by adults and society.

Behaviour, therefore, is prone to modification due to need-oriented learning, and is both, complex and purposeful. Therefore, the modification of behaviour through learning towards the fulfillment of the individual's needs and socially approved way is the main concern of a teacher.

8.3.5 Conditions of Learning

Now, learning depends upon a number of factors or conditions. The more important one's discussed below:

(1) Motivation

Motivation is one of the basic conditions of learning. Motivation, in simple language, means interest. Learning is directly proportional to our interest is learning. Therefore, the fast and foremost faction of a teacher is to create interest of the students in learning. The students must be brought in the proper frame of mind before they can learn anything effectively and successfully. The teacher to motivate the students for acquiring the new knowledge can use a number of devices. This includes questioning and the use of audio-visual aids. Successful motivation means successful learning.

i. Clarity of Presentation

The subject matter must be presented clearly before the students, so that they understand it properly. This is a very important condition of learning. Let us analyze the teaching-learning process. The teacher has a mental image of the subject matter that he likes to teach to the students. He uses the media of verbal explanations aided by various types of devices of teaching and audio-visual aids to get this mental image of knowledge conveyed to the minds of the pupils. The success of teaching as well as learning will depend upon the clarity of this mental image. If a clear image is formed in the minds of the students, the impression on their mind will clear and lasting, which means better learning. Therefore, the presentation of the subject matter should be as clear as possible to make learning effective and successful.

ii. Providing Direct Experiences

Nothing teachers like an experience and personal observation. Therefore, wherever possible, the students should be taught by the method of personal observation and experience. For example, no amount of verbal explanation will give us a clear picture of the Tarbela Dam; the best way, to know and appreciate it is, to see it personally. Let the students observe and experience; and rest assure, true and effective learning will automatically take place.

iii. Level of Intelligence

Learning, to a considerable extent, depends upon the level of intelligence of the learners. Though the teacher cannot do much in this regard because the level of one's intelligence is determined by heredity, the knowledge of the level of intelligence is determined by heredity, the knowledge of the level of intelligence of the learner can greatly help the teacher to devise methods of teaching suited to the learner's level of intelligence. For example, a student with high IQ can easily learn through verbal explanations of the teacher; but a student with comparatively low, IQ needs the help of audio-visual aids and other devices of teaching in learning. The methods of teaching, therefore, have to be adapted to the level of intelligence of the learners.

iv. Academic Atmosphere

A very important and significant condition of learning is the provision of academic and intellectual type of atmosphere for the learners. The academic type of atmosphere prevailing at home and the school is a perpetual inspiration for the children to learn more and more. The reason is that the children imbibe an intellectual type of frame of mind from the academic atmosphere and that type of atmosphere can be created by providing a separate room for a study, providing books and journals and having intellectual talks and discussions. A good school library and a reading room can go a long way in creating academic type of atmosphere in the school.

v. Effective Methods of Teaching

Better and effective methods of teaching are essential for learning. Mostly, poor learning is the result of faulty methods of teaching. Instead of the old and traditional methods of teaching, modern and psychological methods of teaching should be used. A good method of teaching is that which makes the subject-matter is not clear to students on account of employing faculty' methods of teaching. Best methods of learning will result in best type of learning.

vi. Reinforcement

Reinforcement is a procedure of associating pleasant or unpleasant experiences objects or events with the responses, made by the learner. The basic idea of reinforcing a response is either to strengthen a response or to weaken it. Appreciation and rewards help in the strengthening of certain behaviour in the child punishment and reproof help in the elimination of undesirable behaviours in children. Thus, reinforcement can be positive such as appreciation and rewards, and negative such as reproof and punishment. The idea of providing reinforcement in learning was first popularized by Edward Thondike and later by B.F. Skinner, Reinforcement plays a significant part in learning and therefore, the teacher should make use of this technique in the learning process.

vii. Practice

There is a great truth in the dictum that 'Practice makes a man perfect'. We learn things by doing them over and over again. A long experience makes a person skilled and proficient, practice therefore, is one of the most important conditions of learning.

The importance of practice is rightly emphasized in learning. Practice implies repetition of a particular response in the presence of the stimulus. It is not possible for the child to learn the response correctly just performing the activity only once. He has to repeat the performance over and over again to fix and learn it properly and completely. This is also essential for longer retention. The learner will be able to perform the activity easily, properly, correctly and gracefully only through long and constant practice.

These are some of the most important conditions for promoting learning.

8.3.6 Imitation in Learning

The most common general innate tendency of the child is imitation. It involves copying others, it implies "doing as others do'. Imitation is cognitive in nature. Suggestion two has been described as unconscious imitation, but the important thing in imitation is that it is action oriented. All actions are borrowed. We generally imitate those who are elder to us or whom we held in esteem this is particularly true of children. They like to copy their teachers and parents. It is manifested in their dress and talk. There is no logically conceived ground in imitation. It is a unconscious process but can be easily, noticed by others.

Type of Imitation

Drever has mentioned two types of imitation i.e. deliberate imitation and unconscious imitation. In the deliberate imitation, a person imitates deliberately. We put on hair-styles of famous film stars; imitate their modes of action deliberately. In the unconscious imitation one imitates others unconsciously. Children generally imitate others unconsciously.

McDougall has given to main types of imitation-primary imitation and secondary imitation. Primary imitation includes three types:

(i) Sympathetic Imitation
When one feels as others feel (Quite Unconsciously), we have sympathetic imitation. A child cries when he sees others crying.

(ii) Ideo-Motor Imitation
In the Ideo-Motor type of imitation, one imitates the actions of others, when in a match one person raises his hockey stick, spectators raise their arms.

(iii) Deliberate Imitation
Deliberate imitation has been explained earlier.

In the secondary imitation McDougall includes two types' i.e. meaningless imitation, and unconscious imitation. In the meaningless imitation, one imitates others without being able to understand the significance of copying. This is mainly, see in children. Unconscious imitation has been explained earlier.

Laws of Limitation

Imitation the following laws:

1. Imitation grows from higher to lower, urban to rural, rich to poor
2. All the aspects of imitation are borrowed
3. Imitation is more action than thinking
4. It goes one from internal to external
5. Imitation grows rapidly

Imitation of Learning

It is only recently that we have recognized the worth of imitation in the sphere of education. Formerly, it was thought that imitation kills originality and initiative of the child, ready-made learning is no learning. It is a low method of learning and the child only picks up second hand knowledge. It leads to stagnation. But now-a-days, we feel that imitation is of great utility in learning. It is economical and saves time. It is a great socializing agent. The following points will highlight its use:

(1) The Teacher

The behaviour of the teacher be worthy of imitation. He must be expert in his subject. He should be jack of all trades and master of one. He must have noble sentiments and character. His habits should be commendable. One thing is particularly desired in language teachers. i.e. their good handwriting so that children imitate this.

(2) Method of Teaching

Although imitation is unconscious process but sometimes we have to teach some skills deliberately. This should make the purpose of the lesson clear. Teacher should explain all steps so that the students are able to imitate quickly. It will and to their efficiency.

(3) Weak Students

Imitation can help dull and weak student if they copy the brighter ones. Teacher should encourage such case. Let them adopt those study habits. Healthy competition can be encouraged in the class, prizes can be instituted.

(4) Perfection

It should be noted that there could not be cent percent imitation. The teacher should not insist on ideal and perfect imitation. He will kill initiative of the children. He will create problem for children this way.

(5) School

The school should provide models for children to copy. It must recruit best teachers having correct pronunciation and good handwriting. Model lectures should be arranged. To company of the child in the school must be good, for imitation is a great socializing force, if a child has bad friends he will very soon become a delinquent. There must be number of hobbies in the school. Drawings be hung on the walls and let the child copy those.

(6) Good Books

Encourage the students to read good books particularly biographies, and incorporate those ideas in themselves.

8.3.7 Summary

1. After describing the interpretations of learning, we explained a definition of learning as a change in behaviour that results from experience.
2. Certain changes in behaviour occur due to both maturation and learning.
3. The real learning leads to permanent changes in behavior.

4. The following are the general characteristics of learning:
   (i) Learning is adjustment
   (ii) Learning is growth
   (iii) Learning is organizing experience
   (iv) Learning is purposeful
   (v) Learning is active
   (vi) Learning is intelligent, etc.

5. Learning depends upon a number of factors, such as:
   (i) Motivation
   (ii) Clarity of presentation
   (iii) Direct experiences
   (iv) Intelligence
   (v) Atmosphere
   (vi) Methods of teaching, etc.

6. The most common general innate tendency of the child is imitation. It involves copying others. It implies "doing as others do".

8.4 ASSOCIATIVE THEORIES OF LEARNING

Psychologists have developed two principle types of learning theories to explain how individual learn: behavioural or associative and cognitive.

Behaviour learning theories tend to emphasize observable behaviour, such as classroom behaviour or new skills or knowledge that can be demonstrated. Behavioural learning theorist is particularly interested in the way pleasurable or painful consequences of behaviour change the individual's behaviour over time.

A major goal of the behaviourist is to determine the laws governing learning. The concern about the nature of learning has dominated academic psychology for most of this century. A number of ideas contributed to the behavioral view. The Greek philosopher Aristotle's concept of the association of ideas is one important origin of behaviourism.

8.4.1 Associationism

Suppose when Bomb-Blasts you remember the event of Ojri-Camp. The whole thought process reflects the concepts of association of ideas. Two events can become associated with each other; thus when you think of one event, you automatically recall the other.
Aristotle proposed that in order for an association to develop, the two events must be contiguous (Temporally Paired) and either similar to or opposite to each other.

As Aristotle said that learning is the result of association of two components, the "Conditioning" become synonymous with association.

8.4.2 Conditioning

Conditioning is considered by many psychologists to be the fundamental form of learning underlying the development of some of the earliest response patterns in newborn infants. Conditioning has been demonstrated to occur even before birth. Through conditioning the organism's responses to a great variety of stimulus situations are changed.

8.4.3 Classical Conditioning

Classical conditioning may be defined as the formation (or strengthening) of an association between a conditional stimulus and a response through the repeated presentation of the conditional stimulus in a controlled relationship with an unconditioned stimulus that originally elicits that response.

The best known experiment in classical conditioning was performed by a Russian physiologist and Nobel prize winner, Ivan Pavlov, who accidentally discovered the conditioned response while performing a series of routine physiological experiments (Pavlov, 1927) Pavlov was studying digestion and salivation in dogs, using an apparatus which collected and measured the secretions of live animals by means of tubes implanted in the stomach or cheek. In these experiments, meat powder was placed in a dog's mouth and his salivary response to the food was observed. Pavlov's assistants reported that after a number of trials with any particular dog, the animal would begin to salivate when he saw the food, before it was actually placed in his mouth. Soon he would salivate at the sight of the food dish, and finally even at the sound of the assistant's approaching footsteps. Pavlov, realizing that his phenomenon was of great significance, changed the course of his investigations.

In this series of experiments which followed his chance discovery, Pavlov established the terminology that is still used to describe this type of learning. He applied the term unconditioned stimulus (UCS) to the food in the mouth, which elicited the inborn unconditioned response (UCR), salivation. He demonstrated that after repeated occasions on which a bell was sounded immediately before the food was placed in the dog's mouth. The bell alone came to produce the increased flow of saliva. Pavlov called this change in the animal's behaviour a conditioned reflex or conditioned response (CR); the previously "neutral" stimulus, the bell, had become a conditioned stimulus (CS) by virtue, of having been presented with the food. A neutral stimulus is one that before conditioning does not produce the response that the investigator is seeking. It may, of course, produce other presences, such as pricking up the ears or turning the head.

Any stimulus that elicits an inborn response may be used as an unconditioned stimulus in a classical conditioning procedure. In the case of the meat powder, the stimulus is a pleasant one, but an aversive stimulus is a pleasant one, an aversive stimulus may be used instead. For example, if the bell is followed by an electric shock to the paw, the unconditioned response to the stimulus a flexion of the paw soon comes to be elicited by the bell alone.

Pavlov's studies have had a widespread influence on the development of psychological thought. The process of conditioning has since been demonstrated experimentally in countless experiments with both animal and human subjects, and the conditioned response has become a fundamental concept in modern psychology.

8.4.4 Extinction and Recovery

Two other important phenomena discovered in Pavlov's investigations were experimental extinction and spontaneous recovery. As long as the dog was given food after the sound of the bell, his salivary response to the bell continued. But repeated soundings of the bell without reinforcement (the presentation of food) resulted in the gradual disappearance of the contained response, a phenomenon known as experimental extinction. When the dog was allowed to rest for a day after intense extinction training, however, salivation again occurred at the sounding of the bell. The conditioned response was recovered "spontaneously". But on this second day, with continued lack of reinforcement, the point of zero salivation was reached in fewer frails; and within a few more days. The unrewarded trails resulted in permanent extinction of the conditioned response. Without such extinction training, a dog might retain the conditioned response for three or four months with little decrease in its strength.

8.4.5 Conditioning Paradigms

Five different paradigms have been used in conditioning studies. These procedures, representing the varied ways in which a CS can be paired with the UCS, are not equally effective. The delayed conditioning paradigm usually is the most effective; the backward conditioning, the least effective.

(a) Delayed Conditioning

In delayed conditioning, CS on-set precedes UCS on-set. The termination of the CS occurs either with UCS onset or during UCS presentation. If, for instance, a darkening sky precedes a severe storm, this situation is an example of delayed conditioning. The darkening sky is the CS; its occurrence precedes the storm and it remains present until the storm occurs. Having experienced this type of conditioning, a person will be quite frightened whenever he or she sees a darkened sky.

(b) Trace Conditioning

With this conditioning paradigm, the CS is presented and terminated prior to UCS onset. A parent, who calls a child to dinner is using a trace conditioning procedure. In this example the announcement of dinner (CS) terminates prior to the presentation of food (UCS). As we will discover in the next section, hunger developed with this paradigm can be quite weak unless the interval between CS termination and onset is very short.

(c) Simultaneous Conditioning

The CS and UCS are presented together when the simultaneous conditioning paradigm is used. The example may be when you enter and walk into the fast food restaurant, in this setting, the restaurant (CS) and the food (CS) occur at the same time. And probably it would lead to weak hunger conditioned to the restaurant.

(d) Backward Conditioning

In Backward Conditioning paradigm, the UCS is presented and terminated prior to the CS.

(e) Temporal Conditioning

There is no distinctive CS in temporal conditioning. Instead the UCS is presented in regular intervals, and over time the CR will be exhibited just prior to the onset of the UCS. To show the conditioning has occurred, the UCS is omitted and the strength of CR Assessed. What mechanism allow for temporal conditioning? In temporal conditioning, a biological state provides the CS. When the same internal state precedes each UCS exposure, that state will be conditioned to elicit the CR.

Consider the following example for temporal conditioning procedure. You set your alarm to awaken you at 7.00 am for an 8.00 am class. After several months you will find that you awaken prior to the sound of alarm. Your internal state present every day just before the alarm rings (CS) become condition to produce arousal; this arousal (CR) awakens you prior to the alarm's sounding.

8.4.6 Connectionism Theory by E.L. Thorndike

Thorndike viewed learning as a series of stimulus-response (S-R) connection, or bonds. His theories of learning describe the ways in which these (S-R) connections could be strengthened or weakened. He felt that learning was basically a trial-and-error enterprise, and he paid little attention to the possibility of concept formation or thinking.

Thorndike's Puzzle-Box Studies: Around 1900, Edward L. Thorndike conducted a series of studies on animal intelligence, a number of them involving cats in puzzle boxes. The general features of the research situation were as follows.

A hungry cat was placed in a cage with food placed outside the cage, which was so constructed that the door to the cage could be opened by pulling a string somewhere in the cage. Typically, the cat would make a direct and futile attempt to get the food by typing to squeeze through the bars, clawing at the string, and generally engaging in a fair amount of clawing and striking all over the cage. Given enough of such activity, the cat would eventually claw the string, thus opening the door and enabling the cat to get the food. When placed in the cage again after a time, the cat would behave quite similarly to its behaviour on the first occasion, clawing and striking about and eventually getting the door open. Over repeated trials in the puzzle box, the cat would gradually restrict its activity to the area containing the string and, only after a considerable number of trails, would eventually go directly to the string when placed in the cage observations and open the door. These observations led Thorndike to propose that problem solving is a matter of trial and error, with successful response gradually "stamped-in" and unsuccessful responses "stamped-out". There seemed to be no reason to attribute to the animal any insight, reasoning, or understanding of the situation, rather it appeared that the psychologist's task was to identify the principles underlying the strengthening and weakening of various responses to a stimulus situation.

Three Major Laws

Thorndike postulated three major laws of learning:

(i) The Law of Readiness

When an organism is in a state in which the conduction units (S-R connections) are ready to conduct, then the conduction is satisfying. If the conduction unit is not ready to conduct, then conduction is annoying. Thorndike was referring to a more momentary phenomenon, a kind of neurologically teachable moment.

(ii) The Law of Effect

This was by far Thorndike's most important law. It states that an S-R connection followed by satisfaction (reward) is strengthened. Also a connection followed by annoyance (punishment) is weakened. He came to feel that reward strengthened learning far more than punishment weakened it. His evidence for changing his position on this issue was, to say the least, rather flimsy. It was based on a study of symbolic reward and punishment, where the reward consisted of saying "Right" and the punishment consisted of saying "wrong" to the students. The results might have been quite different if the reward had been a candy bar and the punishment a mild electric shock.

8.4.7 Edwin Guthrie: Behaviourist Associationist

The last of the early associationists was Edwin Guthrie. Guthrie was the behaviourist-associationist par excellence. Following directly in Waston's footsteps, he rejected any psychological concept that might have "mentalistic" overtones. He postulated one law of learning: learning by association or, as he called it, contiguity. According to Guthrie, if a certain stimulus (or pattern of stimuli) is followed by a response, then the next time that stimulus appears, the same response will follow. That's all there is to it stimuli and responses in sequence. There is no need to call on reward, reinforcement, or "effect" in order to explain how learning occurs. He also believed that learning occurs the first time the stimulus and response become associated.

To create conditions that will promote learning, Guthrie believed that the teacher should provide the stimulus and the student should respond. For example, the teacher might point to a map and the students would then reply with the name of the city. The important thing was for the appropriate stimulus to be presented before the desired response occurred.

A frenzied mother once brought her child to Guithrie. The child had been in the habit, on coming home from school, opening the door of his home, taking off his coat, and throwing it on the floor. The mother told Guthrie that no matter how many times she told her child to pick up coat and hang it in the closet, the child continued this behaviour. Guthrie did not reach for any deep psychological explanation, like finding out what throwing the coat on the floor symbolized, what it "meant" to the child. He simply told the mother to rearrange the stimulus response sequence. When the child throws his coat on the floor, he should not be told to hang it up. He should instead be told to put the coat on, go back outside, come through the door and, only then, hang up the coat. Thus hanging up the coat could become a response to the stimulus of entering the house, rather than to the stimulus of the mother's command. "Take your coat off the floor and hang it up".

The advice apparently worked, for then on the child hung up his coat correctly. Fortunately for Guthrie, and especially for the child, longer sequence of S-R associations did not form that is according to Guthrie's system, the child might have forever learned to come home, open the door, throw the coat on the floor, pick it up, put it on, go back outside, come back in, their hang up the coat!

8.5 COGNITIVE THEORIES OF LEARNING

Include one's ideas, beliefs, thoughts and images. When we know, understand or remember something, we use cognition to do so. Cognitive processes are mental activities that involve forming, manipulating and using cognition or cognition is a term used to describe all of our mental processes such as perceptions, memory and judgment.

Cognitive approaches to learning emphasize changes that occur within an organism's system of cognition. Its mental representation of itself and the world cognitive learning involves the acquisition of knowledge or understanding and need not be directly reflected in behaviour. As the most important mental process is thinking and cognitivists focus most of their attention on studying how people think. In cognitive theories, however thinking plays the central role.

8.5.1 Max Wertheinmer: Gestalt Psychology

Max Wertheimer, founded the school of psychology called Gestalism, or Configuration. Wertheimer insisted that it was useless to study small parts of psychological concepts, like perception or learning. Studying parts in isolation was unjustified, because changing any singly part necessarily changes the whole. Similarly, the whole may remain, even when all the parts have changed. For example, if we play a tune in two different keys, even though the individual notes are different each time, the tune retains its integrity.
Wertheimer was concerned with the way children learn, particularly in school. He was against the use of rote memorization, especially when it so often seemed to be an end in itself. Above all else, he wanted children to achieve understanding, to have insight into the nature of the problem.

8.5.2 Wolfgang Kohler: Learning by Insight

Wolfgang Kohler, who had worked with Wertheimer at the University of Frankfurt, spent a few years during World War I on the island of Tenerife, off the coast of Africa. There he performed Gestalt psychology's most famous animal studies. Kohler arranged an ape's cage so that there were bananas hanging from the top a couple of boxes on the floor. In order to reach the bananas, the ape had to stack one box on top of another and then climb to the top. The ape's solution to the problem appeared to Kohler not to be one of blind trial and error. Instead, the ape seemed to size up the situation and almost in a flash, it understood the problem and "saw" the solution. The ape displayed what Kohler called insight, and Kohler felt that this was more typical of learning especially human learning, than Thorndike's concept of blind trial and error.

In another experiment, Kohler put food outside the cage, beyond even an ape's long reach. Inside the cage, however, there were some sticks. At first the apes would throw the sticks at banana. Then they "realized" that by using the stick as a kind of tool they could reach out and rake the banana in one, especially intelligent ape, named Sultan, were even able to join two short sticks together to rake the food in.

Kohler explanation was that the apes were able to see problem as unified whole. In the box stacking problem, the ape did not see the boxes and bananas as separate elements but came to realize that they belonged together as part of a whole. Similarly the sticks and bananas were perceived as belonging together, and it was only after this reorganization of perceptions that insight into the solution to the problem occurred.

Insight has been called the "a-ha" phenomenon. Kohler made much of the concept of insight, perhaps too much. He felt that insight learning did not depend on past experience, that it was not just a special case of transfer.

8.5.3 Summary

Association Learning and Cognitive Learning

Now that the dust has settled on some of the great theoretical debates of the past, two main schools of thought on learning have emerged, though many variations still exist. These two main schools of thought are association learning and cognitive learning.

Association theorists, on the one band, see learning as the result of connection (Associations) between stimuli (Sense impression) and responses, Dogs salivating When they hear the can opener opening their food, babies waving "bye-bye" on cue from their mothers, or fifth graders saying "seventy-two" to the stimulus "nine times eight" are all examples of association learning. A bond has been formed between two elements, a stimulus and a response.

Cognitive theorists, on the other hands, view learning as a recognition of a number of perception. This reorganization allows the learner to perceive new relationship, solve new problems and gain a basic understanding of a subject area. A fifth grade suddenly realizing that multiplication is successive addition; an ape suddenly understanding that by putting two short sticks together, a banana that was out of reach is now obtainable; or an eighth grader discovering a way to calculate the area of a parallelogram, these are all examples of cognitive learning.

These two views of learning parallel the two sides of another controversy that has historically split the field of psychology. The behaviorists have typically been associationists, whereas the gestaltists have been cognitive theorists.

8.5.4 Activities

1. **Define Associationism:**

_____
_____
_____
_____

2. **How extinction takes place in classical conditioning**

_____
_____
_____
_____

3. **Enlist laws of learning:**

(i) _____
(ii) _____
(iii) _____

4. **Why S-R is important for learning:**

_____
_____
_____

5. **Define cognitive process:**

_____
_____
_____

6. **Gestalt psychology is a combination of:**

(i) _____
(ii) _____
(iii) _____

7. **Differentiate between associative and cognitive learning:**

_____
_____
_____
_____
_____

8.6 SELF-ASSESSMENT QUESTIONS

1. Define Conditioning. Explain the conditioning process explained by Ivon Pavlov.

2. What do you understand by S-R. Theory and how it can help in classroom teaching?

3. What is cognition, explain the theories of cognition?

4. Differentiate between the associative learning theories and cognitive learning theories?

5. Explain the role of associative and cognitive learning theories in teaching?

6. Gestalt Psychology is important for learning. Discuss?

7. Cognitive learning theories are important for intelligence. Justify your answer with arguments.

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Unit–9

INDIVIDUAL DIFFERENCES

9.1 OBJECTIVES

When you have gone through this unit, you should be able to:-

1. Elaborate the meaning and nature of individual differences.
2. Bifurcate the areas of individual differences.
3. Identify the causes of individual differences.
4. Provide remedial measures for individual differences through general educational provisions and special educational provisions.
5. Take care of slow learners and finally be able to measure individual difference through various evaluation tests and techniques.

9.2 OVERVIEW

As you look within yourself and or the people around you, you realize that you are a very special and unique being. Nobody else in the world is quite like you. Nobody else in the world has the same physiological equipment, the same genetic code (unless of course you are an identical twin) or has experienced the same sequence of life situations. Nobody else use the identical blend defense mechanisms that you use when encountering stress and nobody else is guided by the exact mixture of motives, attitudes, and feelings. Thus one of the basic themes of physiological is that of individual differences. No one is exactly like anyone else. Except n terms of the needs of the human species, that you eat, drink, breathe, sleep, exercise and require same physiological needs. The difference that occurs amongst children of the same age is in then maturational and learning processes. The task of the school is to provide for the common needs of the students with taking into account the unique characteristics of each individual. No easy situation to the task has yet been found, however, knowledge about the kind of difference is becoming more complete.

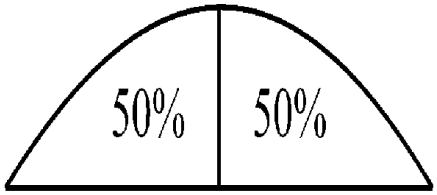
In this unit we shall examine the following aspects of individual differences.

(a) Meaning and Nature of Individual Differences.
(b) Cause of Individual Differences.
(c) Educational Provisions.
(d) Measurement of Individual Difference.

9.3 MEANING AND NATURE OF INDIVIDUAL DIFFERENCES

Experimental psychology has thrown adequate light on the nature and extent of individual difference; the findings of modern psychological tests and measurements have amply demonstrated that individual cannot fall into distinct categories in respect of any physical or mental trait. On the other hands all measures of individual, whether they be

physical, mental, emotional or some other show that they tend to distribute themselves according to the law of the normal probability curve.



Normal Probability Curve

Source: *Google image*

The normal curve is bell shaped and bilaterally symmetrical on each side of its central tendency the mean. Just as many persons are above the average as are below it, starting with the lowest score there is a gradually increasing number of persons making each next higher score gradually decreases until the highest score is reached. For example, the following table indicates the distribution of intelligence according to the normal probability curve.

Table-1: Percentage Distribution of IQs in Term An-Merrill Standardization Group

S. #	Intelligence Quotient (IQ)	Percentage of Cases Occurring
1.	150+	0.2
2.	140-149	1.1
3.	130-139	3.1
4.	120-129	8.2
5.	110-119	18.1
6.	100-109	23.5
7.	90-99	23.0
8.	80-99	14.5
9.	70-79	5.6
10.	60-69	2.0
11.	50-59	0.4
12.	Below 50	0.2

Source: *Adapted from Maud. A. Merril, "significance of IQ on the revised standard binet scales" Journal of education psychology 29, 1938, 641-51.*

Individuals not only differ among themselves with respect to a specific trait but differences may also be noticed within the same individual when he is studied in respect of various traits. Difference may also be noticed in the same individual with respect to this performance of a particular task at different time. Runners differ in running the same distance say 2km. The same runner may cover the same distance taking different times on different occasions. Thus there are inter-individual differences and the intra-individual differences, and both must be considered in studying individual differences.

9.3.1 Areas of Individual Differences

Individuals differ almost in every respect. They differ in physical as well as psychological characteristics. Some of the major areas in which they differ and which affect their personality growth to a large extent are age, height weight, sensory and motor powers, intelligence aptitudes or specific abilities, interest attitudes, appreciations and educational attainments. They also differ in their hereditary, family background and environmental influences.

i. Chronological Age

One of the general factor of difference that influences school grading is chronological age. A child enters school at a certain age, 6 years, and is supposed to progress regularly in his schooling in terms of age factor. It is assumed moreover, that all children should be able to profit similarly from instructions that is the same or nearly the same in content and method of presentation for all learners on the respective grade levels. Apparent in ability on the part of a learner to master study material is explained in terms of factors such as laziness or stubbornness, that fail to take into consideration the factor that learners differ in their ability to perform in any one or more areas of learning material and at any one stage of development.

Chronological age as it represents the learners level of maturity and hence his possible education, is and should be a factor of difference. No matter how superior mentally or physically a child of three may be, he cannot be expected, because of difference in degree of maturity to engage in learning activities that are suitable for the nine year old. Further, readiness to engage in a particular learning situation may differ from individual to individual on any age level.

ii. Intellectual Abilities

Views about the nature of intellectual abilities continue to change. For many decades the idea of a general intellectual ability was very popular. Then, the idea of a few primary mental abilities was added. Next, a structure of some specific abilities was proposed. At present, a major attempt is being made to identify the basic mental processes and learning strategies that underlie intellectual performances. The testing of intelligence began on a widespread basis in 1916 in the United States when Terman (1916) adopted the earlier version of an intelligence test by 'Binet" and "Siman". Terman thought of **intelligence** as the ability to carry on abstract thinking Thorndike (1926) defined **intelligence** as the ability to make good responses from the point of view of truth or fact.

Wechsler (1958) developed on intelligence test to measure the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with the environment. The Wechsler Scale included performance test as well as typical verbal and mathematical test. Jone Miller and Moodie (1934) conceived of **Intelligence** as in born whereas Hunt (1961) viewed it as almost totally determined by environmental condition. "Terman" regarded **Intelligence** is determined almost solely by heredity. Accordingly, he believed that the rate of intellectual development was fixed by heredity and therefore did not change from birth onwards. Cattel (1971) proposed two kind of

general intelligence, fluid and crystallized. **Fluid Intelligence** is genetically determined and sets the upper limit of the individual's ability. How well the inherited ability is used and what forms it takes depend on cultural factors including learning.

iii. Crystallized Intelligence is based on environmental factors, and its observable expression is based on learning. Accordingly, Fluid ability is necessary, but it is not sufficient for the development of Crystallized intelligence. Moreover, Fluid intelligence peaks at about age 25, but Crystallized intelligence continues to rise as long as person continue to learn.

iv. Primary Mental Abilities

Thurstone (1938) identified seven primary mental abilities, and devised tests to measure them. The seven primary mental abilities are shown in table 2.

Thurstone's identification of primary mental abilities refutes the idea underlying general intellectual ability that persons are equally able in all academic areas. Instead, most individuals vary markedly in verbal, numerical, spatial and other abilities. For example it is possible for a student to be in the top one-fourth of the students of the same grade in one ability, such as spatial, or mathematical, and to be in the bottom one-fourth of the same students in another ability such as word fluency or perceptual speed. The primary abilities emerge and reach full functional maturity at different rates. For example, perceptual seed approaches full functional maturity corresponding to that of adult status by age 20, Whereas word fluency and verbal comprehension only reach such a level, respectively, of about 60% and 80% of adult status and by 20% our verbal growth continues after we have peaked in perception; speed.

Table-2: Primary Mental Abilities

S. #	Ability	Description
1	Verbal Comprehension	The ability to understand the meaning of words vocabulary test represent this factor.
2	Word Fluency	The ability to think of words rapidly, as in staving anagrams or thing of words that rhyme.
3	Number	The ability to work with numbers and perform computations
4	Spatial	The ability to visualize space-from relationships, as in recognizing the same figure presented in different orientations.
5	Memory	The ability to recall verbal stimuli, such as word pairs or sentences.
6	Perceptual Speed	The ability to grasp visual details quickly and to see similarities and differences between pictured objects.
7	Reasoning	The ability to find a general rule on the basis of presented instance, as in determining how a number series in constructed after being presented with only a portion of that series.

Guildford proposes three types of intelligence, each associated with different contents. **Concrete intelligence** involves figured content of mechanics, operators of machines, architects, artists etc.

(i) **Abstract Intelligence:** Requires the processing of symbolic and semantic content. Learning to recognize words, to spell, to operate with numbers, and to understand verbal and mathematical concepts involves abstract intelligence, the present day tests measure abstract intelligence.

(ii) **Social Intelligence:** Pertains to behaviour content, that is awareness and feelings regarding the behaviour of other and oneself teachers, social workers and political leaders require higher social intelligence than many other professional groups.

(iii) **Special Abilities:** Since learning on the elementary levels is concerned with the mastery of learning tools, the discovery of the extent to which a child may posses a special ability or aptitude is not so important during the early years of his schooling as it will be later. On the junior and senior high school and college levels provision needs to be made for the development of whatever aptitudes the individual learners may possess of music, art, physical education etc.

Differences in Readiness for Learning

Children of the same age are not necessarily at the same stage of readiness to learn. Differences are caused not only by variation in state of maturing but also by differences in previous learning background. Six years olds who enter the first grade may differ by one, two, or even three years in degree of readiness to profit from formal education. For example it has been found that the mental ages of the members of an entering first grade class may range between that of a three-years old and that of an eight years old. This means that although the chronological ages of the children may centre around six years, their stage of mental maturity (mental age) varies by five years. Also, pre-school home experiences may be such as to encourage the development of some children more than that of others.

Perhaps in no other field of learning, readiness to a learning is more important than it is in reading. The ability to adequate thought from the printed page is essential to success on all school levels as well as to proficiency in the higher forms of specialized learning. One of the most significant aims of fundamental education is to prepare the child to master the tools of reading during his elementary school training so that he may be prepared to extend his knowledge in the various areas of higher learning on the result of his acquired ability to understand and apply content of written material.

Differences in Motor Ability

Persons of any age differ in their ability to perform in activities that are preeminently motor. In general, motor coordination and ability to perform successfully in the more complex motor skills increase with age as maturity brings with it the more complex motor skills increase with age as maturity brings with it the power of sustained attention, muscular coordination, speed of performance, steadiness of control, and resistance to fatigue.

Psychological (Sex Differences)
Maccoby (1966) reviewed approximately 1600 studies that provided some information about psychological differences between males – females. Subsequently, Maccoby and Jacklin (1974) arrived at three kinds of conclusions regarding sex differences.

i) Widely confirmed differences
ii) Questionable differences
iii) And unfounded differences

Differences Confirmed by MacCoby and Jacklin/Block
Girls are higher than boys in verbal abilities, such as reading, vocabulary comprehension and spelling. Boys are higher than girls in spatial abilities, quantitative abilities and aggressiveness. Girls are higher than boys in tactile sensitivity in expressing fear, in seeking help and assurance, in maintaining closer proximity to friends are more anxious, have lower task confidence and are more compliant with adults of younger age.

Boys are higher than girls in solving problems, are more dominant, have a stinger self-concept, are more active and are more impulsive.

All these conclusions are based on the average of test scores / other performances of different groups of boys and girls used in the various studies. The conclusions give no indication of the amount of the difference between the boys and girls or of the percentage of one sex that was higher than the average of the other sex.

Social Class Differences
Social class is indicated by the status given to group of persons in a society by other persons of the same society. Warner, Havighurst, and Loeb (1944) found that person of a large community could be classified in to the following six socio class group: upper, upper-middle, middle-lower, upper-lower, and lower-lower. Social-economic status of the family, as measured by income, occupation of parents, and amount of education of parents, was found to be an important determinants of social class. These criteria are generally used in determining an individual's social class today.

Within any group of learners, differences in social background can be found that facilitate or retard achievement regardless of individual potentiality to master material. The learning experiences in which the child engages or has engaged in his home affect his willingness to participate in a present learning situation. Individual interests, attitude toward school and towards particular school subjects (sometimes developed as a result of attitudes at home or in the neighborhood environment), habits of cooperation or non-cooperation, ability or willingness to concentrate on learning material, and acquired study habits-all constitute factors of difference among learners.

The amount and kind of previous experiences and knowledge that the individual brings to a specific learning situation have much to do with his capacity for further study or his attitude towards it. If the learner feels that he already know much of the study contents of

a specific course, he may lose interest in it, and fail to gain from further instruction. Hence, poor study habits are developed in learners, which may result in his failure to master the new material of the course.

Home condition, contribute significantly to educational achievement factors in the family (homes which are found to rear cognitive development are less favourable parental attitudes towards school and education lower parental expectations for their children and a less favourable in electoral climate of the home.

Racial and Ethnic Differences

Differences in abilities amongst racial and ethnic groups have not yet been studied sufficiently for the formulation of a general conclusion that will cover all cases. Factors other than individual ability to master learning material may very easily affect the results of studies and measurements, moreover, cross-marriages that have occurred for many generation between persons of different racial and ethnic groups may hamper clear delineation.

9.3.2 Causes of Individual Differences

There are some psychologists who hold the view that the cause of individual differences or psychological differences is inherited. These psychologists are called the HEREDITARIANS or TRADITIONALISTS. On other hand there are some environmentalists or progressivists who are of the opinion that environment is the sole factor in the development of intelligence. As a teacher, one should not accept any one of these two viewpoints without examining their relative importance. If a teacher believes that environment is the complete force and that heredity is little or nothing, then, his efforts will be directed almost equally for all children. In that way he will misdirect much of his energy. There are teachers who believe that "every child is a diamond in raw who needs only polishing in order to reflect the light of intelligence. If a teacher believes that children differ in respect of their potentialities he will feel that his efforts will bring different results with different pupils and he will have different expectations for different pupils. Such teachers believe that a child will develop in the direction determined by his heredity and that the guidance and learning by parents and teachers matter very little. A teacher with such beliefs will miss many opportunities to develop the extent capacities of his pupils. It is therefore, necessary to examine various causes of individual differences, so as to arrive at a proper understanding of the problem. To prove that intelligence is due to heredity or an environment is not possible and can only be estimated indirectly since the two factors are interactive from the moment of conception. The main indirect lines of evidence have come from the study of family trees. Twin studies and others reared together and apart.

Galton's Study

Sir Francis Galton was the first to study the possible relationship between intelligence and heredity. Galton first demonstrated that there is a great deal of individual variation in intelligence. That all people are not equally bright or capable. They also tried to show that these differences in mental ability were largely inherited, mostly by arguing that eminent men tended to be related to one another. As evidence, he presented the family

trees of prominent men in the fields of law, science, art and the military, indicating that greatness ran in certain families.

Goddard's Study

H.H. Godded studied the Kallikak family. A Certain Martin Kallikak (false name) had children by two women; one was feeble-minded, the other was of normal intelligence. The feeble minded mother gave rise to a high proportion of feeble-minded descendants, while the mother with normal intelligence had no feeble-minded children at all.

Since late 1960's, a large number of studies have been conducted on development of intelligence. Investigators have tried to find out the correlation of IQ's of identical twins reared together, identical twins reared apart, children and their true parents, foster children and their foster parents, sibling, and unrelated children.

Table-3: IQ Correlation for Different Blood Relationships

S. #	Relationship	Correlation
1.	Unrelated Children Reared Apart	0.01
2.	Unrelated Children Reared Together	0.23
3.	Foster Parent Child	0.20
4.	Parent – Child	0.50
5.	Siblings	0.49
6.	Fraternal Twins	0.53
7.	Identical Twins Reared Apart	0.75
8.	Identical Twins Reared Together	0.87

Kimling and Jarvik's Study

Erlenmeyer Kimling and Jarvik (1963) studied the IQ correlations for different blood relationships. The findings of their study are presented in table 4.

Interpretations of the Findings

(i) If heredity is an important influence on intelligence, then arbitrarily picked pairs of people who are not related biologically and who do not interact socially will not be similar in IQ at all. The correlation of IQ scores of many such pairs will average about O. This has been proved by Kimling-Jarvik.

(ii) If environment is an important influence on intelligence then unrelated children reared in the same environment should be similar in IQ to some extent. The findings of Erlenmeyer, etc; indicate that the correlation of IQs of unrelated children reared in the same home is 0.20.

(iii) If heredity is important for the development of intelligence, then children's IQ will correlate with those of their true parents. This fact comes true when we examine the findings of Erlenmeyer.

(iv) If heredity is important, then the correlation of IQs of children and their true parents should be higher than the correlation of IQs of children and their foster parents. This is also true. (Parent-child = 0.50' foster – Parent and child = 0.20)

(v) Since foster father and foster children have different heredity, a positive correlation of their IQs indicates the role of environment. A positive correlation of IQs of biological parents and their children (0.50) also indicates the influence of environment on intelligence. For example both parents of a particular child will have very high IQs and that their child's IQ will also be quite high. On the other hand, another set of parents may both have low IQs and so may have children. In these two cases, the transmission, though biological, may be also social at the same time. The child who has bright parents may have been exposed to a large vocabulary and a highly stimulating environment; he may also have been turned by his parents in basic intellectual skills. These experiences could readily help him achieve a high IQ while the children of dull parents could have been reared in an intellectually impoverished environment, thus leading to a low IQ.

(vi) If heredity is more important, then the IQs of identical twins should be more similar than those of fraternal twins. Identical twins have identical heredity, whereas fraternal twins may be as dissimilar as two siblings born to the same parents at different times. For this purpose the correlations of IQs of identical twins are higher than the correlations of IQs of fraternal twins. This can be seen from the findings of Erlenmeyer.

(vii) If environment is an important influence on intelligence, then identical twins reared together should be more similar in intelligence than identical twins reared apart. Identical twins who are reared together have identical heredity and similar environments. By contrast, identical twins reared apart have identical heredity but different environments. For this purpose, identical twins reared together have very high correlation of their IQs (0.87 Erlenmeyer) than identical twins reared apart 0.75.

(viii) In Conclusion, we can say that both heredity and environment are potent factors which cause individual differences in intelligence. The same is also true for other affective and cognitive characteristics. Intelligence is not the result of inheritance only, nor is it due to environmental influence and experiences. However, heredity does determine the mental ability/abilities of individual to an un-specifiable extent. Arthur Jensen (1969) says that intelligence is 80 percent inherited. Based on studies conducted over the past 50 years, Jensen concludes that genetic elements are for more important than environmental influences in explaining individual differences in IQ. But Jensen's conclusions were debated and a search is being made about the

role of early experiences in the intellectual development of children. We can also not forego environmental conditions that influence intellectual development. Nutrition, health, stimulation, emotional and intellectual climate and early education are important determinants of intelligence. Given two infants with the same genes, the one receiving better nutrition, health care, intellectual stimulation enriched home environments / pre-school education will score higher on an IQ test when entering the first grade. Therefore a person's intelligence / differences are dependent upon the continual interaction of heredity and environment.

9.3.3 Educational Provisions

Whatever may be the causes, children differ in their learning abilities. It is the duty and responsibility of any school system to provide for these differences so that every child is helped to rise to a height quite commensurating with his own abilities. The following are a few of the important steps that a school might take up in this direction.

9.3.4 General Provisions

(1) Every Individual's ability should be assessed as accurately as possible. Since individual possess cognitive and psychomotor abilities ranging from a very low to a very high degree and since they do not fall into distinct types, it becomes difficult to locate the exact standing of a child. Hence it is imperative that the abilities of children should be accurately assessed. The more reliable is the assessment; the better will be the provision. We must remember that ability is the capability to perform tasks, and a style refers to the Learner's preferred mode / desired conditions of learning, such as preferring to acquire information visually rather than orally and requiring quietness when studying, rather than tolerating sound, such as background music or other persons talking. Cognitive styles refer to how one perceives, or cognizes situations. Dunn and Dunn (1978) identified student's needs / preferences, or learning styles when studying. They also identified ways to adapt the physical environment of the classroom and instructional approaches to student's need. There are four major areas of learning needs/preferences or styles. The four areas involve (i) the student's environment for learning. (ii) the student's motivation (iii) the sociological aspects of the learning environment (iv) and the student's physical needs.

A Checklist of learning needs based on Dunn and Dunn is reproduced below. Teacher can mentally check the ones they correspond to the way the student's preferred.

Table-4: Checklist of Learning Preferences

Environmental Conditions of Learner	
1.	Needs Quietness or Tolerates Sound
2.	Requires Bright Light or Requires Low Light
3.	Needs Cool Environment or Needs Warm Environment
4.	Requires formal design of furniture such as a Desk/Chair or Requires Informal Design that Permits.
Motivational States of The Individual/Learner	
5.	Self-Motivated or Unmotivated
6.	Persistent or Not Persistent
7.	Responsible or Not Very Responsible
8.	Needs Structured Learning Conditions as Specific Assignments and Rules or Need little Structure.
Sociological Preference of Learners	
9.	Prefers Learning Alone or Prefers Learning With One Peer. Prefers Learning With Two Peers or Several Peers. Prefers Learning With Adults or Prefers Learning Through Several Ways.
Physical Needs	
10.	Has Auditory Preference Has Visual Preference Has Tactile Preference Has Kinesthetic Preference
11.	Require Food Intake Such as Nibbling Food or Sipping Soft Drinks or Does Not Require Food Intake
12	Functions Best in Morning or Late Morning or After Noon, or Evening
13.	Needs Mobility e.g. To More About or Does Not Need Mobility

Next we come to a very important learning preference / mode called as **Cognitive Style.** Teacher's current with it will be able to assess the academic and social behaviour of an individual. A cognitive style is a identified learning styles, based upon the review of the literature, into two cognitive styles.

(a) Reflective Versus Impulsive
(b) Field-Dependence Versus Field-Independence

Persons with an **impulsive style** react quickly to situations. They give answer quickly without thinking through the situation first and tend to make errors by responding quickly. Persons with a reflective style react in opposite patterns.

Field-independent and field-dependent styles were identified by Witkin (1949). The basic difference between the field-independent and field style is in perceiving and ordering the stimulus world. The field independent person tends to restructure environmental situations. The field dependent person tends not to restructure situations but to accept them as experienced. The effects of these basic differences are reflected in many ways that are of interest to education.

S. #	Field Dependent Persons	Field Independent Persons
1.	They are attentive to social cues, accept other people readily, and like to be with people.	They are less attentive to social cures and prefer to work with ideas and abstract principle.
2.	They get along with other.	They have fewer warm, interpersonal relations.
3.	They tend to be interested in social studies.	They are more interested in mathematics and science they learn well.
4.	They learn abstract concepts with difficulty	They learn abstracted concept well.
5.	They require more externally defined goals and extrinsic rewards.	They set their own goals, find desired consequences of achieving their goals and do not require extend reinforcement?
6.	Art students with informal art style.	Art students with formal art style.

A Good environment and proper education are necessary

Though heredity is important in determining eventual adult, performance and environment also plays a vital role as demonstrated by experiments. Hence a good environment and proper education are necessary for all. Younger children must have rich opportunities to express themselves and they must have proper guidance for their emerging abilities.

(2) Identification of special talents

We need to spend considerably more efforts than being done at present in identifying abilities stating early in school years with the help of standardized tests. Such identification will be more authentic. The identified talents should be properly nurtured.

(3) Educational provisions must be continuous

In order to provide well for children of the entire range of abilities, educational provisions must be continuous. The continuity must be ensured, especially when children pass from one stage of education to another or from one school system to another.

(4) Adequate facilities and materials are needed

Bright children need some instructional materials more advanced than those for the other children. The slow learners also require reading materials different from the rest of the group. The sensory handicapped and emotionally disturbed children also require special material, equipment and space. In order to provide well for individual differences every school should be properly equipped with such facilities and materials as will be needed for all kinds of children.

(5) Competent school staff is needed

Even the best facilities of education of children cannot be better than the school personnel doing the work. Hence society should recognize the importance of well educated and competent school staff and give necessary financial support to schools. Every school

should have competent teacher's school psychologist, curriculum supervisors and administrators.

(6) Individualization is necessary

The principal means of providing for individual differences is individualization of instruction where every individual is allowed to work independently, Dalton Plan, Winnekta Plan, assignments, directed or supervised study, proper use of the library period conduction individuals experiments in the science laboratory and club activities are some of the methods of encouraging individual work.

(a) The Dalton's Plan

Initiated by Helen Parkhurst, the Dalton plan stressed the principles of freedom and group interaction. According to the Dalton Plan, the school is to be regarded as a "house", traditional classrooms become laboratories in which the function of the teacher is that of preserving "an atmosphere of study." The teacher suggests activities, answers questions, and holds conferences with the learners as these are desired by them. The learner's assignments may spread over an entire month. The learner is free to prepare his assignments in his own way with the help of the teachers, who guides him in the budgeting of his time and who, as well as the pupils, keep "graphs of his daily progress". Opportunity is also provided for group discussion on literary, historical and similar other socializing influences.

(b) The Winnetka Plan

Credit for this plan of individualization type of instruction goes to Carleton Washburne, of Winnetka, Illinois. The educational philosophy underlying this plan is that a learner should be allowed to follow his own rate of learning in each of the subject fields comprise his full curriculum. Basic to carrying out of the plan is the need of discovering the individual's stage of learning for each subject and of building upon that rather than having him lack step with a group of learners who differ from him in stage of learning readiness. This plan necessitates the administration of examinations before a specific learning unit is undertaken in order to discover what that individual already knows.

The Dalton Plan, which keeps the learner at the same level on all subjects, the Winnetka plan allows the child to proceed at different rates in different areas. He might be a year ahead in arithmetic and six months ahead in reading. Learning units are arranged in the form of tasks/goals. Progress is checked by the learner himself by means of self administered tests. According to this plan there would be no failure since the child is measured against his own progress rather than in terms of the achievement of other learner. There is no skipping for the bright learner, but he does all the work in less time. The slower learner also completes his work but in longer time.

(c) Homogeneous Grouping

In order to effectively deal with children of varying abilities, one of the best methods is to divide them into groups of homogeneous ability and treat them

separately by means of differentiated curricula and method of instruction. There are various forms of grouping practiced in American schools. Such as friendship grouping, interest grouping, achievement level grouping etc. but the most common and effective method is differential ability grouping. Recently mixed ability grouping has been introduced in school of UK.

(7) Need of Adult Education

The concept of individual difference has also an implication for adult education. Parents must receive training in sound preparation in regard to psychological needs and nature of children.

9.3.5 Special Provisions

(a) Provisions For the Gifted / Talented Children

Marlance (1971) defined gifted and talented children as those with high demonstrated achievement and / or high potential ability in any one of the following areas.

a. General intellectual ability
b. Specified academic aptitude
c. Creative, productive thinking
d. Leadership
e. Visual and performing arts
f. Psychomotor skills

This definition has been widely used, but required some elaboration. A gifted student is one who is high in general intellectual ability and in achievement in several areas such as mathematics, science, and English. Generally, a child who possesses IQ of 140 or above and is superior in most areas of the school life or promises to be so is called a gifted child, strangely enough the gifted are forgotten students in the class. Because they are able to take care of themselves academically, they get less attention from the teacher. Many gifted children display signs of apathy, boredom, unhappiness and even maladjustment.

The first task that teachers face is identifying the area or areas of giftedness of the students. Identification may be by an individual intelligence test, achievement tests and parental or teacher observation. Aptitude test designed to predict specialized talents in art and music, architecture, mechanics may also be used to identify talented students.

When the identification is done annually, new students not identified in prior years are found to be gifted or talented. Accordingly, it is not uncommon for as many as 25% of the school population to be identified as having a gift or a talent. It is also unwise to identify and label the gifted students; least others feel that they are not gifted. The entire exercise should be done very discreetly. Moreover, nearly every normally developing student has at least one area of high or potentially high performance that should be identified and developed as that of exceptional children.

(b) Educating the Gifted Children

Much can be accomplished with existing resources. A gifted student should have time to purse topics more deeply than their classmates. Cluster of schools should combine their gifted children regularly for special enrichment programmes. School, should employ community expertise in such fields as art, photography, journalisms, drama, and creative writing for their talented youngsters.

The key to educating the gifted children is to formulate individual programmes for them so that they encounter daily challenges. Such education requires teachers who have received special training that enables them to work with gifted students.

Special technique for educating the gifted fall along three lines.

(a) Enrichment
(b) Acceleration
(c) Ability Grouping

(i) Enrichment

Enrichment is defined as experiences that are above and beyond the regular curriculum. Kirk (1972) states that enrichment techniques usually follow one are more of these procedures.

(a) Teachers attempt to challenge gifted pupils by assigning extra reading and assignments and permit them to participate in related extracurricular activities, for example, if parents can arrange time, they could take a scientifically advanced student to special classes at an institution.
(b) Grouping the gifted students of different schools so that they are together occasionally enabling interested teachers to challenge their abilities by group discussion and independent research.
(c) Providing special offerings, such as extra language or advanced science course.
(d) Employing for each school system a special teacher who could more from school to school, identify the gifted, aid regular teacher and actually work with the gifted in seminars or group discussions busy schedule of work. It means providing challenging and meaningful work for the gifted.

The "Renzulli" model focuses on individual and small group investigations of aerial problems as the key enrichment activities for gifted students. Included in it are projects directly related to the school's curriculum? For example, students may engage in creative writing, drama, dance, and similar expressive areas. In general, any enrichment activity is appropriate that enables students develop an area of their giftedness.

(ii) Acceleration

Acceleration means some modification in the regular school programme that permits the gifted student to complete the programme in less time or at an earlier age than usual (Getzels and Dillon, 1973). Double promotion is also an

acceleration type. Acceleration can be of various types: school admission based on mental age rather than chronological age, skipping classes, combining two years work into one eliminating more basic course, early admission to high school/College.

Acceleration is important because curriculum is graded by age and every student is required to spend one school year to complete each class. Not permitting student to learn the subject matter assigned to a higher grade unnecessarily retards the educational development of many students. Stanley (1977) presents strong arguments supporting two or more years of acceleration pair to high school graduation by highly talented students. The concludes that enrichment, without any acceleration, will be injurious to the educational development of the brilliant student.

(iii) Ability Grouping

Ability Grouping has definite possibilities for dealing with the gifted. There are certain objections against grouping children according to mental abilities and segregating the gifted from the rest. It has definite advantages over teaching a class of heterogeneous group. Gifted children must be identified and grouped together in a special class so that the curriculum, instructional materials and teaching techniques can be designed to meet their requirements. But segregation should be done discreetly and without labeling the children.

(iv) Paul Torrance's Guidelines to encouraging Giftedness

(a) Encourage manipulation and sensitivity to objects and ideas.
(b) Try to be tolerant of new ideas, no matter how far-fetched they may be.
(c) Be flexible in setting up lessons; permit some brainstorming.
(d) Maintain a relaxed classroom, tutoring or therapeutic atmosphere.
(e) Help the child who is creative learn to get along with other children.
(f) Present controversial problems and challenge accepted origins.
(g) Teach the basics of problem solving / creative processes.
(h) Teach them not to underrate their own creativity, dispel the sense of awe of masterpieces.

(c) Provisions for the Slow Learners

The term slow learner' is commonly used with reference to children with IQs between about 80-90. Those with IQ of 90 or above are considered to be within the normal or above average range. Ordinarily they have the ability to get along fairly well in a regular class-room without much special help. Those with IQ below 75-80 on the other hand are usually classified as retarded or mentally retarded. The child we call slow learner is one who is not necessarily retarded or in need of special education but is likely to need some extra help in a regular class-room. He is capable of learning just about anything that the average child is capable of it just takes him longer. Students who are slow in learning one subject are frequently slow in learning others. But this is not always the case. A child

may be slow in reading, but is average or above in learning, say mathematics. Different abilities are required for learning different subjects.

(1) Identifying the Slow-Learner

In identifying the slow-learner the teacher can make use of intelligence test scores. But IQ scores are not always true indicators of slowness in learning. Because, two students having the same IQ score may have two different types of problems. Competency-based tests, an improvement of traditional achievement tests in different school subject may also be used to identify specific backwardness of children. Observation of students' behaviour, adjustment language difficulties, emotional problems etc by parent and teachers can provide useful information in identifying slow learner.

(2) Periodic Medical Examination

Deficiency in ability required for a particular task may cause slow or poor learning in relation to that task. If the physical defect is recognized and corrected, the slow learner becomes a normal learner. Our school systems, must, therefore, provide for periodic medical examination of students, for taking remedial measures.

(d) Learning Handicaps in exceptional Children

Exceptional children are those who are considerably above or below the average of their age-group in characteristic or behaviour. Those above the average of their age-group are termed as gifted or creative, and have been discussed earlier. Here we shall talk about these exceptional children who are below the average of their age-group.

An exceptional child with a learning handicap/disability is one who differs from other children so much in one or more characters, for example, in vision or in behaviour that the child cannot profit maximally from the typical pattern of instructions provided to normally developing children. Change must be made in what is taught or how it is taught in order is provide for handicapped exceptional children. A child is classified exceptional on the basis of careful assessment/identification of various types of learning handicaps, so that they may participate in programmes for handicapped children as defined by the state.

There are children who have a good vocabulary, who know what words mean, and who can use words in conversation, but who are unable to learn to read. Such children are said to have **"dyslexia"** which in itself merely means inability to read". There are also children who have what is called **"hyperlixia"** which means who can read at an early age, but who cannot understand what is spoken to them. The word dyslexia has come to be associated with learning disabilities generally, since so many of them related to the problem of reading. Actually, dyslexia is but one type of learning disability, and there are two basic kinds: visual and auditory.

A child who is **"visual dyslexic"** has difficulty in translating written letter into round such a child may also have difficulty is discriminating between two letters which are similar as "b" and "d" or "n" and "u" when written in text form. This often extends to difficulty in recognizing the difference between such words as "cat" and "cap" or "top" and "tip" when they are in print. Such children may have other nonbearing difficulties as

well, as in the case of a child who insists to play with a ball but who does not enjoy watching others play a ball game because he or she cannot understand what is going on even though can she "see" it.

A child who is an **"auditory dyslexic"** has difficulty in translating sound in to meaning. Sometimes this shows up as difficulty in discriminating between sounds that are somewhat similar: a child with such a difficulty will not discriminate between "bat" and "cat" when they are given orally. He may also fail to recognize the similarity between "milk" and "silk". A child with auditory dyslexia may also have difficulty remembering things told to him orally.

Another type of difficulty that learner may have is **"sequencing"**, for example, they are unable to put blocks in the same order as a model or to get the steps right in a long division problem, or to get the letters in the right order in spelling (writing "mlik" for milk".

A complete programme of diagnosis will include medical reports and other information. A fairly complete list of things that can be done to identify various types of difficulties is given below:

a. Evaluation of intelligence.
b. Visual-motor Perceptual Tests.
c. Personality Tests
d. Linguistic Evaluation
e. Reading Tests
f. Pinpointing of Behavioural Difficulties
g. Medical History Evaluation
h. Evaluation of Physical Development, Family Situation and Emotional Stresses in the Home.
i. Physical Examination, both General and Neurological Including Visions and Hearing Tests.
j. Assessment of Cognitive Development.

(e) Placement with a Teacher

Emotional crises, difficulty in interaction with the teachers and lack of proper environmental setting may also cause slow learning. In order to find measures to prevent failures in learning, each learner should be placed with the teacher with whom he can interact most effectively. The positive effects of such interaction can bring about remarkable changes in a student. In helping the slow learner the teacher should (i) look at the total child (development, maturation, motivation etc) and (ii) examine the educational setting (curriculum content, mode of instruction and the learning environment).

(f) Avoid Competition

Competition is especially harmful for slow-learners. This does not do so much good for their self-concept. Competition causes the slow Learner stop trying and to feel even less

adequate than he did originally. It is supposed to contribute to frustration, discouragement and feeling of worthlessness in them.

(g) Remedial Teaching

Teachers must provide remedial teaching/instructions for the slow learner. They have to repeat their instruction/directions several times and in simple words, they should give practice drill and review exercise lessons. They should introduce new material in small easy steps, relating it to what he already knows. Short range incentives are more productive than intrinsic motivation towards long range goals.

(h) Non-Promotion

Some teachers argue in favour of detention or non-promotion of slow learners. But when a youngster is not promoted he perceives himself and is perceived by other as a failure. He thinks that he has been punished. As dissatisfaction increases, he becomes a truant and drop-out. The slow learner is not to be branded as a failure/non-learner, not to be compared with others who are not really his peers. He is to be helped and listened to, and should be encouraged and understood rather than beaten down, at home as well in school. If possible **Special Classes,** especially by trained teachers may be started for slow learners who have a strong need for accomplishments, which might be difficult for them in a regular class. Each small success or accomplishment must be rewarded.

(i) A Disadvantaged Child

Is one who is (a) handicapped or disabled because of certain conditions, (b) denied the opportunity to grow normally at his own natural rate (c) has been denied the basic / universal rights of children i.e. a stable home, loving mother, a supportive father, (d) who suffers from a continuing inadequacy of basic necessities of life. Thus the term continuing inadequacy of basic necessities of life. Thus the term disadvantaged refers to an inner condition of a child resulting from an outer deprivation; there are several categories of disadvantaged children, such as:

Economically disadvantages, socially, culturally, intellectually, educationally or linguistically disadvantaged.

(j) Causes of Disadvantaged Conditions

(a) Economic-poverty, poor occupational status, unemployment, poor housing/diet/health clothing etc. or inadequate medical care, cleanliness, pre-natal and post natal complications.
(b) Home and neighborhood-school inadequacy, crowded home, lack of play space, slum type, homes.
(c) Defective child-rearing and parenting behaviour, lack of cultural stimulation, parental rejection or over-indulgence.
(d) Intellectual, educational, retarded cognitive growth, delayed speech, over stimulation, failure, stagnation, dropout.
(e) Psychiatric problems, behaviour problems and disorders.

(k) Programme for the Disadvantaged

(a) Preventing programme for health, nutrition and care.
(b) Preparatory and pre-school education programmes
(c) Educational reform for adapting curricular, school, teachers teaching methods and textbooks.
(d) Parent education and functional literacy programmes.
(e) Social and welfare programmes for adolescents/Youth/Families and communities.

9.4 MEASUREMENT OF INDIVIDUAL DIFFERENCES

Measurement is the assignment of a number to an object or event according to rule. This may represent something physical, as when you step on the scales and note, with dismay or pleasure the number that indicates your weight. Or it may be more subtle, as when you take a vocational aptitude test and receive your score in medical or engineering aptitude test. In order to draw meaningful comparison, measurement, must be meaningful. In order to have meaning, all measurements must satisfy two basic criteria: they must be reliable and they must be valid.

(a) **Reliability** is the indication of the consistency of measurement, e.g: If your weight reads 140Ibs, one days, 240 pound the next day, and 40 pound the days after, your faith in the precision of the scale would be secretly shaken. The same is true of psychological test. Our measurements must be consistent over repeated tests of measurement. A good test should yields roughly the same scores over repeated measurements, as long as that which is being measured does not change dramatically.

(b) **Validity** Measurements must also be valid, validity is an indication of the extent to which a test measure what it is supposed to measure.

(c) **Correlation** In order to give precise statements about reliability and validity, a statistical technique called correlation may be utilized. It allows scientists to make predictions; correlation is a statement about the strength of the association between two (or possibly more) variables. If the correlation between two variables is high, the variables will tend to be very together, that is, wherever one of the traits is found, chances are good that the other trait will also be found. If we observe that people with bland hair usually have blue eye then we would say that there is correlation between the variables hair colour and eye colour. This is not to say that having bland hair causes one to have blue eyes, but it does allow us to predict, whenever we know that certain individuals have bland hair, that they are also likely to have blue eyes. As discussed earlier, individuals differ in sensitive, affective and psychomotor abilities. They differ almost in every respect-personality, attitude, interest, intelligence and achievement. Individual differences can be identified and measured through finer measurement instruments know as psychological test. A psychological is a pattern of stimuli, selected and organized to elicit responses which reveal certain psychological characteristics in the person who makes them. The following psychological tests can be used by the teacher or psychologists to measure difference among individuals.

9.4.1 Test of General Intelligence

Sometimes these tests are also referred to as tests of mental ability, tests of general ability or test of scholastic aptitude, these tests measure the psychological traits termed to "intelligence" which provide the best possible single clue to the understanding of children's academic performances. There are various tests of intelligence like standard-binet intelligence test (revised), Wechsler intelligence scale for children and various culture free and culture fair tests.

9.4.2 Tests of Aptitude

These tests measure the possibilities of success in future performance. One of the most famous batteries, which measure children's different aptitudes, is "differential aptitude test battery" which measures the following abilities.

(i) Verbal Reasoning
(ii) Numerical Ability
(iii) Abstract Reasoning
(iv) Space Relations
(v) Mechanical Reasoning
(vi) Clerical Speed and Accuracy
(vii) Language Usage

9.4.3 Interest Inventories

Strong Vocational Interest Blank, and Kuder's Preference Record (Vocational) are some of the interest inventories that can be used to measure differences among individuals in their interest.

9.4.4 Test of Personality

The MMPI, Bells Adjustment Inventory, Projective tests like "Rorschach Ink Blot test." Thematic Apperception test, and other questionnaires can be used to measure personality structure and adjustment, and difficulties of individuals.

9.4.5 Competence-Based Tests

Tests of achievement, mostly teacher-made type, can be used to measure individual differences in academic achievement. Practically, these tests as are prepared by teachers do not measure the competence in learning various subjects. The competence-based tests are an improvement over the traditional tests, and are not difficult to prepare such tests. Once the teacher knows the learning competencies in various school subjects it becomes easy for the teacher to prepare such tests.

It must be noted that scores obtained by a student in any one of the tests may not be a sure measure of his standing in the group. Scores on tests are influenced by a number of factors, internal and external operating at the time of taking the test. For this purpose scores obtained by one test can be supplemented by scores obtained from other similar tests.

9.4.6 Multiple-Choice Tests or Essays

What about multiple-choice tests or, as many poorly prepared students like to call them, "multiple-guess tests?" One of the criticisms of the multiple-choice tests is that it rewards rote memorization rather than true understanding. This can certainly happen if the test is poorly designed, but when thoroughly researched and carefully prepared, the multiple choice test can assess a person's ability to apply concepts to problem solving situations. Rather than break up the units of knowledge and isolating the pieces, as the critics typically charge, a well-designed multiple choice test, such as SAT, demands that the students be able to understand concepts and bring facts together. Research evidence clearly shows that the SAT verbal score shares much in common with IQ, the correlation between them being an extremely high + 0.80.

What about essay questions? There is the fear that standardized tests based only on essay questions and writing samples may have an adverse effect on learning. Verbally adept but uninformed students may bluff their way through an essay exam. Similarly, the tactics used by some students or memorizing or rotting the topics of subjects also affects learning process. Essay type exams however, illuminate the student's thought process in more detail, as compared to multiple-choice tests. But for a teacher, with a large class of widely varying abilities, interests and needs may have to rely on the multiple choice tests. It not only ensures reliability of testing but also more importantly it permits free time to work with individual students.

9.4.7 Computer Assisted Testing (CAT)

The computer age has led to a high tech form of testing called CAT. (Computer Assisted Testing) Here, the individual sits at a computer keyboard, and the questions are presented on the screen. The testing becomes personalized since the testing is interactive with the computer, in effect custom designing the test to each student's skill level. For example, the question may get progressively more difficult until a level is reached. When a student begins to get the questions wrong, an easier set of questions suddenly appears. This branching of easier and harder questions called going "up the ladder" or "down the chute" continues until the students true level of competence to reach. The educational testing services of USA are currently putting both the SAT and GRE (Graduate Record Exam) on a computer format. Many people believe that CAT is viable, cost-effective and a big improvement over paper and pencil testing.

9.4.8 The Portfolio Approach

Another testing technique, currently gaining in popularity is called the portfolio approach. Just as an aspiring artist or model carries a portfolio of past work to a prospective employer, so too does the student who selects examples of his or her best work over a term or even an entire year of study. It is said that the portfolio approach places more emphasis on a student's overall accomplishment than on the ability merely to score well on a single battery of tests. Typical portfolios include original poetry, plan, short stories, essay and art projects. Even in math, a student might produce a series of fractions, showing their relationships to decimals, or an arrangement of dice to illustrate probabilities, or even present an essay on the life of the Prophet "Muhammad" (P.B.U.H).

At the end of the year, the student hands over the portfolios to the teacher for evaluation. Teachers of the new Millennium should be made aware of this approach and should be given workshop preparation in learning this technique.

The portfolio method can also be used to evaluate teachers, students and the curriculum itself. A portfolio that includes, for example, "samples of student's teacher developed plans and materials, videotaped teaching episodes, and other teacher's reflections on his or her own teaching can provide direct evidence of what a teacher knows and can do.
Whether, the portfolio approach proves to be as valuable as it promises is still in question, but there is no doubt that new testing methods will be employed as educational psychology operates in the 21st century. New testing procedures are on the horizon, procedures intended to bridge the gap between cognitive psychology and psychometric methods.

9.4.9 Grade Equivalent Scores

Grade equivalent scores are based on relating a given student's score on a test to the average scores found for other students in a particular grade, at the same time of years, and of roughly the same age. For example, assume that in September, a large, representative sample of their graders (III class, students) of the morning group, producer an average score of 30 on a certain arithmetic test. If a given student is then tested, and receives a score of 30, that child would be assigned a grade-equivalent score of 3.0 of the child did somewhat better than that and had a score of say 3.4, it would indicate a performance equal to a third grade student in the fourth month (December) of the school year. Grade equivalent scores are typically reported in tenths of a year, so that a score of 5.9 refers to the ninth month (June) of the fifth grade, and a score of 0.0 to the first day of Kindergarten. Thus, the scores range from 0.0 (or sometimes ko) through 12.9, representing the thirteen years of school from Kindergarten through grade 12. the first of September is given on the score as 0, whereas the end of September as 0.1, the end of October as 0.2 and on until the end of June as 0.9. a note of caution in this system is.

(a) Children do not all grow and develop at the same yearly rate, never mind the same monthly rate, so don't be overly concerned when a seemingly bright child suddenly under performs the norms of a few months, that same child may quickly catch up and even outperform the norms several months later.

(b) Don't be too quick to use a precocious child's high score in same area as a reason to have that child skip a grade or two. A third class (grader) might even get a grade equivalent of 7.0 on a given test. This doesn't mean that the child is now ready for a fast promotion to class-7th. What it does mean is that the third grader has certainly enquired third-grade material and infect has done as well as a seventh grader when measured on a third-grade test. However, there are many things the 7th grader has learned and is expected to know which are simply not even part of a third-grader's consciousness and which don't appear on a third grade test.

9.4.10 Curriculum Testing

Virtually any curriculum that is more than five years old requires a thorough evaluation, this is most obvious in field such as science, but should be done in all areas. This type of testing shown answers the following:

(a) To what degree have the curriculum's goals been reached?
(b) Is the curriculum content appropriate in view of the mission's objectives.
(c) Has the instruction been truly based on the curriculum.
(d) Has the assessment measured the taught curriculum or planned.

9.5 SUMMARY

Human beings have many common needs and characteristics, but they are also different in many ways. Students of the same chronological age vary widely in general intellectual abilities, primary mental abilities, motor abilities, and specific intellectual abilities. Differences among students in their learning abilities, interests and motives result in very great differences in their educational achievements. Some normally developing, rapid-learning class 3 children achieve as high as normally developing slow-learning class 12 students. Moreover a student typically does not achieve at the same level in different subjects such as mathematics, science, reading, foreign language and typing. It is also not un-common to find students who are in the upper one-fourth of their grade in one primary mental ability, such as mathematical reasoning, and in the lower one-fourth in another ability, such as word fluency or perceptual speed.

The relative effects of heredity and environment on each individual's development and on differences between groups have not been established with precision and accuracy. Some scholars indicate a greater impact of heredity, while others indicate a greater impact of environment. A generally accepted scientific view is that heredity and environment are in continual interaction, and the precise contribution of each cannot be determined.

Children who are considerably above or below the average of their age-group in a characteristic or behaviour are designated exceptional children. However, most special education programmes today are for those who are below average, there is a recent shift from labeling exceptional children as handicapped, disabled, mentally retarded, hyperactive, gifted or in other terms. Instead, the behaviours are being classified, for example, deficits in specified abilities or skills, excessive behaviours in particular areas and acceleration in learning or creativity.

Many teachers of children and youth with high learning and creative capabilities follow provisions for gifted talented students including enrichment, acceleration or a combination of enrichment and acceleration. Sometimes ability grouping is also followed. Brining handicapped/children with learning handicaps into the mainstream should be the preferred way rather than placing them in special classes and special schools.

Certain forms of learning are fundamental to the adjustment of the individual to the society. The tool skills, common knowledge and attitudes of understanding and cooperation constitute what may be termed the basis of a general education. All individual, whose intelligence level is normal/sub-normal, should be helped to achieve these educational goals.

Measurement is the assigning of a number to an observation according to certain rules. To give meaning to these numbers, all measurements must satisfy two basic criteria. They must be reliable and valid. Reliability indicates the consistency of a measurement, while validity is the extent to which a test measures what is intended to measure.

For measurement of individual differences certain tests of general intelligence, aptitude, interests, personality, etc have been formulated. Nowadays, computer Assisted Tests (CAT) ore also being employed. Multiple choice tests are also being followed, while a new method of portfolio approach is also proving very innovative and useful.

In conclusion, teachers must indicate as per the principles of child psychology, developmental psychology and educational psychology. Besides the theoretical instruction in the class, extracurricular activities for development of social/Islamic values must be emphasized to attain the goals of education.

9.6 SELF-ASSESSMENT QUESTIONS

1. What do you understand by individual differences? How can their knowledge help the teacher in his work?

2. Explain the concept of individual differences and the importance in education.

3. Select one of the classes in which you were a teacher on the elementary school level. Recall two members of the group who were discipline problems. How can you now explain their behaviour?

4. List persons of your acquaintance who seem to show marked differences in their motor skills and capacity for abstract learning.

5. Compare the Dalton and Winnetka plans, which one do you prefer and why.

6. Explain with examples what is meant by readiness for learning.

7. What provisions can be made in the schools to meet the situation of individual differences.

8. Explain the relative importance of heredity and environment on the development of intelligence in children. What are their implications for the teacher?

9. State the role of competence based tests to measure individual differences?

10. Explain the importance of Computerized Assisted Tests.

11. How can you identify gifted children in the class?

12. Explain the role of heredity and environment as causes of individual differences.

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