UNIT-I
EDUCATIONAL PSYCHOLOGY AND LEARNING

- Meaning, & Scope of Educational Psychology
- Meaning & Concept of Learning
- Types of learning
- Trial and Error theory (Thorndike), Conditioning theory (Pavlov) and Learning by Insight (Kohler et al.)
- Multiple Choice questions

WHAT IS EDUCATIONAL PSYCHOLOGY?

Educational psychology is one of the many branches of psychology dealing mainly with the problems, processes and products of the education. It consists of two words Psychology and Education. While Genral Psychology is a pure science. Educational Psychology is its application in the field of education with the aim of socializing man and modifying his behaviour. In other words, educational psychology may be defined as that branch of psychology which studies the behaviour of the learner, his educational needs and his environment. Various psychologists and scholars have defined educational psychology.

Let us analyze a few important definitions.

- **According to Charles E. Skinner (1958):** "Educational psychology is that branch of psychology which deals with teaching and learning".
- **Crow and Crow (1973) defined** educational psychology as: "Educational psychology describes and explains the learning experiences of an individual from birth through old age".
- **F.A. Peel (1956) says**: "Educational psychology is the science of education. Education in its applied form is centred around the process of teaching and learning".
- **Stephen says:** " Educational psychology is the systematic study of the educational growth and development of a child".
- **Judd defines** educational psychology as: "The science which explains the changes that take place in the individuals as they pass through the various stages of development".

Nature of Educational Psychology

Educational psychology is an offshoot and a part and parcel of psychology, so its nature cannot be different from the main subject. The following points further confirm the nature of educational psychology as.

1. Educational psychology possesses a well-organized systematic body of facts which is supported by the psychological laws and principles.

2. It is constantly in search of the truth, which is studying the behaviour of the learner in relation to his educational environment. The results of any study in educational psychology can be challenged and are modified or altered in terms of the latest explanations and findings.
3. Educational psychology does not accept hearsay and does not take anything for granted. It emphasizes that essentially there is some definite cause linked with behaviour. And, the causes of this behaviour are not related to super natural phenomenon.
4. Educational psychology is mostly concerned with "what" and "why" of happenings in the present instead of caring for the past. Therefore, in its study it focuses attention on problems like the present behaviour of the learner, the causes of such behaviour, and the repercussion if it were to continue unchanged.
5. The generalizations arrived the study of educational psychology are sufficiently reliable and thus like the sciences, these can be used for predictions of behaviour in similar situations.

This discussion shows that educational psychology is sufficiently scientific. In fact it is an applied behavioural science, which deals with the behaviour of learner in the educational environment. Since the learner's behaviour is dynamic and unpredictable and the methods of its study are also not absolute and objective, educational psychology cannot claim the status of a developed positive science like other natural or applied sciences. Although we accept its nature as quiet scientific yet we cannot term it as a developed positive science and have to satisfy ourselves with saying that it is a developing positive science of the learner's behaviour.

Scope of Educational Psychology

Five major areas covered by Educational Psychology are:

- The Learner
- The learning Process
- The learning Situation
- The Teaching Situation
- Evaluation of Learning Performance
- The Teacher

The Learner

Educational Psychology acquaints us with need of knowing the learner and deals with the techniques of knowing him well. Following are the topics studied included in it: the innate abilities and capabilities of the individual differences and their measurements, the overt, covert, conscious as well as unconscious behaviour of the learner, the characteristics of his growth and development at each stage beginning from infancy to adulthood.

The Learning Process

After knowing the learner and deciding what learning experiences are to be provided, the next problem is to help the learner in acquiring these learning experiences with ease and confidence. Hence, it deals with the nature of learning and how it take place and contains the topics such as laws, principles and theories of learning; remembering and forgetting, perceiving, concept formation, thinking, reasoning process, problem solving, transfer of training, ways and means of effective learning etc.

Learning Situation

It also deals with the environmental factors and learning situation which come midway between the learner and the teacher. Topics like classroom climate and group dynamics techniques and aids which facilitate learning, evaluation techniques, guidance and counselling etc. which help in the smooth functioning of the teaching learning process.

Teaching Situation

It suggests the techniques of teaching. It also helps in deciding what learning situation should be provided by the teacher to the learner according to his mental and physical age, his previous knowledge and interest level.

Evaluation of Learning Performance

Main objective of education is allround development of the learner. It includes cognitive, affective and psychomotor aspects of personality. Educational Psychology suggests various tools and techniques for assessment and evaluation such as performance test, oral test and written test.

The Teacher

Educational Psychology emphasizes the need of knowing the self for a teacher to play his role properly in the process of education. It throws light on the essential personality traits, interests, aptitudes, the characteristics of effective teaching etc., so as to inspire, help teachers handle the stress, conflict and anxiety by giving them insight into their own personality.

CONCEPT OF LEARNING

Learning is defined as “a relatively permanent change or modification in behaviour that occurs as a result of practice or prior experience.” In other wards it is the acquisition of knowledge or skills through study, experience, or being taught.

Learning is understood as the modification of behaviour through practice, training or experience. This is supplemented with five important components of learning:

1. **Learning is change:** A change may be for good or bad. Change may not be evident until a situation arises in which the new behaviour can occur. Learning is not always reflected in performance

2. **All changes are not learning:** To constitute learning, change should be relatively permanent. Temporary changes may be only reflective and fail to represent any learning. This requirement, therefore, rules out behavioural changes caused by fatigue or drugs.

3. **Learning is reflected in behaviour:** A change in an individual's thought process or attitude, not accompanied by behaviour, is no learning. It should be further clarified that learning needs to result in behaviour potentiality and not necessarily in the behaviour itself. The reason for this distinction lies in the fact that an individual may learn but owing to lack of motivation, may not exhibit any changed behaviour.

4. **The change in behaviour should occur as a result of experience, practice or training:** This implies that behaviour caused from maturity, disease, or physical damages does not constitute learning.

5. **The practice or experience must be reinforced in order for learning to occur:** If reinforcement does not accompany the practice or experience, the behaviour will eventually disappear.

Definitions of Learning:

1. **Christine Chin Sang,** "Learning is a relatively permanent change in the behaviour or attitude of a person over time". For example when a child learns to read he is able to retain this knowledge and behaviour for the rest of his life.

2. **Eric Blackburn defines learning as** "The acquisition of new responses to various stimuli".

3. **Kristi McGrath,** "Learning is the accumulating of experiences and the consequential growth and new understanding of the world around us".

4. **Thomas Correll,** "Learning is a lifelong process of gaining and using information presented to us. The ability to learn is endless, as long as the desire is present. Learning is only successful when the information gained is used and understood".

5. **S.B.A. Gul defines learning as,** "Learning is all the relatively permanent modifications or developments that occur in our behaviour with the passage of time".

In short, it can be concluded that learning is the act of acquiring new, or modifying and reinforcing, existing stock of knowledge, behaviours, skills, values, or preferences and may involve synthesizing different types of information. Learning is not compulsory, it is contextual. It does not happen all at once, but builds upon and is shaped by what we already know. To that end, learning may be viewed as a process, rather than a collection of factual and procedural

knowledge. Learning produces changes in the organism and the changes produced are relatively permanent.

What are various types of Learning

To understand how to move from passive to active learning, it is important to understand the different type of learning. There are four primary types of learning: visual, auditory, read-write, and kinesthetic. Most people learn best through a combination of all the four types of learning styles.

1. **Auditory Learning (Hear):** Auditory learners would rather listen to things being explained than read about them. Reciting information out loud and having music in the background may be a common study method. Other noises may become a distraction resulting in a need for a relatively quiet place.

2. **Visual Learning (See):** Visual learners learn best by looking at graphics, watching a demonstration. For them, it's easy to look at charts and graphs, but they may have difficulty focusing while listening to an explanation.

3. **Kinesthetic Learning (Touch):** Kinesthetic learners process information best through a "hands-on" experience. Actually doing an activity can be the easiest way for them to learn. Sitting still while studying may be difficult, but writing things down makes it easier to understand.

4. **Read & Write learning:** Such learners make good traditional studiers. They fit in with the conventional, school-taught study method of reading textbooks and writing notes. Read & Write Learners are good at taking notes during class. They study best by reading over these notes or copying them out.

THEORIES OF LEARNING

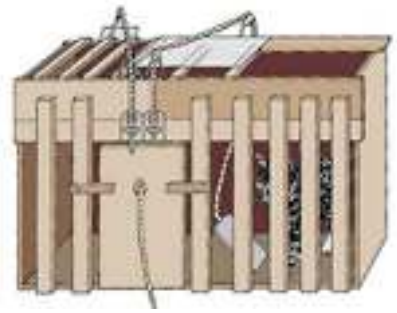
Thorndike's Theory of Connectionism/ Trial and Error Learning/ S-R Bond Theory?

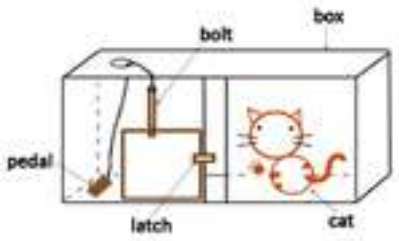
Trial and Error is a method of learning in which various responses are tentatively tried and some discarded until a solution is attained. E.L. Thorndike (1874-1949) was the chief exponent of the theory of connectionism or trial and error. He was an American Psychologist who conducted Stimulus-Response (S-R) theory experiment with animals. Thorndike was the first to study the subject of learning systematically using standardized procedure and apparatus. All learning, according to Thorndike is the formation of bonds or connections between Stimulus-Response.

Thorndike's Experiment on Cat:

His classic experiment used a hungry cat as the subject, a piece of fish as the reward, and a puzzle box as the instrument for studying trial-and-error learning. In this typical experiment, a hungry cat was placed inside the puzzle box, and a piece of fish was kept outside the box. The cat could not reach the fish unless it opened the door. In order to escape from the box, the cat had to perform a simple action as required by the experimenter. The cat had to pull a loop or press a lever in order to open the door. Once the door was opened, the cat could escape and get the fish as a reward.

First Trial:





Hungry cat is placed inside the box. Fish kept outside the box work as a motive. Cat started doing random movements for getting food. Cat squeeze through opening, claws and bites at the bars of wires, thrust its paws through any opening. All the irrelevant responses continued for several minutes until the cat hit upon the correct response, by chance. Hungry cat came out and got its reward, i.e., fish.

Second Trial:

Hungry cat is placed in a puzzle box. Fish kept outside the box worked as a motive. To get out of the box, cat again did random movements. But cat took less time to come out of the box.

With increasing trials, the time taken to pull the loop (response latency) decreased. The wrong responses (errors) that the cat was showing also decreased, as trials increased. Finally, the cat learned the trick. As soon as it was put in the box, it pulled the loop to escape for a well-deserved reward. The name, trial-and-error learning comes from the fact that errors decreased over trials. The cat learned from its errors.

Experiment sums up the following stages in the process of learning:

Trial & Error is based on random activities to reach the goal. Random activities are blocks or hindrances, drive, goal, random movements, multiple response, chance, success, selection and fixation.

- **Drive:** Hunger intensified by the sight of the food.
- **Goal:** To get food by getting out of the box.
- **Block**: The cat was confined in the box with a closed door.
- **Random movements:** The cat persistently tried to come out of the box without knowing how to get out.
- **Chance success:** Through striving and random movements, the cat by chance succeeded in opening the door.
- **Selection:** Gradually, the cat recognized the correct way to manipulate the latch.
- **Fixation:** At last, the cat learned the proper way to open the door by eliminating all the incorrect responses and fixing only the right response.

Thorndike's Laws of Learning:

1. **Law of Readiness:** The law states “when any conduction unit is ready to conduct, for it do so is satisfying. When a conduction unit is not ready to conduct, for it to conduct is annoying. When any conduction is ready to conduct, for it not to do so is annoying”.
2. **Law of Effect:** The law states “when a modifiable connection between a stimulus and response is made and is accompanied by a satisfying state of affairs, the strength of that connection is increased. When a connection between stimulus and response is made and accompanied by an annoying state of affairs, that connection’s strength decreases.
3. **Law of Exercise:** The law states “any response to a situation will, other things being equal, be more strongly connected with the situation in proportion to the number of times it has been connected with that situation and to the average vigour and duration of the connection."

   The law has two sub parts: a) Law of Use and b) Law of Disuse. Law of Use states that “when a modifiable connection is made between a situation and response that connection strength is increased if it is practised”. Law of Disuse states that “when a modifiable connection is not made between a situation and response, during a length of

time, that connection's strength is decreased". This means, any act that is not practised for sometime gradually decays.

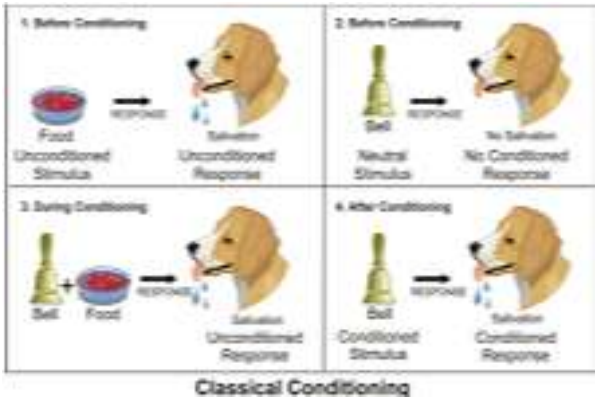
Educational Implication of Trial and Error Theory

1. Thorndike's theory emphasizes the importance of motivation in learning. So learning should be made purposeful and goal-directed.
2. It stresses the importance of mental readiness, meaningful practise and incentive in learning process.
3. The law of readiness implies that the teacher should prepare the minds of the students to be ready to accept the knowledge, skills and aptitudes before teaching the topic.
4. More and more opportunities should be given to the learners to use and repeat the knowledge they get in the classroom for effectiveness and longer retention.
5. To maintain learned connection for longer period, review of learned material is necessary.
6. The law of effect has called attention to the importance of motivation and reinforcement in learning.
7. In order to benefit from the mechanism of association in the learning process what is being taught at one situation should be linked with the past experience of the learner.

PAVLOV'S THEORY OF CONDITIONING

Ivan Pavlov and his theory of classical conditioning had a profound impact on the understanding of human behaviour. Ivan Pavlov, in 1927, began working with learning through "classical conditioning". Initially the dog only salivated when it was eating. Later Pavlov noticed the dog salivated when he carried the food into the room. He became curious as to why this change had taken place. He thought there were both learned and unlearned components associated with the dog's behaviour. He began experimenting with different stimuli, and if he rang a bell immediately before giving food to the dog, eventually the dog would salivate merely in response to the sound of the bell. He generated terminology to describe his observations. An unconditioned stimulus (UCS) such as food, generates an instinctual reflexive and unlearned behaviour, such as salivation when eating. The salivation was called an unconditioned response (UCR) because it was not learned. The bell, formerly a neutral sound to the dog, becomes a conditioned stimulus (CS) and the salivation a conditioned response (CR).

Pavlov's Experiment



Classical Conditioning

The model of classical conditioning is given below.

1. US (food)……UR (saliva)
2. CS (sound of bell)

   US (food)…….UR (saliva)
3. CS (sound of bell)……CR (saliva)

In this experiment subject is first presented sound of bell followed by food, which evokes the inborn salivary response. After repeated presentation of the sound of bell followed by the food, the sound itself is adequate to elicit the salivary response. The bell is referred to as a conditioned stimulus and salivation in response to the bell is called a conditioned response.

Classical conditioning may be defined as a process in which a neutral stimulus by pairing with a natural stimulus acquires all the characteristics of natural stimulus. It sometimes called as stimulus substitution as new stimulus previously a neutral one is substituted for the stimulus which originally elicited the response.

Another types of conditioning called higher order conditioning goes one step further as presented below.

1. US (food)……..UR (saliva)
2. CS+US (bell+food)….CR (saliva)
3. CS1+CS2 (bell+light)…CR (saliva)
4. CS2 (light)……..CR (saliva)

The following are some of the important principles of classical conditioning:

1. **Extinction**: If a conditioned stimulus is repeatedly presented without the unconditioned stimulus, then the conditioned response will disappear. This is known as extinction. If a

dog learns to associate the sound of a bell with food and then the bell is rung repeatedly, but no food is presented, the dog will soon stop salivating at the sound of the bell.

2. **Stimulus Generalisation**: A dog who has been conditioned to salivate at the sound of a bell of one tone, may well salivate to a similar sounding bell or a buzzer. Stimulus generalisation is the extension of the conditioned response from the original stimulus to similar stimuli.
3. **Spontaneous recovery**: An extinguished response usually returns though at a lowered strength, after an interval of time during which the conditioned stimulus is not presented. This is called as spontaneous recovery.
4. **Differential conditioning**: The subject may be trained to differentiate between the conditioned stimulus and similar stimuli. For example, a bell of a certain tone is the CS. When the bell is sounded, food immediately follows, but when other sounds occur, such as horn, which is not followed by food. At first the dog salivates to all such sounds but soon it learns to salivate only to the bell. Salivation to other sounds is extinguished. When extinction occurs for stimuli which are not the CS, we say differential conditioning has developed.

Educational implications of Pavlov's Theory of Conditioning

Pavlov brought a revolution in the field of psychology. His theory has generated worldwide research on conditioning. The conditioning was accepted as theoretical framework and practical technique of solving variety of problems. He reported 'capacity to learn depends on the type of the nervous system and repetition of the activity under reinforcement'. For learning to occur, one must have some drive that motivates for action.' The principles of classical conditioning can be used in following areas.

1. Good habits such as cleanliness, respect for elders and punctuality etc can be developed among children by conditioning.
2. Similarly bad habits of children can be eliminated by conditioning.
3. The principles of classical conditioning are used in de-conditioning emotional fears in mental patients.
4. It can be used to develop favourable or unfavourable attitude towards learning, teachers and school among students.
5. The principles of classical conditioning are used to teach alphabets and fundamental principles of arithmetic by using some concrete materials.

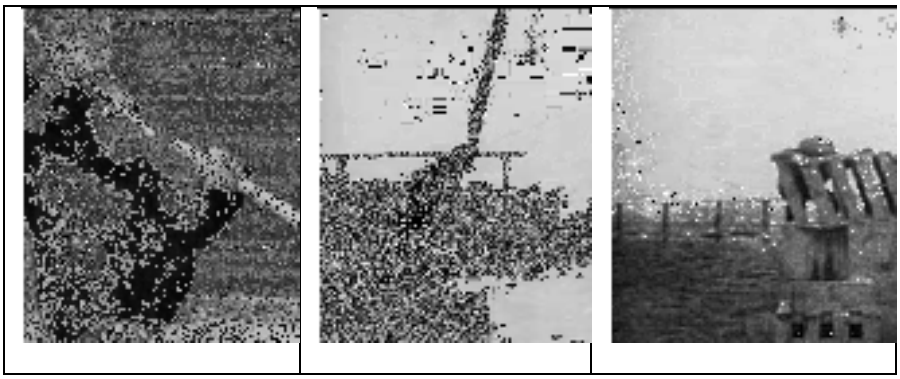
THEORY OF LEARNING BY INSIGHT (WOLFGANG KOHLER)

Insight learning was first developed by Wolfgang Kohler (1887-1967). This theory of learning differs from the trial and error ideas that were proposed before it. The key aspect of

insight learning is that it is achieved through cognitive processes, rather than interactions with the outside world. There is no gradual shaping or trial and error involved; instead, internal organizational processes cause new behaviour.

Sultan the Chimpanzee and Insight Learning

Kohler's most famous study on insight learning involved Sultan the chimpanzee. Sultan was in a cage and was presented with a stick. He could use the stick to pull a piece of fruit close enough to the cage so that he could pick it up. After Sultan had learned to use the stick to reach the fruit, Kohler moved the fruit out of range of the short stick. He then placed a longer stick within reach of the short stick. Initially, Sultan tried to reach the fruit with the short stick and failed. Afterwards, Sultan looked around, used the short stick to reach the long stick, and used the long stick to reach the fruit. Sultan was never conditioned to use one stick to reach another; instead, it seemed as if Sultan had an epiphany. The internal process that leads Sultan to use the short stick in order to reach the longer stick instead of the fruit, is a basic example of insight.



Insight learning occurs when one suddenly realizes how to solve a problem. Sometimes when you are taking a test that you have no idea how to solve. Then all of a sudden, the answer comes to you. Kohler showed the power of insight learning by placing a banana above the reach of chimpanzees and watching how they attempted to reach the food. In the room there were several boxes, none of which was high enough to enable the chimpanzees to reach the banana. Kohler found that the chimpanzees spent most of their time unproductively rather than slowly working towards a solution. They would run around, jump, and be generally upset about their inability to snag the snack until, all of a sudden, they would pile the boxes on top of each other, climb up, and grab the bananas.

Idea of Theory:

Thing cannot be understood by the study of its constituent parts but only by the study of it as whole. Gestalt theory focuses on idea of grouping. i.e. characteristics of stimuli that structure or interpret visual field or problem in a certain way.

Factors Determing Grouping (Law of organization):

- **Proximity:** Elements grouped together according to their nearness.
- **Similarity:** Similar items in some respect tend to be grouped together.
- **Closure:** Elements grouped together if they complete some entity.
- **Simplicity:** Elements tend to be organized into simple figures according to symmetry, regularity & smoothness.

Educational implications of Insight Theory

1. Learning is purposeful & goal-oriented.
2. Motivation to the learner
3. Acquaint with specific aims & purposes of the learning.
4. Emphasis on situation as a whole – maxim from whole to parts. Example: To learn or memorize a poem, present as a whole. After being read & understood as a whole, break into parts or stanzas as for effective memorized.
5. Organization of a perceptual fields & learning material as a whole. Learning cannot be related to subject or skill. It should be collection of isolated facts, information's or unrelated behavioural acts. Contributes in organization of curriculum, scheme of studies, work plan & procedure of planning the schedule of learning or teaching of a skill or behaviour.
6. Distinction between a psychological & a logical order of presentation. Example: to teach matter we have to proceed as sub-electronic particles electrons, atoms molecules and matter.
7. Problem solving attitude develops
8. Encourages reasoning, develops thinking & trains imagination & creative activity

UNIT-II
INTELLIGENCE AND ITS THEORIES

- Concept of Intelligence & I.Q
- Two factor theory, Group factor and Multi factor theory (Spearman, Thorndike & Thurstone)
- Verbal, Non-verbal and Performance test (Simon-Binet Scale, Cattel's Culture Fair Test & Bhatia Battery Test).
- Creativity- Concept, Characteristics and its Nourishment
- Multiple Choice questions

CONCEPT OF INTELLIGENCE AND I.Q

Intelligence is defined as general cognitive problem-solving skills. A mental ability involved in reasoning, perceiving relationships and analogies, calculating, learning quickly etc. Intelligence, the dictionary says is the 'ability to learn or understand or to deal with new or trying situations'. So, intelligence is the mental quality that consists of the abilities to learn from experience, adapt to new situations, understand and handle abstract concepts, and use knowledge to manipulate one's environment. Some famous definitions of intelligence are as under.

Definitions

1. **David Wechsler (1972)**, "Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment".
2. **Francis Galton (1884),** "Intelligence is the innate general cognitive capacity".
3. **Lewis Terman (1921),** "Intelligence is the ability to think abstractly".
4. **E.G. Boring (1923),** "Intelligence is what the intelligence tests test".
5. **Jean Piaget (1952),** "Intelligence is a particular instance of biological adaptation".
6. **S.B.A. Gul (2013),** "Intelligence is the collection of mental abilities".

So, in short we can conclude the concept of intelligence is very comprehensive. Earlier it was believed that there was one underlying general factor at the intelligence base (the g-factor), but later psychologists maintained that it is more complicated and could not be determined by such a simplistic method. Some psychologists have divided intelligence into subcategories. For example Howard Gardner maintained that it is comprised of seven components: musical, bodily-kinesthetic, logical-mathematical, linguistic, spatial, interpersonal, and intrapersonal. Other definitions are: "Intelligence is what you do when you don't know what to do." "Intelligence is a hypothetical idea which we have defined as being reflected by certain types of behaviour."

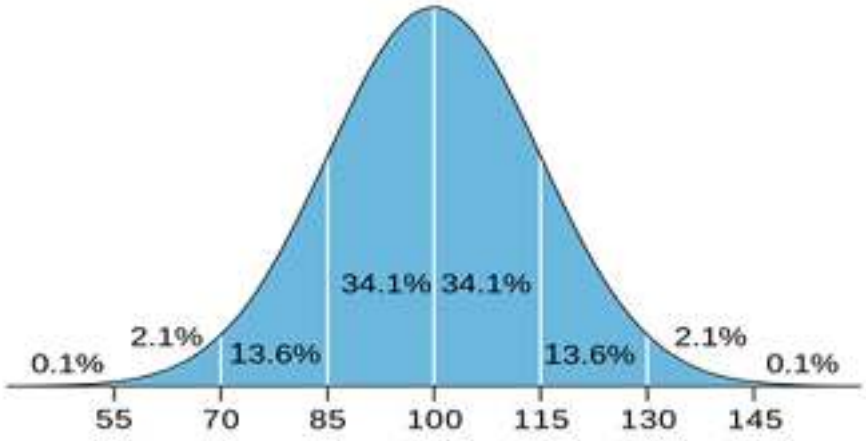
How do you measure intelligence?

Intelligence Quotient (IQ): This is a mathematical formula that is supposed to be a measure of a person's intelligence. When it was first created, it was defined as the ratio of mental age (MA) to chronological age (CA) multiplied by 100. For example, if a 20 year old answers the questions like a "typical" or "average" 20 year old would, the person would have an IQ of 100 (20/20 x 100 = 100).

IQ Score = MA / CA x 100

Mental age (MA): the typical intelligence level found for people at a given chronological age. Chronological age (CA): the actual age of the child taking the intelligence test.

- People whose mental age is equal to their chronological age will always have an IQ of 100. If the chronological age exceeds mental age – below-average intelligence (below 100). If the mental age exceed the chronological age – above-average intelligence (above 100).



The normal distribution: most of the population fall in the middle range of scores between 84 and 116.

- Very Superior Intelligence (gifted) - Above 130
- Superior Intelligence - 120 to 129
- High Average Intelligence - 110 to 119
- Average Intelligence - 90 to 109
- Low Average Intelligence - 80 to 89
- Borderline Intellectual Functioning - 71 to 79
- Mild Mental Retardation - 55 to 70
- Moderate Retardation - 40 to 54

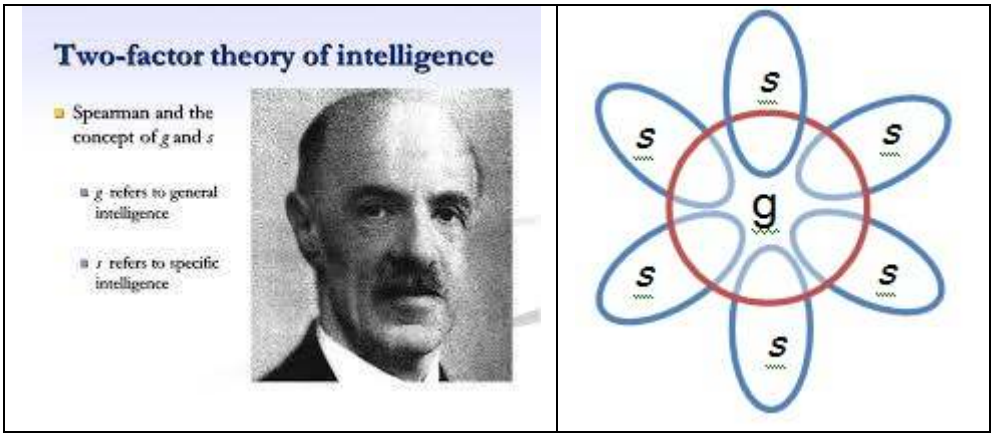
- Severe Mental Retardation - 25 to 39
- Profound Mental Retardation - Below 25

THEORIES OF INTELLIGENCE

Spearman's Two-factor Theory of Intelligence

It was developed in 1904 by an English Psychologist, Charles Spearman, who proposed that intellectual abilities were comprised of two factors : one general ability or common ability known as 'G' factor and the other a group of specific abilities known as 'S' factor. 'G' factor is universal inborn ability. Greater 'G' in an individual leads to greater success in life. 'S' factor is acquired from the environment. It varies from activity to activity in the same individual. In addition to 'G', there are so many 'S' factors found in a person. Viewed from the practical performance an individual is guided by both 'G' and 'S'. Every activity involves some amount of 'G'; factor and one of the 'S' factors. The mass of 'S' is unlimited. Theoretically each individual demonstrates endless types of 'S'. On the one hand amount of 'G' is fixed and permanent in an individual, whereas the strength of 'S' factor depends on experience and training of an individual. All actions are determined by both 'G' and 'S'. Amount of 'G' varies from individual to individual but it is fixed in each person whereas amount of 'S' factor varies within the individual.

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



Characteristics of 'G' Factor:

1. ‘G’ factor/General Intelligence is inborn and does not change as a result of training or education.
2. It is a central factor which supplies energy to all the ‘S’ factors.
3. It is constant in the sense that for any individual in respect of all the co-related abilities, it remains the same.
4. The amount of ‘G’ differs from individual to individual.
5. It is used in every life activity, therefore, success or failure of an individual in life is greatly determined by the amount of his ‘G’ factor.

Characteristics of ‘S’ Factor:

1. ‘S’ factor is learned and acquired in the environment.
2. The amount of ‘S’ factor can be improved through experience and training.
3. The amount of different ‘S’ factors varies within the individual.
4. ‘S’ factor serves as the base for the aptitude and interest of an individual for a particular kind of work or occupation.
5. ‘S’ factors determines the field of life of an individual.

Educational Implications:

Following are the educational implications of two factory theory of intelligence:

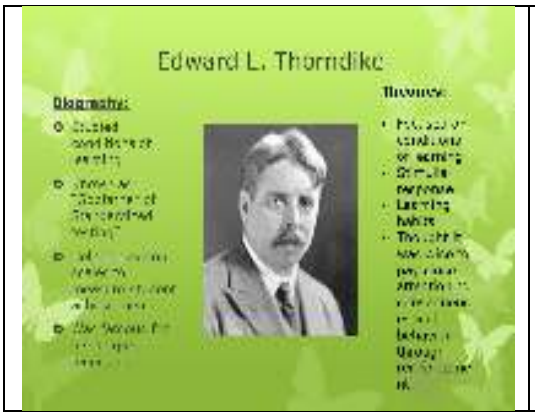
1. **Giving Intelligence Test**: In order to know the level of general intelligence of the students, teacher should administer the standardized test of intelligence on the students.
2. **Differential Aptitude Test Battery**: In order to know the strength of ‘S’ factors among different students teacher should administer the Differential Aptitude Test Battery to the students.
3. **Classification of Students:** The students should be classified in different sections on the basis of their level of general intelligence as well as on the basis of ‘S’ factor. In simple words the students having the strong mechanical ability should be kept in one group. Students having good verbal ability should be kept in other group and students having strong numerical ability should be kept in other group.
4. **Diversified Curriculum**: In order to cater to the educational needs of the students having different levels of general intelligence as well as different specific mental abilities, a diversified curriculum should be introduced so that all the students may opt for the subjects and activities as per their abilities.
5. **Psychological Methods of Teaching:** Teacher should apply the psychological methods of teaching keeping in view the level of general intelligence of the students as well as the strength of their ‘S’ factor.
6. **Co-curricular activities:** Various types of co-curricular activities suitable to the children having different levels of general intelligence as well as having different types of specific mental abilities should be organized in the educational institutions.

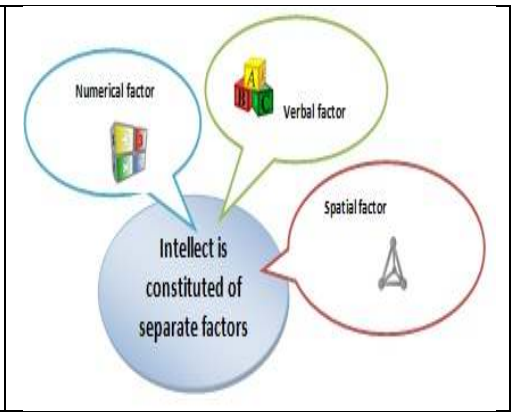
7. **Admission to various courses**: Admission to various courses should be given to the students on the basis of the level of their general intelligence as well as their specific mental ability or 'S' factor.
8. **Guidance and Counselling:** In order to help the students in making the right selection of the subjects, activities and opportunities at right time as well as for helping them in solving their personal, social and educational problems efficiently.
9. **Provision of Training to the Teachers:** Necessary training should be imparted to the teachers for educating the students having different types of specific mental abilities.

THORNDIKE'S MULTI-FACTOR THEORY OF INTELLIGENCE

Thorndike was an associationist and he opposed the theory of General intelligence. He proposed that these are Specific stimuli and Specific response. According to him, Intelligence is nothing more than a convenient name for almost infinite number of actual or potential specific connections between these stimuli and responses.
According to this theory intelligence is said to be constituted of multitude of separate factors or elements each being a minute element or ability. A mental act involves a number of these minute elements operating together. If any two tasks are correlated, the degree of correlation is due to the common elements involved in the two tasks. Thorndike distinguished 4 attributes of intelligence. They are: Level, Range, Area, and Speed.

- **Level**
  This refers to the difficulty of a task that can be solved. If we think of all test items arranged in a sequential order of increasing difficulty, then the height that we can ascend on this ladder of difficulty determines our level of intelligence.
- **Range**
  This refers to the number of tasks at any given degree of difficulty that we can solve. Theoretically an individual possessing a given level of intelligence should be able to solve the whole range of task at that level. Range is determined not only by Level but also by the breadth of experience and by opportunity to learn.
  In intelligence tests range is represented by items of equal difficulty.
- **Area**
  It refers to the total number of situations at each level to which the individual is able to respond. Area is the summation of all the ranges at each level of intelligence processed by an individual.
- **Speed**
  This is the rapidity with which an individual can respond to items.
  Speed and altitude are positively related. Speed is much closely bound up with altitude than are the other attributes. We should not therefore emphasis speed too much in our intelligence test.





Author of the theory assumed that intelligence involves three mutually independent abilities:

- **Abstract intelligence:** the ability to verbal and symbolic thinking.
- **Mechanical intelligence:** the ability to effectively control your body and manipulate objects
- **Social intelligence:** the ability to communicate with people, understand and perform in social relations

Thorndike came up with his model in 1920, when psychology was dominated by the concept of intelligence as a universal factor. As one of the first realized significant limitations of this approach and proposed a model consisting of three mutually independent components.

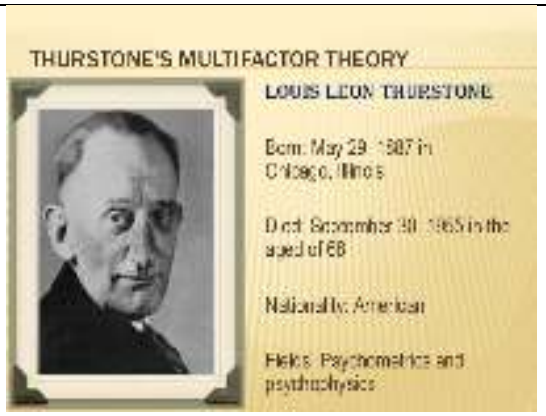
Use of the Thorndike's Intelligence Theory in practice: In human resource management it is used in job creation and staffing - in job analysis. The individual components are relatively independent of each other. During various work tasks and activities, different forms of intelligence apply in different degrees.

Thurstone's Group factor theory or Primary Mental Ability Theory of Intelligence

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

Thurstone gave this theory after using 56 different tests ranging from 2 to 20 minutes in duration of 240 students of Chicago University. On the basis of factorial analysis, he found that intelligence is comprised of seven primary mental abilities. Thurstone concludes that certain mental operations have a common primary factor that gives them psychological and functional unity and also differentiates them from other mental operations. These mental operations constitute a group. A second group of mental operations has its own unifying primary factor

and so on. In all there are seven such groups which cover the entire range of mental abilities. Each of these primary factors is independent of others.



Description of Primary Mental Abilities:

According to Thurstone, these seven primary mental abilities are:

1. **Verbal Comprehension:** It is the ability to understand and use verbal relations, words and ideas. In other words, it is the ability to use words in planning, thinking and communication.
2. **Numerical Ability:** It is the ability to do calculations quickly and accurately.
3. **Word Fluency:** It includes the use of vocabulary and communication skills.
4. **Memorising Ability:** It is the ability to retain the learnt material in the mind for long time and recall it spontaneously.
5. **Spatial Ability:** It is the ability to visualise objects in space.
6. **Perceptual Ability:** It is the ability to perceive objects accurately
7. **Reasoning Ability:** It is the ability to understand or judge the things with the help of signs and symbols. It may be inductive or deductive.
   a) Inductive Reasoning Ability - It is the ability to proceed from specific to general.
   b) Deductive Reasoning Ability - It is the ability to proceed from general to specific.

Educational Implications:

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

1. **Giving the Intelligence Tests:** In order to see the strength of different primary mental abilities in the students', teacher should administer the standardized intelligence test on the students.
2. **Classification of the Students:** The students should be classified in different categories/sections on the basis of their primary mental abilities.

3. **Diversified Curriculum:** In order to help the students to opt for the subjects and activities according to their primary mental abilities, a diversified curriculum should be introduced in the educational institution.
4. **Co-curricular activities:** In order to develop the different primary mental abilities among the students, various types of co-curricular activities should be organized in the educational institutions.
5. **Providing Freedom:** In order to give full expressions to the innate potentialities, talents and abilities maximum freedom should be given to the students.
6. **Introduction of creative activitie**s: Some creative activities like art and craft, drawing, painting, music, singing, dancing, dramatics, clay modelling and such other activities should be introduced in the curriculum for developing different primary mental abilities of the students.
7. **Admission to various courses:** Admission to various courses should be given on the basis of the strength of the primary mental ability of the students.

INTELLIGENCE TESTS

Verbal and Non-verbal tests of Intelligence (Simon-Binet Scale, Cattel's Culture Fair Test & Bhatia Battery Test)

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

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

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

1. **Verbal Tests:** Verbal intelligence tests include items that can be expressed in language forms. In this test, you are given a large no of questions which you have to solve in a very short period of time.

2. **Non- Verbal Tests:** Non verbal intelligence tests are expressed by means of objects, materials, for instance, lines, drawing, pictures, etc. The same procedure is followed in this test too, you are given a no of question which you have to solve in mean time.

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

a) Verbal Individual Intelligence Test
b) Non- Verbal Individual Intelligence Tests
c) Verbal Group Intelligence Tests
d) Non- Verbal Group Intelligence Tests

Simon-Binet Scale of Intelligence

The first successful test of intelligence was developed by French psychologist Alfred Binet in response to a request by French public school officials for a test that could identify school children at risk of falling behind their peers in academic achievement. The result was the Binet-Simon intelligence test.

The Binet-Simon test consists of a variety of items intended to reflect knowledge and skills which the average French school child of a given age would have. These items are graded in difficulty according to age, so that, for example, items the average twelve-year-old would be able to answer, a younger child would tend to miss. The test is administered individually, one-on-one, by a person trained to do so, and requires about of two hours to complete.

The scoring of the test produces a number called the child's mental age. The mental age reflects the level at which the child performed the test – If the child performed at the level of the average ten-year-old, for example, then the child would be assigned a mental age of ten, regardless of the child's chronological age (physical age). One compares the child's mental age to his or her chronological age. If the mental age is the same as the chronological age, then the child is average. If the mental age is higher than the chronological age, then the child is mentally “advanced” or gifted. If the mental age is lower than the chronological age, then the child is mentally “retarded,” or behind his or her peers in intellectual development.

The Binet-Simon test and its successors measure intelligence by assessing intellectual skills and knowledge. They assume that the individual has had the opportunity to learn these skills and knowledge; if the person had the opportunity to learn them and did not perform well, then this is assumed to reflect a deficit in intelligence. On the other hand, if the person has not had the exposure needed to learn these things, the failure to demonstrate knowledge of them says nothing about the person's intelligence. Ignoring this truth has led to some unwarranted conclusions being drawn based on test results.

Cattel’s Culture Fair Test of Intelligence

The Culture Fair Intelligence Test (CFIT) was conceived by Raymond B. Cattell in 1920s. It is a nonverbal instrument to measure your analytical and reasoning ability in the abstract and novel situations. The test includes mazes, classifications, conditions and series. Such problems

are believed to be common with all cultures. That's the reason that the testing industry claims it free from all cultural influences.

The culture fair is a high speed IQ test. The full scale is to be resolved in less than one hour. When you ignore the speed factor, your results can be misleading and even dangerous to your career efforts.

The culture fair intelligence test has gone through many revisions since its inception. The latest revision was made in 1961 and since then very smart and minor changes have been introduced. Currently you can find three scales of the culture fair IQ test.

The first scale of the culture fair test is used for children (4-8 years) and those who are mental retarded. This scale is not important for your career building efforts. However, the scale number 2 and 3 are used for screening purposes at job and college admission situations. So, the remaining part of this page shall focus upon the common features of these two scales of the culture fair intelligence test.

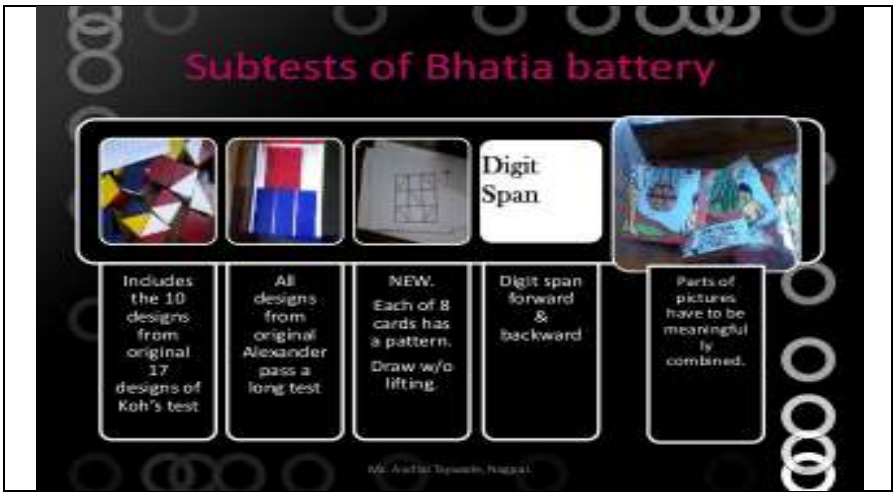
Two Forms of the Culture Fair Intelligence Test

The scale 2 and 3 contain two equivalent forms as A and B with the following features.

- Each form can be administered individually or with combination of the other form. When it is administered individually, it is called short intelligence test. However, when both forms of a scale are combined, it is called a full scale test.
- Each form is comprised of four sub-tests: series, classifications, matrices and conditions. Each sub-test is preceded by several practice questions. You are offered a booklet of eight-pages of multiple choice questionnaires.

BHATIA BATTERY OF PERFORMANCE TEST OF INTELLIGENCE

Bhatia's Battery of Performance Test of Intelligence was constructed by C. M. Bhatia in 1955. This test was developed to test the Intelligence of Indian Population This is a performance test of intelligence and consists of a battery of 5 Sub-tests, namely: Koh's Block Design Test, Pass-along Test, Pattern Drawing Test, Immediate Memory, and Picture Construction Test.



1. **Koh's Block Design Test:** This battery includes 10 designs from the original 17 designs from the Koh's test. The time for first five designs is 2 minutes and for the remaining five, the time is 3 minutes. The cards with a variety of coloured designs are shown to the test taker and he is asked to reproduce them using a set of coloured blocks. Performance is based not just on the accuracy of the drawings but also on the examiner's observation of behaviour during the test, including such factors as attention level, self-criticism and adaptive behaviour (such as self-help, communication, and social skills).
2. **Alexander Pass-along Test:** All the designs of the original test are included in this battery. The first four of these have to be completed in two minutes and the rest of the four have to be completed in 3 minutes.
3. **Pattern Drawing Test:** This test is constructed by Bhatia. This test includes eight cards. Every card has a pattern and the subject is required to draw these patterns in one go without lifting the pencil. The time for the first four cards in 2 minutes and for the rest of the four cards it is 3 minutes.
4. **Immediate Memory:** This test has two parts: digit span forward and digit span backward. The test taker is required to repeat the numbers the examiner says. The number of digit is increased on every trail. The test is continued till the subject repeats it successfully in the same order. This is digit span forward. In the backward recall, the numbers are repeated in the backward position, from the last to the first. This recall is also continued till the subject successfully repeats the sequence.
5. **Picture Construction Test:** This test requires the subject to construct a picture that is given in parts. The parts are to be meaningfully combined to construct the picture. The time for first two pictures is 2 minutes and the rest of the three pictures it is 3 minutes.

Individual administration of this test takes less than one hour. Maximum 95 marks can be obtained in the complete test. Maximum marks for the 1st, 2nd, 3rd, 4th, and 5th test are 25, 20, 20, 15, 15 respectively. The main objective of the test is to measure the intelligence of children and less educated or illiterate Indians. The norms for the test have been obtained for the boys of 11 and 16 years. Later, the norms for girls have also been obtained.

CREATIVIVY: CONCEPT, CHARACTERISTICS AND ITS NOURISHMENT

Creativity was believed to be a gift of God bestowed on highly talented people and geniuses. Therefore, the view that the very intelligent or very superior people would also be creative was held. Creativity was regarded as a rare quality of distinguished individuals. A creative person has an inborn talent. The relationship between creativity and intelligence is neither linear nor curvilinear. For a long time creativity was considered to be associated with artistic individuals who have been distinguished in various fields as painters, sculptors or writers. Creativity is distinguished by novelty, originality and is unusually inventive. Creativity is the power of the mind to form new ideas and thoughts. It helps you imagine something new and special. For example drawing, painting, writing, comes from being able to wonder, appreciate and think about things and be inspired by them. For example if you draw well and you see a beautiful painting, you begin to wonder at its beauty. You ask yourself why you should not paint something as beautiful as the picture you have seen. Next day, you begin to draw or paint something of your own which is more beautiful than that you have seen. This is your creativity. So creativity brings out something special in you. Now, you must be clear about the concept of creativity.

Definitions of Creativity

Drevdhal, J. E: "Creativity is the capacity of a person to produce compositions, products or ideas which are essentially new or novel and previously unknown to the producer."

Mc Kinnon: "Creative is a process extended in time and characterized by original adaptiveness and realization."

Taylor: "A process is creative when it results in a novel work that is accepted as tenable, useful or satisfying by a group at a point in time."

Torrance: "Creativity is a process sensing gaps or disturbing missing elements, forming ideas or hypotheses communicating the result, possibly modifying and re-testing hypotheses."

Characteristics of Creativity

1. In order to be creative, a person should be very well aware of the problems in his surroundings. A creative person is aware of the problems present in his surroundings and makes every effort to find out new solutions to these problems.
2. Dynamic Thinking- A creative person not only thinks creatively, but he will be having dynamic thinking. He has more capacity of adjustment.
3. The most important characteristic of creativity is divergent thinking. Divergent thinking involve continuity, flexibility, and originality. These qualities can be observed in the works of great scientists, philosophers and literary thinkers.
4. Besides being divergent, creativity leads to useful results. It is certain that a new idea gives immense pleasure to the thinker as creativity impresses every one. According to Bruner, a creative product must be impressive.

5. An important trait of creative thinking is flexibility of thinking and behaviour. The creative person is always prepared to adapt to new attitudes, ideas or behaviour.
6. Originality is an essential feature of creative thinking. A creative person is not confined to ideas or experiences. He uses new ideas, new attitudes and new methods.
7. In order to achieve the above mentioned traits of creative thinking, the creative person should have sufficient curiosity. It is due to curiosity that a person is anxious to know new things in any field. It is due to curiosity again that he seeks to utilize new methods.
8. An ordinary person is generally confined to his immediate environment and circumstances and hence cannot rise above it. A creative person on the other hand, has the ability to go beyond the immediateenvironment and show novelty in thinking and behaviour.
9. In order to find out new solutions, it is necessary that the problem should be looked from a new point of view. The object of thinking should be novel and valuable. Thinking should b divergent, highly motivated and constant.

NOURISHMENT OF CREATIVIVY

Creativity is difficult for a lot of people to quantify; it's a broad term, but an important skill. Creativity is what drives us as designers. Creativity and expertise is what makes the difference between an amateur and a professional. Creativity is usually a personal talent. And, the good news is: anyone can learn to be more creative in their work and life.

‘You can't wait for inspiration, you have to go after it with a club’

– Jack London

Education breeds knowledge, knowledge makes way for imagination and imagination takes on the path to creativity. A young mind is a power house as it strives to showcase what it has been carrying inside itself. When a person starts to comprehend the fact that the limitations set on the mind are nothing but illusions of fear, they unravel the mysteries of the mind and focus on finding their true self.

It is an era of self-development and self-awareness. Every single day, thousands of new ideas come into existence just because a few brilliantly wild yet disciplined students had the courage to think out of the box and look far beyond the normal course of things. They were not taught what to think rather they had the capability to analyze how to think about things. Education and training aims to provide the students with all the tools and resources that they need in order to disrupt the ordinary pattern of life and think of ideas that aspire to change the world and make it a better place. It’s a fact that when a fire is ignited in the mind to achieve something that seems impossible to achieve, that fire turns the mind into a golden sword that slashes away those self-doubts and turns you into a warrior who will fight and finish the battle.

Challenge is the mother of creativity. The more uncomfortable you get, the more imaginative your mind gets. As the students become part of the institute, their sense of innovation and the craft of creativity take a great jump towards the higher end of the spectrum. We should walk with our students to every possible extent and support their initiatives like a parent supporting the family. To believe that everyone on this planet has a creative thinker inside them and that's how we can change the world; by believing that we are unique in our ideas yet connected in that uniqueness.