# 1

# LEARNING APPROACHES AND EDUCATIONAL IMPLICATIONS

**a. Constructivist Approaches to Learning (7Es Model)**

**b. Collaborative Approaches to Learning**

**c. Inquiry –Based Approaches to Learning**

**Unit Structure**



## 1.0 OBJECTIVE

After going through this unit carefully you should be able to

- Understands meaning and nature of Learning Approaches of Education
- Explain the Constructive, Collaborative and Inquiry based Approaches of learning
- List out the educational implication of various learning approaches.

## 1.1 INTRODUCTION

This is the first unit of the second section of Educational Psychology. This course deals with the importance and contribution of educational psychology on the theory and practice of education. It enables a teacher that how learning process should be initiated, how to motivate, how to memorize or learn. It also helps a teacher to adjust his methodologies of learning according to the nature of the learner. The purpose of this unit is to explain different learning approaches with its educational implication.

## 1.2 MEANING OF LEARNING APPROACHES OF EDUCATION

Different learning approaches focuses on student's behaviors. How students know and understand, how they acquire behaviors, how and according to what they behave in which situations, the reason of the differences between behaviors, factors that affect human behaviors and different learning style. As is known, people acquire all their abilities throughout their lives after birth except for a few innate behaviors that are species-specific There are many definitions of learning, one of those is by Schuck ' learning involves the acquisition and modification of knowledge, skills, strategies, beliefs, attitudes and behaviors. Learning involves cognitive, linguistic, motor and social skills and can take many forms.' Schunk, D. (2000).

The learning approach are the elements used by teachers to help students understand the information in depth. The responsibility in this case is the teachers with the emphasis on planning, processing and methods of implementing the learning. In this unit we consider complex cognitive processes that lead to understanding. Understanding is more than memorizing; it is more than retelling in your own words. Understanding involves appropriately transforming and using knowledge, skills and idea. These understandings are considered "higher level of cognitive objectives. We will focus on the implication of learning approaches for the day today practice of teaching.

## 1.3 CONSTRUCTIVIST APPROACHES TO LEARNING (7ES MODEL) AND ITS EDUCATIONAL IMPLICATION

Fundamentally, constructivism says that people construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences. Learning is an interaction between the learner and the learning experience. In this learner-centered learning, students engage in an active role in their learning. Constructivism is the model which emphasizes the fact that learners construct or build their own understanding. For this purpose, there are several Constructivist models were formulated. One of the important Constructivist models 7-E Learning model. Constructivism view that emphasizes the active role of the learner in building understanding and making sense of information.

Formalization of the theory of Constructivism is generally attributed to Jean Piaget, who articulated mechanisms by which knowledge is internalized by learners. This theory describes how learning happens, regardless of whether learners are using their experiences to understand a lecture of following instructions. Constructivism implies that real learning occurs when student investigate a concept, find information, discuss it and create something with it.

**How is knowledge constructed?**
Different approaches to constructivism are based on how knowledge is constructed. Moshman(1982)described three explanations:

**External direction:** knowledge is acquired by constructing a representation of the outside world. Direct teaching, feedback and explanation affect learning. Knowledge is accurate to the extent that it reflects the "way things really are" in the outside world.

**Internal Direction:** knowledge is constructed by transforming, organizing and reorganizing previous knowledge. Knowledge is not a mirror of the external world, even though experience influences thinking and thinking influences knowledge. Exploration and discovery are more important than teaching.

**Both external and internal direction:** knowledge is constructed based on social interaction and experience. Knowledge reflect the outside world as filtered through and influenced by culture, language, beliefs, interaction with others, direct teaching and modelling. Guided discovery, teaching, models, and coaching as well as student's prior knowledge, beliefs' and thinking affects learning.

It is an approach in which the learner is building an internal illustration of knowledge, a personal interpretation of experience. It is active, constructive, cumulative, goal directed, diagnostic and reflective (Simons, 1993). The theory of Constructivism states that learning is nonlinear, recursive, continuous, complex and relational. It focuses on the learner and each learner's perceptions and motivation.

**Learning Cycle** The learning cycle is a methodology that provides students with experiences in generating both declarative and procedural knowledge and is grounded in Piaget's theory of Cognitive development (Lawson, 1988). The learning cycle rests on constructivism as its theoretical foundation. Atkins and Karpius developed a three-stage model. The Biological Science Curriculum Study program uses a five step learning cycle called 5-E model. The modified version of 5- E model is 7-E learning cycle.

**7-E Learning Model of constructivism:**

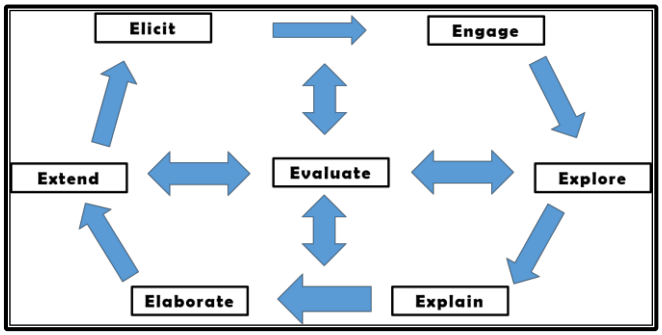


**Figure no. 1**

7-E learning cycle is a template for planning and getting the most out of the enquiry activities. The phases in the 7-E learning are Elicit, Engage, Explore, Explain, Elaborate, Evaluate and Extend. Explore – It is a phase of the learning cycle that

**Elicit** – It has to do with arousing the students' prior knowledge to ascertain what the student knows about the topic to be taught. Current research in cognitive science has shown that eliciting prior knowledge is a necessary component of the learning process . Recognizing that students construct knowledge from existing knowledge, teachers need to find out what existing knowledge their students possess

**Engage** – It is a phase of the learning cycle that the student is been engaged in a new concept through the use of short activities that prompt curiosity, enthusiasm and attention towards the new concept. It intends to capture student's mind and stimulate thinking. For example, a teacher may engage students by creating surprise or doubt through a demonstration that shows apiece of steel sinking and a steel toy boat floating. The corresponding conversation with the student may access their prior learning. The student should have the opportunity to ask and attempt to answer "why is it that the toy boat does not sink"? These capture their attention, prompting curiosity and stimulate thinking. These short activities by the teacher excite the students; get them interested and ready to learn

**Explore**- This phrase provides an opportunity for students with a common base of activities within which prior knowledge, process and skills are identified and conceptual change is facilitated. That is, using prior knowledge to generate new ideas. It provides an opportunity for students to observe and record data, isolate variable, design and plan experiments, create graphs, interpret results, develop hypotheses and organize their findings .Teachers may frame prompting questions, suggest approaches and assess understanding.

**Explain** – This phase focuses students' attention on a particular aspect of engagement and exploration experiences thereby providing opportunities to explain and demonstrate their conceptual understanding, process skills and behaviours. The teacher guides the student toward coherent and consistent generalization, helps the student with distinct scientific vocabulary and provides questions that help students use this vocabulary to explain the results of their exploration.

**Elaborate** – It is a phase of the learning cycle that provides the student with an opportunity to apply their knowledge in new domain hence challenge their conceptual understanding and skills through new experiences to foster deeper and broader understanding of the concept. This phase may also include related numerical problems for students to solve. The elaboration phase ties directly to the psychological construct

called “transfer of learning”. Transfer of learning can range from one concept to another (e.g. Newton’s law of gravitation and Coulomb’s law of electrostatic).

**Evaluate** – It is a phase that encourages students to assess their understanding and abilities. It provides the teacher with an opportunity to evaluate the students’ progress through a formative and summative evaluation. Students are allowed to pose questions to each other to evaluate themselves as to learn from each other's understanding of the concept while the teacher moderates the section.

**Extend** – This is an addition to the elaboration phase. Students are challenged to extend their understanding in a new context, compare and contrast ideas, theories and concept in a relationship with knowledge gained. Also find out the real-life situation the concept could be applied

The purpose of the first phase, elicit, is to assess student’s knowledge of the content. The engage phase is intended to motive students and to capture their interest in the topic. The third phase is exploration phase where teacher provides students with opportunities for experience to construct their own understanding of the concept. The purpose of the explain phase is to allow opportunities for students to verbalizing the concept. The fifth phase is elaboration phase where the students can apply the content to other situations. The sixth phase is evaluation phase. The purpose of this phase is to assess student’s understanding of the content. The last phase is extend phase. This phase challenges student understands to apply what they have learned.

**Educational Implication of Constructivism:**

Implications of Constructivism for Teaching and Learning:

Some of the implications of constructivism for teaching and learning are mentioned below:

- Teacher embed learning in complex, realistic and relevnt learning environment
- Teacher supports multiple perspective and use multiple representation of content
- Nurture self-awareness and an understanding that knowledge is constructed
- Teachers act as facilitators, supports, guides and models of learning.
- Learning concerns in adjusting our mental models to accommodate new experiences.
- Learning concerns in making connections between information.
- Instruction should be built around more complex problems, not problems with clear, correct answers.
- Context and personal knowledge have high significance.

- Students should help in establishing the criteria on which their work is assessed.
- Teachers know more and shouldn't let students muddle around.
- Student learning depends on background knowledge – that's why teaching facts is so necessary (reversed).
- Student interest and effort are more important than textbook content.
- It is sometimes better for teachers, not students, to decide what activities are to be done.
- Sense making and thinking are most important, not knowing content.
- Experimentation replaces rote learning.

**Check Your Progress:**
**Note**: a] Write your answer in the space given below:
A] Fill in the blanks:
1] Constructivism says people construct their own _____ and _____

2] Mention 7 E of Constructivism: 1] _____ 2] _____ 3] _____ 4] _____ 5] _____ 6] _____ 7].

B] Describe any five educational Implication of Constructivism.

_____
_____
_____
_____
_____

## 1.4 COLLABORATIVE APPROACHES TO LEARNING AND ITS EDUCATIONAL IMPLICATION

**"**Collaborative learning" is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. Usually, students are working in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product. Collaborative learning activities vary widely, but most center on students' exploration or application of the course material, not simply the teacher's presentation or explication of it. Collaborative learning is an educational approach to teaching and learning that involves groups of students working together to solve a problem, complete a task, or create a product.

**According to Gerlach**, "Collaborative learning is based on the idea that learning is a naturally social act in which the participants talk among themselves (Gerlach, 1994). It is through the talk that learning occurs."

There are many approaches to collaborative learning. A set of assumptions about the learning process (Smith and MacGregor, 1992) underlies them all:

1. Learning is an active process whereby students assimilate the information and relate this new knowledge to a framework of prior knowledge.
2. Learning requires a challenge that opens the door for the learner to actively engage his/her peers, and to process and synthesize information rather than simply memorize and regurgitate it.
3. Learners benefit when exposed to diverse viewpoints from people with varied backgrounds.
4. Learning flourishes in a social environment where conversation between learners takes place. During this intellectual gymnastics, the learner creates a framework and meaning to the discourse.
5. In the collaborative learning environment, the learners are challenged both socially and emotionally as they listen to different perspectives, and are required to articulate and defend their ideas. In so doing, the learners begin to create their own unique conceptual frameworks and not rely solely on an expert's or a text's framework.

Thus, in a collaborative learning setting, learners have the opportunity to converse with peers, present and defend ideas, exchange diverse beliefs, question other conceptual frameworks, and be actively engaged.

Collaborative learning processes can be incorporated into a typical 50-minute class in a variety of ways. Some require a thorough preparation, such as a long-term project, while others require less preparation, such as posing a question during lecture and asking students to discuss their ideas with their neighbors (see concept tests). As Smith and MacGregor state, "In collaborative classrooms, the lecturing/listening/note-taking process may not disappear entirely, but it lives alongside other processes that are based in students' discussion and active work with the course material." Regardless of the specific approach taken or how much of the ubiquitous lecture-based course is replaced, the goal is the same: to shift learning from a teacher-centered to a student-centered model. Some examples/methods of collaborative learning are- Cooperative Learning, Problem-Centered Instruction, Simulations, Peer Teaching, Writing Groups etc.

**Educational implication of Collaborative learning:**
Research shows that educational experiences that are active, social, contextual, engaging, and student-owned lead to deeper learning. The benefits of collaborative learning include:

- Involvement Develop higher-level thinking, oral communication, self-management, and leadership skills. Involvement in learning, involvement with other students, and involvement with faculty are

factors that make an overwhelming difference in student retention and success in college. By its very nature, collaborative learning is both socially and intellectually involving. It invites students to build closer connections to other students, their faculty, their courses and their learning.

- Promotion of student-faculty interaction. In collaborative endeavors, students inevitably encounter difference, and must grapple with recognizing and working with it. Building the capacities for tolerating or resolving differences, for building agreement that honors all the voices in a group, for caring how others are doing -- these abilities are crucial aspects of living in a community.
- Increase in student retention, self-esteem, and responsibility. Cultivation of teamwork, community building, and leadership skills are legitimate and valuable classroom goals, not just extracurricular ones.
- Exposure to and an increase in understanding of diverse perspectives. If democracy is to endure in any meaningful way, our educational system must foster habits of participation in and responsibility to the larger community. Collaborative learning encourages students to acquire an active voice in shaping their ideas and values and a sensitive ear in hearing others.
- Preparation for real life social and employment situations. Dialogue, deliberation, and consensus-building out of differences are strong threads in the fabric of collaborative learning, and in civic life as well.
- Help students develop the skills they need to succeed, such as using team-building exercises or introducing self-reflection techniques.
- Incorporate self-assessment and peer assessment for group members to evaluate their own and others' contributions.

**Check Your Progress:**
**Note**: a**] Write your answer in the space given below:**
**A] Fill in the blanks:**
**1] Collaborative learning is an educational approach to _____and_____ learning that involves groups of students working together to solve a problem.**

**2] _____ and _____ are the method of collaborative learning.**

**B] Describe any five educational Implication of Collaborative learning.**

## 1.5 INQUIRY –BASED APPROACHES TO LEARNING AND ITS EDUCATIONAL IMPLICATION

Inquiry-based learning is an approach to learning that emphasizes the student's role in the learning process. Rather than the teacher telling students what they need to know, students are encouraged to explore the material, ask questions, and share ideas. Inquiry based learning is a student centered approach to learning in which the teacher presents a puzzling situation and student solve the problem by gathering data and testing their conclusion. Jhon Dewey described the basic inquiry learning format in 1910. The teacher presents a puzzling event, question, or problem. The students:

- Formulate hypotheses to explain the event or solve the problem.
- Collect data to test hypothesis,
- Draw conclusion, and
- Reflect on the original problem and thinking processes needed to solve.

Inquiry-based learning uses different approaches to learning, including small-group discussion and guided learning. Instead of memorizing facts and material, students learn by doing. This allows them to build knowledge through exploration, experience, and discussion.

Just like **experiential learning**, inquiry-based learning actively engages students in the learning process. Students aren't just hearing or writing what they are learning. Instead, students get the chance to explore a topic more deeply and learn from their own first-hand experiences.
We retain 75% of what we do compared to 5% of what we hear and 10% of what we read**.** Inquiry-based learning allows students to better understand and recall material by actively engaging with it and making their own connections.

In one kind of inquiry, teachers present a problem and students ask yes/no questions to gather information and test the hypothesis; this allow the teacher to monitor students thinking and guide the process. Here is an example:

1. Teachers present discrepant event: the teacher blow softly across the top of an sheet pf paper, and the paper rises. Teacher asks students to figure out why it is rises.
2. Students ask questions to gather information and to isolate relevant variables: teacher answer only "yes" or "no". students ask if temperature is important(no). They ask the paper is of a special type(no). They ask if air pressure has anything to do with the paper rising(yes).
3. Student test causal relationship: In this case, they ask if the nature of the air on top causes the paper to rise(yes). They ask if the fast

movement of the air results in less pressure on top (yes). Then they test out the rule with other materials- for example, the plastic.

4. Students form a generalization (principle): If the air on the top moves faster than the air on bottom of a surface, than the air pressure on the top is less ended, and the object rises." Later lessons expand students understanding of the principles and physical laws through further experiments.
5. The teacher leads students in a discussion of thinking processes. What were the important variables? How did you put the cause and effects together? And so on.

**Educational Implication of Inquiry Based Approach:**
Now that you know more about this learning approach, let's take a look at the advantages and benefits of inquiry-based learning.

**1. Enhances learning experiences for children:**
Sitting in a classroom taking notes isn't always the most effective (or fun) way to learn. Rather than memorizing facts from the teacher, inquiry-based learning enhances the learning process by letting students explore topics themselves.

**2. Teaches skills needed for all areas of learning:**
As they explore a topic, students build critical thinking and communication skills. The cognitive skills that students develop can be used to improve comprehension in every subject, as well as in day-to-day life.

**3. Fosters curiosity in students:**
An inquiry-based learning approach lets students share their own ideas and questions about a topic. This helps foster more curiosity about the material and teaches skills students can use to continue exploring topics they are interested in.

**4. Deepens students' understanding of topics:**
Rather than simply memorizing facts, students make their own connections about what they are learning. This allows them to gain a better understanding of a topic than they would get by just memorizing and recalling facts.

**5. Allows students to take ownership of their learning:**
Students have the opportunity to explore a topic, giving them more of a sense of ownership over their learning. Instead of the teacher telling them what they should know, students are able to learn in a way that works for them.

**6. Increases engagement with the material:**
As a form of active learning, this approach encourages students to fully engage in the learning process. By allowing students to explore topics,

make their own connections, and ask questions, they are able to learn more effectively.

**7. Creates a love of learning:**
Inquiry-based learning is designed to teach students a love of learning. When students are able to engage with the material in their own way, not only are they able to gain a deeper understanding—they are able to develop a passion for exploration and learning.

**Check Your Progress:**
**Note**: a] Write your answer in the space given below:
A] Fill in the blanks:
1. Inquiry-based learning uses different approaches to learning, including _____and _____.

2. In Inquiry based learning students get the chance to _____a topic more deeply and learn from their own first-hand experiences.

B] Describe any five educational Implication of Inquiry Based Learning.

## 1.6 LET US SUM UP

This unit covers the following topics

- Constructivism is the model which emphasizes the fact that learners construct or build their own understanding. For this purpose, there are several Constructivist models were formulated.
- 7 E model of constructivism – Elicit, Engage, Explore, Evaluate, Elaborate, Explain, Extend.
- Collaborative learning is an educational approach to teaching and learning that involves groups of students working together to solve a problem, complete a task, or create a product.
- Inquiry based learning is a student centered approach to learning in which the teacher presents a puzzling situation and student solve the problem by gathering data and testing their conclusion.

## 1.7 UNIT END EXERCISE

Q.1 Explain the meaning of Constructivism and its educational implication.

Q.2 Describe 7 E s of constructivism.

Q3. Explain inquiry based Learning with its educational Implication.

Q4. "Learning is an active process whereby students assimilate the information and relate this new knowledge to a framework of prior knowledge". Justify the statement with reference to collaborative learning.

Q.5 Short notes

a. Any five educational implication of collaborative learning.

b. Writes on the process of Inquiry based learning.

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# 2

# APPROACHES AND THEORIES OF LEARNING

**Unit Structure**



## 2.0 OBJECTIVES

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

1) Understand Piaget's theory of cognitive development.
2) Understand Jerome Bruner's approach that all knowledge creation is relative to the perspective on which it is built.
3) Understand Dr. Gardner eight different intelligences to account for a broader range of human potential in children and adults.
4) Understand Vygotsky's theories which stresses on the fundamental role of social interaction in the development of cognition.

## 2.1 INTRODUCTION

No two individuals are exactly alike. Some are bright, others are dull, some are quick, other slow, some solve problems quickly and directly, others fumble over them for a long time, some adapt themselves to new situations easily, while others experience difficulty. The teacher is

conscious that are individual differences in the intelligence. Keeping this in view many psychologists have propounded several theories. Jean Piaget and Jerome Bruner constructed theories of cognitive development which states that, intelligence develops in a series of stages that are related to age and are progressive because one stage must be accomplished before the next can occur. Len Vygotsky stated that social interaction plays a critical role in children's learning. Through such social interactions, children go through a continuous process of learning. And Howard Gardner stated that people have multiple different ways of thinking and learning.
Thus, this unit throws light on the various theories related to cognitive development, social development and multiple intelligence.

## 2.2 COGNITIVE DEVELOPMENT THEORIES –

- Jean Piaget
- Jerome Bruner

### 2.2.1 Jean Piaget's theory of Cognitive development:

Piaget's (1936) theory of cognitive development explains how a child constructs a mental model of the world. He disagreed with the idea that intelligence was a fixed trait, and regarded cognitive development as a process which occurs due to biological maturation and interaction with the environment.

Piaget (1936) was the first psychologist to make a systematic study of cognitive development. His contributions include a stage theory of child cognitive development, detailed observational studies of cognition in children, and a series of simple but ingenious tests to reveal different cognitive abilities.

To Piaget, cognitive development was a progressive reorganization of mental processes as a result of biological maturation and environmental experience.

**There are three basic components to Piaget's Cognitive Theory:**

**2) Schemas: (Building blocks of knowledge):**

Schema describes both the mental and physical actions involved in understanding and knowing. Schemas are categories of knowledge that help us to interpret and understand the world. In Piaget's view, a schema includes both a category of knowledge and the process of obtaining that knowledge. As experiences happen, this new information is used to modify, add to, or change previously existing schemas.

For example, a child may have a schema about a type of animal, such as a dog. If the child's sole experience has been with small dogs, a child might believe that all dogs are small, furry, and have four legs. Suppose then that the child encounters an enormous dog. The child will take in this new

information, modifying the previously existing schema to include these new observations.

**2) Adaptation Process:** (enables the transition from stage to another) – assimilation, accommodation and equilibrium.

- **Assimilation:**

The process of taking in new information into our already existing schemas is known as assimilation. The process is somewhat subjective because we tend to modify experiences and information slightly to fit in with our pre-existing beliefs. In the example above, seeing a dog and labelling it "dog" is a case of assimilating the animal into the child's dog schema.

- **Accommodation:**

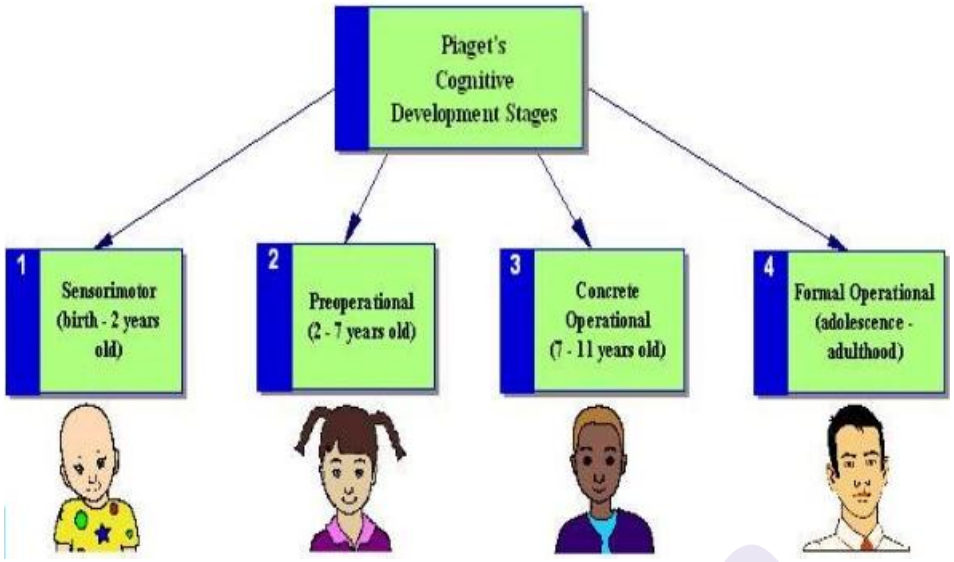
Another part of adaptation involves changing or altering our existing schemas in light of new information, a process known as accommodation. Accommodation involves modifying existing schemas, or ideas, as a result of new information or new experiences. New schemas may also be developed during this process.

- **Equilibration:**

Piaget believed that all children try to strike a balance between assimilation and accommodation, which is achieved through a mechanism Piaget called equilibration. As children progress through the stages of cognitive development, it is important to maintain a balance between applying previous knowledge (assimilation) and changing behaviour to account for new knowledge (accommodation). Equilibration helps explain how children can move from one stage of thought to the next.

**3) Stages of cognitive development:**

- Sensorimotor,
- Preoperational,
- Concrete operational,
- Formal operational.




**i) The Sensorimotor Stage:**
Ages: Birth to 2 years

**Major characteristics and developmental changes:**

- The infants know the world through their movements and sensations.
- Children learn about the world through basic actions such as sucking, grasping, looking and listening.
- Infants learn that things continue to exist even though they cannot be seen. (object permanence)
- They are separate beings from the people and objects around them.
- They realize that their actions can cause things to happen in the world around them.

During this earliest stage of cognitive development, infants and toddlers acquire knowledge through sensory experiences and manipulating objects. A child's entire experience at the earliest period of this stage occurs through basic reflexes, senses, and motor responses.

It is during the sensorimotor stage that children go through a period of dramatic growth and learning. As kids interact with their environment, they are continually making new discoveries about how the world works.

The cognitive development that occurs during this period takes place over a relatively short period of time and involves a great deal of growth. Children not only learn how to perform physical actions such as crawling and walking; they also learn a great deal about language from the people with whom they interact. Piaget also broke this stage down into a number

of different substages. It is during the final part of the sensorimotor stage that early representational thought emerges.

Piaget believed that developing object permanence or object constancy, understanding that the objects continue to exists even when they cannot be seen was an important element at this point of development.

By learning that objects are separate and distinct entities and that they have an existence of their own outside of individual perception, children are then able to begin to attach names and words to objects.

**ii) The Preoperational Stage:**
Ages: 2 to 7 years

**Major characteristics and developmental changes:**

- Children begin to think symbolically and learn to use words and pictures to represent objects.
- Children at this stage tend to be egocentric and struggle to see things from the perspective of others.
- While they are getting better with language and thinking, they still tend to think about things in very concrete terms.

The foundations of language development may have been laid during the previous stage, but it is the emergence of language that is one of the major hallmarks of the preoperational stage of development.

At this stage, kids learn through pretend play but still struggle with logic and taking the point of view of other people. They also often struggle with understanding the idea of constancy.

For example, a researcher might take a lump of clay, divide it into two equal pieces, and then give a child the choice between two pieces of clay to play with. One piece of clay is rolled into a compact ball while the other is smashed into a flat pancake shape. Since the flat shape looks larger, the preoperational child will likely choose that piece even though the two pieces are exactly the same size.

**iii) The Concrete Operational Stage:**
Ages: 7 to 11 years

**Major characteristics and developmental changes:**

- During this stage, children begin to thinking logically about concrete events.
- They begin to understand the concept of conservation; that the amount of liquid in a short, wide cup is equal to that in a tall, skinny glass, for example.

- Their thinking becomes more logical and organized, but still vey concrete.
- Children begin using inductive logic, or reasoning from specific information to general principle.

While children are still very concrete and literal in their thinking at this point in development, they become much more adept at using logic.[2] The egocentrism of the previous stage begins to disappear as kids become better at thinking about how other people might view a situation.

During this stage, children also become less egocentric and begin to think about how other people might think and feel. Kids in the concrete operational stage also begin to understand that their thoughts are unique to them and that not everyone else necessarily shares their thoughts, feelings, and opinions.

**iv) The Formal Operational Stage:**
Ages: 12 and up

**Major characteristics and developmental changes:**

- At this stage, the adolescents or young adult begins to think abstractly and reason about hypothetical problems.
- Abstract thought emerges.
- Teens begin to think more about moral, philosophical, ethical, social and political issues that require theoretical and abstract reasoning.
- Begin to use deductive logic, or reasoning from a general principle to specific information.

The final stage of Piaget's theory involves an increase in logic, the ability to use deductive reasoning, and an understanding of abstract ideas. At this point, people become capable of seeing multiple potential solutions to problems and think more scientifically about the world around them.

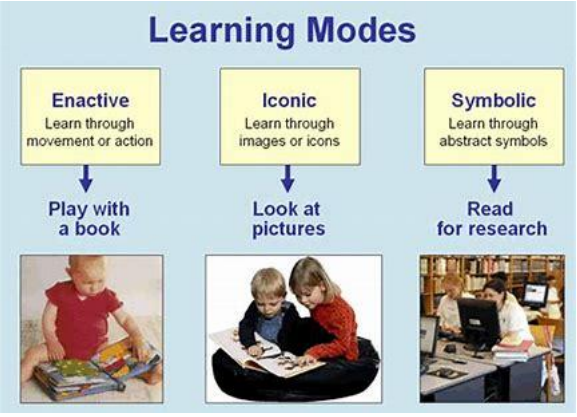
It is important to note that Piaget did not view children's intellectual development as a quantitative process; that is, kids do not just add more information and knowledge to their existing knowledge as they get older. Instead, Piaget suggested that there is a qualitative change in how children think as they gradually process through these four stages. A child at age 7 doesn't just have more information about the world than he did at age 2; there is a fundamental change in how he thinks about the world.

Thus, Jean Piaget concentrated only on the developmental aspect of intelligence. Piaget in his theory mainly starts by analysing the existing biological characteristics and ends in cognitive results. Thus, Piaget's main interest was in the existence and development of cognition.

### 2.2.1.a Educational Implications:

1. A focus on the process of children's thinking, not just its products. Instead of simply checking for a correct answer, teachers should emphasize the student's understanding and process they used to get the answer.
2. Recognition of the crucial role of children's self-initiated, active involvement in learning activities. In a Piagetian classroom, children are encouraged to discover themselves through spontaneous interaction with the environment, rather than the presentation of ready-made knowledge.
3. A deemphasis on practices aimed at making children adult like in their thinking. This refers to what Piaget referred to as the "American question" which is "How can we speed up development?". His belief is that trying to speed up and accelerate children's process through the stages could be worse than no teaching at all.
4. Acceptance of individual differences in developmental progress. Piaget's theory asserts that children go through all the same developmental stages, however they do so at different rates. Because of this, teachers must make special effort to arrange classroom activities for individuals and groups of children rather than for the whole class group.
5. The teachers' main role is the facilitation of learning by providing various experiences for the students. "Discovery Learning" allows opportunities for students to explore and experiment, while encouraging new understandings. Opportunities that allow learners of different cognitive levels to work together often help encourage less mature students to advance to a higher understanding of the material.
6. Encourages child-centred learning. Teaching has to be focused upon the child, taking into consideration their development stage and level.

### 2.2.2 Jerome Bruner theory of Cognitive development:




Jerome Seymour Bruner (October 1, 1915 – June 5, 2016) was an American psychologist who made significant contributions to human

cognitive psychology and cognitive learning theory in educational psychology. Cognitive psychologist Jerome Bruner felt the goal of education should be intellectual development, as opposed to rote memorization of facts. A major theme in the theoretical framework of Bruner is that learning is an active process in which learners construct new ideas or concepts based upon their current/past knowledge.

We will also explore his beliefs on learning, language, and discovery and differentiate his views from those of Jean Piaget.

**Bruner held the following beliefs regarding learning and education:**

- He believed curriculum should foster the development of problem-solving skills through the processes of inquiry and discovery.
- He believed that subject matter should be represented in terms of the child's way of viewing the world.
- That curriculum should be designed so that the mastery of skills leads to the mastery of still more powerful ones.
- He also advocated teaching by organizing concepts and learning by discovery.
- Finally, he believed culture should shape notions through which people organize their views of themselves and others and the world in which they live.

Below is described, Bruner's theory of development and his three modes of representation.

**Enactive (0 - 1 years):**
The enactive stage appears first. This stage involves the encoding and storage of information. There is a direct manipulation of objects without any internal representation of the objects. This mode is used within the first year of life (corresponding with Piaget's sensorimotor stage). Thinking is based entirely on physical actions, and infants learn by doing, rather than by internal representation (or thinking).

It involves encoding physical action-based information and storing it in our memory. For example, in the form of movement as a muscle memory, a baby shakes a rattle and hears a noise. The baby has directly manipulated the rattle and the outcome was a pleasurable sound. In the future, the baby may shake his hand, even if there is no rattle, expecting his hand to produce the rattling sounds. The baby does not have an internal representation of the rattle and, therefore, does not understand that it needs the rattle in order to produce the sound.

**Iconic (1 - 6 years):**
The iconic stage appears from one to six years old. This stage involves an internal representation of external objects visually in the form of a mental image or icon. Information is stored as sensory images (icons), usually

visual ones, like pictures in the mind. Thinking is also based on the use other mental images (icons), such as hearing, smell or touch. For some, this is conscious; others say they don't experience it. This may explain why, when we are learning a new subject, it is often helpful to have diagrams or illustrations to accompany the verbal information.

For example, a child drawing an image of a tree or thinking of an image of a tree would be representative of this stage.

**Symbolic (7 years onwards):**
The symbolic stage, from seven years and up, is when information is stored in the form of a code or symbol such as language. This develops last. Each symbol has a fixed relation to something it represents. In the symbolic stage, knowledge is stored primarily as words, mathematical symbols, or in other symbol systems, such as music. Symbols are flexible in that they can be manipulated, ordered, classified etc., so the user isn't constrained by actions or images (which have a fixed relation to that which they represent).

For example, the word 'dog' is a symbolic representation for a single class of animal. Symbols, unlike mental images or memorized actions, can be classified and organized. In this stage, most information is stored as words, mathematical symbols, or in other symbol systems.

Thus, Bruner believed that all learning occurs through the stages we just discussed. This constructivist theory implies learners (even adults) should tackle new material by progressing from enactive to iconic to symbolic representation. Another implication is that even very young learners are capable of learning any material, provided it is appropriately organised to match their current level of ability.

**2.2.2.a Educational Implications:**

1. Instruction must be appropriate to the level of the learners. For example, being aware of the learners' learning modes (enactive, iconic, symbolic) will help you plan and prepare appropriate materials for instruction according to the difficulty that matches learners' level.
2. The teachers must revisit material to enhance knowledge. Building on pre-taught ideas to grasp the full formal concept is of paramount importance according to Bruner. Feel free to re-introduce vocabulary, grammar points, and other topics now and then in order to push the students to a deeper comprehension and longer retention.
3. Material must be presented in a sequence giving the learners the opportunity to:
   a. acquires and construct knowledge,
   b. transform and transfer his learning.
4. Students should be involved in using their prior experiences and structures to learn new knowledge.

5. Help students to categorize new information in order to able to see similarities and differences between items.
6. Teachers should assist learners in building their knowledge. This assistance should fade away as it becomes unnecessary.
7. Teachers should provide feedback that is directed towards intrinsic motivation. Grades and competition are not helpful in the learning process. Bruner states that learners must "experience success and failure not as reward and punishment, but as information"

**Activity 2.2**

1) Name the two theories of Cognitive Development

2) Name 3 components of Jean Piaget's Theory

3) Name 3 modes of Jerome Bruner's cognitive development theory.

**Check your progress 2.2**

**Note:** a) Write down the answers in the space given below

1) Explain 4 stages of Jean Piaget's Theory

2) Explain, Bruner's theory of development and his three modes of representation.

## 2.3 SOCIAL DEVELOPMENT THEORY

- Lev Vygotsky

### 2.3.1 Lev Vygotsky's theory on Social Development:


Vygotsky's Social Development Theory is the work of Russian psychologist Lev Vygotsky. Vygotsky's work was largely unknown to the West until it was published in 1962.

Vygotsky's theory is one of the foundations of constructivism. It asserts three major themes regarding social interaction, the more knowledgeable other, and the zone of proximal development.

**i) Social Interaction:**
The Social Development Theory (SDT) mainly asserts that social interaction has a vital role in the cognitive development process. With this concept, Vygotsky's theory opposes that of Jean Piaget's Cognitive Development Theory because Piaget explains that a person undergoes development first before he achieves learning, whereas Vygotsky argues that social learning comes first before development. Through the Social Development Theory, Vygotsky states that the cultural development of a child is firstly on the social level called inter-psychological, and secondly on the individual or personal level called intra-psychological.

**ii) The More Knowledgeable Other (MKO):**
The MKO is any person who has a higher level of ability or understanding than the learner in terms of the task, process or concept at hand. Normally, when we think of an MKO we refer to an older adult, a teacher or an expert. For example, a child learns multiplication of numbers because his tutor teaches him well. The traditional MKO is an older person; however, MKOs could also refer to our friends, younger people and even electronic devices like computers and cell phones. For instance, you learn how to skate because your daughter taught you this skill.

**iii) The Zone of Proximal Development (ZPD):**
The ZPD is the distance between a student's ability to perform a task under adult guidance and/or with peer collaboration and the student's ability solving the problem independently. According to Vygotsky, learning occurred in this zone.

Vygotsky focused on the connections between people and the sociocultural context in which they act and interact in shared experiences. According to Vygotsky, humans use tools that develop from a culture, such as speech and writing, to mediate their social environments. Initially children develop these tools to serve solely as social functions, ways to communicate needs. Vygotsky believed that the internalization of these tools led to higher thinking skills.

Thus, Vygotsky focused on the connections between people and the sociocultural context in which they act and interact in shared experiences. According to Vygotsky, humans use tools that develop from a culture, such as speech and writing, to mediate their social environments. Initially children develop these tools to serve solely as social functions, ways to communicate needs. Vygotsky believed that the internalization of these tools led to higher thinking skills.

**In a Nut shell:**

1) Vygotsky places more emphasis on culture affecting cognitive development. Vygotsky assumes cognitive development varies across cultures.
2) Vygotsky places considerably more emphasis social factors contributing to cognitive development. Vygotsky states cognitive development stems from social interactions from guided learning within the zone of proximal development as children and their partner's co-construct knowledge. For, Vygotsky, the environment in which children grow up will influence how they think and what they think about,
3) Vygotsky places more emphasis on the role of language in cognitive development. For Vygotsky, thought and language are initially separate systems from the beginning of life, merging at around three years of age, producing verbal thought (inner speech). For Vygotsky, cognitive development results from an internalization of language.
4) According to Vygotsky adults are an important source of cognitive development. He advocates adults transmit their culture's tools of intellectual adaptation that children internalize.

**2.3.1.a Educational Applications:**

**1)** One of the applications of Vygotsky's theories is "reciprocal teaching," which is used to improve students' ability to learn from text. In this method, teachers and students collaborate in learning and

practicing four key skills: summarizing, questioning, clarifying, and predicting. The teacher's role in the process is reduced over time.

**2)** Also, Vygotsky is relevant to instructional concepts such as "scaffolding" and "apprenticeship," in which a teacher or more advanced peer helps to structure or arrange a task so that a novice can work on it successfully.

**3)** Vygotsky's theories also feed into the current interest in collaborative learning, suggesting that group members should have different levels of ability so more advanced peers can help less advanced members operate within their ZPD.

**4)** Vygotsky's theory makes the teacher to discuss with a child, read books, interact in a way that helps the child to get a rich vocabulary and conceptual understanding, which will help them to control themselves with language.

Individual difference is taken into consideration which in turn helps the learner to learn as per his/her capacity, capabilities, interest etc.

**Activity 2.3:**
1) Explain MKO (More Knowledgeable Other in detail)

**Check your progress 2.3**

**Note:** a) Write down the answers in the space given below.

1) Explain the three major themes of Lev Vygotsky's social interaction theory

## 2.4 LEARNING STYLES AND MULTIPLE INTELLIGENCE THEORY (HOWARD GARDNER)

**Learning Styles:**
It's believed people processes information uniquely, so trainers and teachers should understand the different learning styles. With this knowledge, you'll be able to tailor your teaching to suit your students or trainees. The term "learning styles" speaks to the understanding that every student learns

differently. Technically, an individual's learning style refers to the preferential way in which the student absorbs, processes, comprehends and retains information.

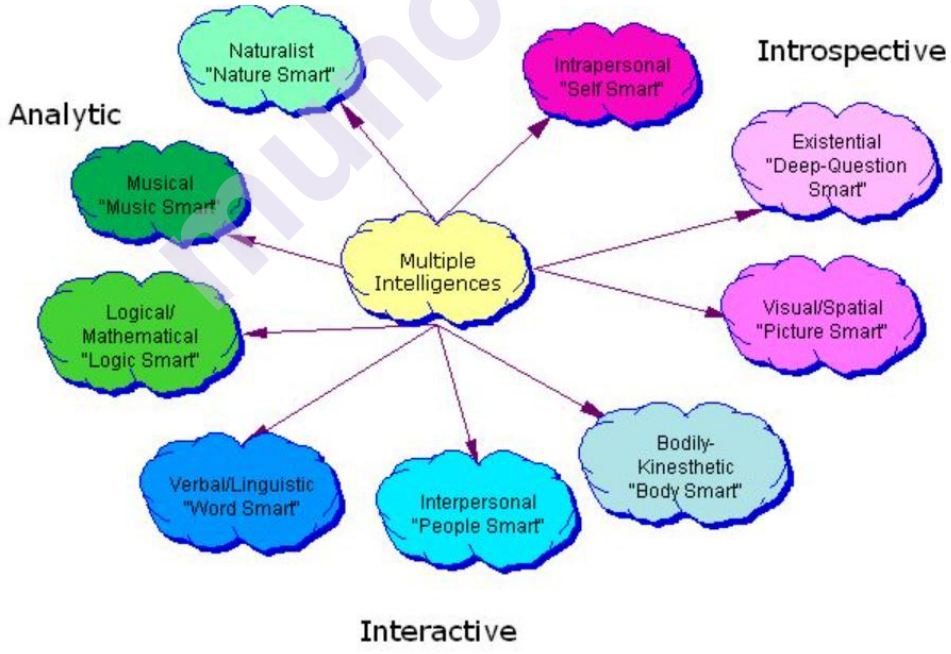
**Multiple Intelligence Theory:**

- Howard Gardner

### 2.4.1 Howard Gardner's theory on Multiple Intelligence:

The theory of multiple intelligences was introduced in 1983 by psychologist Howard Gardner in his book Frames of Mind. The essence of Gardner's Multiple Intelligences (MI) is that each person has eight types of intelligence. According to Howard Gardner, intelligence means "the ability to learn, to solve problems". This can be done in multiple ways. Each person has developed other intelligences more strongly, leading to different kinds of cleverness. With his theory of multiple intelligences, Gardner aims to emphasise that teachers must assess their student's learning process in a way that provides a correct overview of their strong and weak suits.

**According to Gardner,** "intelligence is (a) the ability to create an effective product or offer a service that is valued in a culture, (b) a set of skills that make it possible for a person to solve problems in life, and (c) the potential for finding or creating solutions for problems, which involves gathering new knowledge."



**According to Gardner there are 9 intelligence or categories of human abilities:**

**1) Verbal-linguistic Intelligence: (words, language and writing):**
Linguistic intelligence is generally called verbal ability. It is responsible for all kinds of linguistic competencies, abilities, talents and skills available in human beings. It is a person's ability to deal with grammar and in speech. It can be best divided into components like (i) syntax, (ii) Semantics and (iii) pragmatics as well as (iv) more school-oriented skills such as written or oral expression and understanding. This type of intelligence is most visible in professional like lawyers, lecturers, writers and lyricists, journalists and a number of other professionals exploiting linguistic intelligence.

**2) Logical-mathematical intelligence: (analysing problems and mathematical operations):**
Logical-mathematical intelligence is responsible for all types of abilities, talents and skills in areas related to logical and mathematics. It has to do with numerical ability such as solving logical puzzles and mathematical problems. It can be divided into components like

(i) Deductive reasoning, (ii) Inductive reasoning, (iii) Scientific thinking including solving puzzles, carrying out calculations. Professionals like scientists, mathematicians and philosophers re found to have this type of intelligence in abundance.

**3) Visual-spatial intelligence: (visual and spatial insight):**
Spatial intelligence is concerned with the abilities, talents and skills involving the representation and manipulation of spatial configuration and relationship. It is distinguished from logical-mathematical intelligence by its concern with orientation in space: map reading, visual arts and even playing chess. Many persons like painters, architects, engineers, mechanics, surveyors, navigators, sculptors and chess players use spatial intelligence in their fields of work in their own way.

**4) Musical-rhythmic intelligence: (rhythm and music):**
Musical intelligence is concerned with the abilities, talents and skills pertaining to the field of music. It may be well demonstrated through one's ability to produce and appreciate rhythm, pitch, texture, timber and appreciation of the forms of musical expressiveness. This type od intelligence is visible in a quite large proportion in professionals like musicians and composers.

**5) Bodily-kinesthetics intelligence: (physical movement, motor control):**
It is concerned with the set of abilities, talents and skills involved in using one's body or its various parts to perform skilful and purposeful movements. A child may demonstrate such intelligence in moving excessively in response to different musical and verbal stimuli or bending

different body parts in organized sports. Professionals like athletes, dancers, actors and surgeons may be seen to demonstrate a high degree of bodily-kinesthetics intelligence in their respective fields.

**6) Naturalistic intelligence: (finding patterns and relationships with nature):**

A person who possess naturalistic intelligence has the interest about nature and related things. A naturalistic intelligent person may be interested in oceans, mountains, forests, weather, and animals. A person with this type of intelligence has real love and care for nature. These people have a strong affinity to nature for living and non-living. They have a strong attachment to natural world. But this doesn't require them to be outside all the time. This interest may be applied to academics. They love subjects related to nature. Subjects like biology and zoology are of great appeal. It is the ability to identify things that happen in nature. They get refreshed and inspired by nature. People who have this type of intelligence love being outdoors. Also, they feel connected to nature. This interest and attachment to nature begin at an early age. In practical life this type of intelligence is visible among farmers, landscaper, animal trainer, geologists, horticulturists etc.

**7) Interpersonal intelligence (obtaining insight into and dealing with other people):**

Inter-personal intelligence consists of the abilities to understand others i.e, individuals other than one's self and one's relation to others. In addition, it includes the ability to act productively, based on the understanding of others. The knowledge and the understanding of others is the quality that is needed for social interactions in one's day to day life. In practical life this type of intelligence is visible among teachers, psychotherapists, salesmen, politicians and religious leaders.

**8) Intrapersonal intelligence: (introspection and self-reflection):**

It consists of knowledge of the internal aspects of oneself (understanding of self); access to one's own feelings and emotions. In other words, intra-personal intelligence consists of an individual's abilities to know his self. It includes knowledge and understanding of one's own cognitive strengths, styles and mental functioning, as well as one's feelings, range of emotions and skills to utilise one's fund of knowledge in practical situations. In short, intrapersonal intelligence helps an individual to understand his own self by providing an insight into his total behaviour- what he feels, think or does. Hence, it is considered as the most private of the intelligences that a person possesses. The access to this type of intelligence in an individual is available only through self-expression i.e., language, music, visual art and similar other forms of expression. In our practical life this type of intelligence is demonstrated bt saints, mahatmas, rishis and yogis.

**9) Existential Intelligence: (Existential or Cosmic Smart):**

It consists of sensitivity and capacity to tackle deep questions about human existence, such as the meaning of life, why we die, and how did we get

here. Existential Intelligence Traits They tend to be closer to nature**.** They are naturally highly introspective**.** They have a deep connection with their inner selves. Meditation and relaxation is something they value and enjoy. They have their own set of beliefs. People with existential intelligence are abstract, philosophical thinkers. They have the ability to use meta-cognition to explore the unknown. They thrive on intellectual debate and aren't afraid to challenge the norm.

Thus, each of these intelligences are relatively independent of one another.[1] This means that a child can be highly proficient in one intelligence and struggle with another. An athlete, for example, could have strong bodily-kinesthetic and spatial intelligence but poor musical intelligence. That's why it's so important to use instructional strategies that involve a variety of these multiple intelligences so every child has the opportunity to learn in a way that works best for them.

**2.4.1.a Educational Implications:**

1. Teacher should structure the presentation of content in a style which engages most or all intelligence. For example, when teaching about the revolutionary war, a teacher can show students battle maps, play revolutionary war songs, organize role play of the singing of the declaration of independence, and have students read a novel about life during that period. This kind of presentation not only excites students about learning, but it also allows a teacher to reinforce the same material in a variety of ways. By activating a wide assortment of intelligences, teaching in this manner can facilitate a deeper understanding of the subject material.
2. Helping students to learn in an effective way is a goal of all educators, so use of the multiple intelligences' theory is another tool for teachers to use to reach that goal.
3. Teacher when applies Gardeners' theory in Teaching-Learning theory it help the students develop a better understanding and appreciation of their own strengths and learning preferences.
4. Multiple Intelligence theory acts as a guide to provide a greater variety of ways for students to learn and to demonstrate their learning.
5. It also provides educators with a conceptual framework for organizing and reflecting on curriculum assessment and pedagogical practices.
6. Application of this theory leads to reflection has led many educators to develop new approaches that might better meet the needs of the range of learners in their classrooms.

**2.4 Activities**

1) List down nine intelligences propounded by Howard Gardner

**Check your progress 2.4**

**Note:** a) Write down the answers in the space given below.

1) Explain in detail Multiple Intelligence Theory propounded by Howard Gardner

## 2.5 SUMMARY

Thus, in this unit we have discussed different theories propounded by various psychologists.

Cognitive development theories by Jean Piaget and Jerome Bruner, Social development theory by Lev Vygotsky and Multiple Intelligence theory by Howard Garner,

**Jean Piaget's View:** Piaget's theory is that it takes the view that creating knowledge and intelligence is an inherently active process. Piaget's theory of cognitive development helped add to our understanding of children's intellectual growth. It also stressed that children were not merely passive recipients of knowledge. Instead, kids are constantly investigating and experimenting as they build their understanding of how the world works.

**Jerome Bruner's View:** Bruner states that what determines the level of intellectual development is the extent to which the child has been given appropriate instruction together with practice or experience. Bruner views symbolic representation as crucial for cognitive development, and since language is our primary means of symbolizing the world, he attaches great importance to language in determining cognitive development.

**Lev Vygotsky View:** The major theme of Vygotsky's theoretical framework is that social interaction plays a fundamental role in the development of cognition. Vygotsky (1978) states: "Every function in the child's cultural development appears twice: first, on the social level, and

later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological).

**Howards Gardner's View:** Gardner's theory of multiple intelligences has had an important impact on how we think about human intelligence. Rather than simply focusing on a single measure of human cognitive ability, it can be helpful to consider all of the different mental strengths that an individual may possess.

## 2.6 UNIT END EXERCISE

1) "Theories of Cognitive Development are vital to understand learners' intellectual growth." Explain this statement with respect to the theory of Jean Piaget.
2) Summarize Piaget's contribution to theory and practice of education (Educational Implications)
3) Explain the theory of Jerome Bruner in detail. And also explain the educational implication of Jerome Burner's theory.
4) Explain Lev Vygotsky's theory of Social development.
5) Explain nine types of intelligence as given by Howard Gardner.

## 2.7 REFERENCES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# Module 2: Mental processes and Techniques Facilitating Learning

# 3

# MENTAL PROCESS RELATED TO LEARNING

**Structure**



## 3.0 OBJECTIVES

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

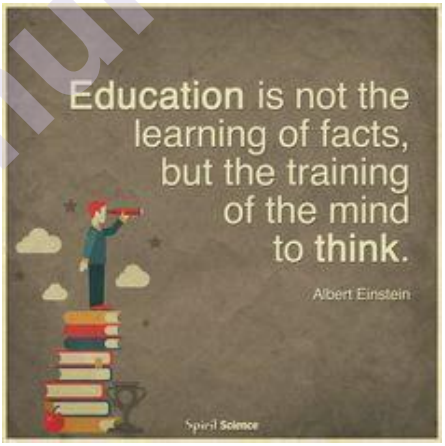
- define thinking, memory and forgetting;
- understand the factors affecting memory;
- understand the causes of forgetting;
- explain the types of memory and forgetting;
- analyse the educational implications for forgetting.

## 3.1 INTRODUCTION

We've all seen a classroom of students sitting and watching their teacher impart upon them knowledge and wisdom. Did you ever wonder what was going on inside their heads? Just how does the information they are taking in become actual knowledge? Well wonder no more, because today we are going to walk through the process of how we learn through cognition. Both cognition and learning are awfully similar. Both are inexorably linked- learning requires cognition and cognition involves learning. The first step in cognition learning process is thinking. In order to begin learning, a student must be involved in various thinking: convergent, divergent, lateral, reflective and critical. Next the information due to thinking is grasped attentively and the information that you are paying attention is put into memory. There are three levels of memory sensory register, short-term memory and long-term memory through which information travels to be truly learned. And now after thinking process and attention information is moved into memory, it's important that your brain organize this information so it can be retrieved later. If it is not retrieved at right time this means forgetting has taken place. No doubt, forgetting is important to some extent but forgetting important information id not right. For forgetting to occur only when it is necessary to know the causes of forgetting is essential. Thus, thinking, memory and forgetting are the vital mental processes related to learning.

Thus, this unit throws light on the mental processes related to learning.

## 3.2 THINKING




### 3.2.1 Concept of Thinking:

Man is rational animal. His rationality consists in his ability to think and reason. Thinking is an incredible activity. We do it all the time automatically. Ability to think and reason clearly is necessary to successful living. Those human beings who have developed this ability to think are among the most efficient and respected in life. Advancement in culture and civilization, art and literature, philosophy and religion,

inventions and social institutions bear testimony to the great human efforts at clear and bold thinking and reasoning. The progress of individual as well as society depends upon the human tendency to think. And reason effectively.

### 3.2.2 Meaning and Definition of Thinking:

i) **Ross:** "Thinking is the mental activity in its cognitive aspect."

ii) **Woodworth:** "Thinking is mental exploration for finding out the solution of a problem."

iii) **Warren:** "Thinking is an educational activity, symbolic in character initiated by a problem or task the individual is facing, involving some trial and error but under the directing influence of that problem and ultimately leading to a conclusion or solution of the problem."

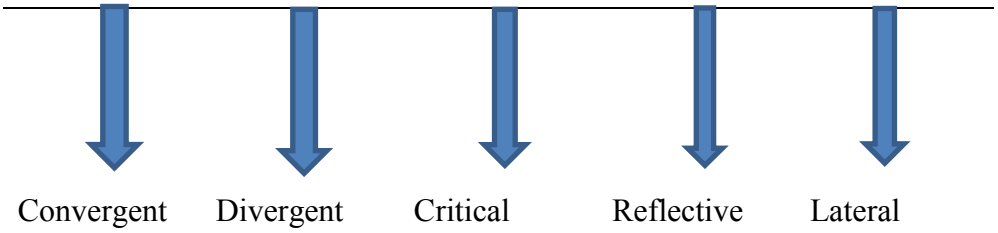
In the light of the above definition we can say that thinking is a mental process which starts with a problem and concludes with its solutions. It involves trial and error, analysis and synthesis, foresight and hindsight, abstraction and reasoning. It is a symbolic behaviour.

### 3.2.2.a Characteristics of Thinking:

1. It is one of the most important aspects of one's cognitive behaviour.
2. It depends on both perception and memory.
3. Thinking is a mental process which starts with a problem and concludes with a solution.
4. It is a cognitive activity.
5. It is a problem-solving behaviour.
6. It is always directed to achieve some purpose.

### 3.2.3 Types of Thinking:

**Types of Thinking**




- Convergent
- Divergent
- Critical
- Reflective
- Lateral

**1) Convergent thinking:**
Convergent thinking is the basis of intelligence. In convergent thinking on individual has the tendency to find out the one most appropriate idea or response. In intelligence test, where usually one correct response is required, convergent thinking is being tested. Convergent thinking is rigid, stereo-typed and mechanically operated. In convergent thinking we include remembering, recognition and manipulation of some concrete material. Convergent thinking is stimulus bound. Convergent thinking is sometimes known as reasoning or rational thinking.

**2) Divergent thinking:**
Divergent thinking forms the basis of creativity. This type of thinking has been regarded as the distinctive aspect of creative thinking. Divergent allows as many responses as possible. This type of thinking is characterized by flexibility, originality and fluency:

- **Flexibility:** Flexibility refers to the case with which one changes or shifts from one set of assumption or approach to another.
- **Originality:** Originality refers to the novel approach.
- **Fluency:** Fluency refer to the number of ideas provided in a given unit.

Thus, in divergent thinking we think in different directions, searching and seeking some variety and novelty.

**3) Critical thinking:**
It is a type of thinking that helps a person in stepping aside from his own personal beliefs, prejudices and opinions to sort out the faiths and discover the truth, even at the expense of his basic belief system. Here one resorts to set higher cognitive abilities and skills for the proper interpretation, analysis, evaluation and inference, as well as explanation of the gathered or communicated information resulting in a purposeful unbiased and self-regulatory judgement. An ideal thinker is habitually inquisitive, well-informed, open-minded, flexible, fair-minded in evaluation, free from personal bias and prejudices, honest in seeking relevant information, skilled in the proper use of the abilities like interpretation, analysis, synthesis, evaluation and drawing conclusion and inferences, etc. The critical thinking is of a higher order well-disciplined thought process which involves the use of cognitive skills like conceptualization, interpretation, analysis, synthesis and evaluation for arriving at an unbiased, valid and reliable judgment of the gathered or communicated information or data as a guide to one's belief and action.

**4) Reflective thinking:**
This type of thinking aims in solving complex problems; thus, it requires reorganization of all the relevant experiences to a situation or removing obstacles instead of relating with that experiences or ideas. This is an insightful cognitive approach in reflective thinking as the mental activity here does not involve the mechanical trial and error type of efforts. In this

type, thinking processes take all the relevant facts arranged in a logical order into an account in order to arrive at a solution of the problem.

**5) Lateral thinking:**
Lateral thinking is the mental process of generating ideas and solving problems by looking at a situation or problem from a unique perspective. It is the ability to think creatively or "outside the box." Lateral thinking involves breaking away from traditional modes of thinking and discarding established patterns and preconceived notions. Lateral thinking provides deliberate, systematic process that results in innovative thinking Lateral thinking enables you to find creative solutions that you may otherwise not consider.

**Activity 3.2**

Make a list of types of Thinking. And explain Lateral Thinking in brief.

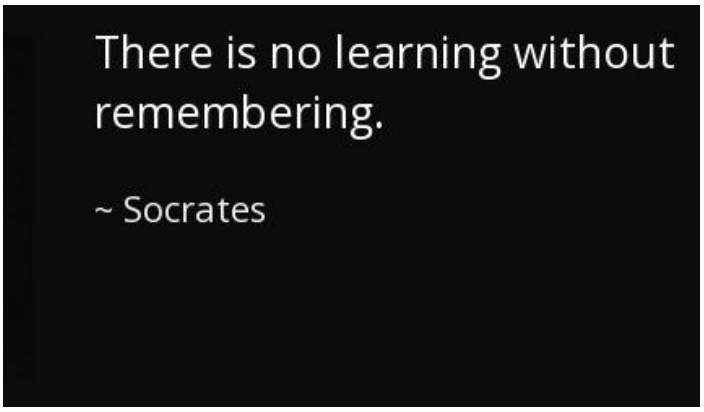
**Check your progress 3.2**

**Notes:** a) Write down the answers in the space given below.

1) Define Thinking.

b) Explain types of Thinking in detail.

## 3.3 MEMORY




### 3.3.1 Concept of Memory:

Man is said to be the crown of creation. He has been endowed with the higher power of memory. Memory is special ability of our mind to store when we learn something, to recollect, and reproduce it after some time. Memory is a complex process involving learning, retention, recall and recognition. It is imagination, thinking and reasoning. The success, efficiency and durability of learning to a great extend depends on memory. The experiences, which we undergo, leave traces in our mind in the form of 'schemas.' The length of our retention depends on the strength and quality of traces. The Memory plays very vital role in the day-day chores and life. If humans had no memory than his life too would have been like that of lower animals. In that situation man wouldn't have learnt anything rational. In short power of memory makes the man a social memory.

### 3.3.2 Meaning and Definition of Memory:

i) Stout has defined memory as, "ideal revival", i.e. to retrieve the things, objects or experiences in the same order and form.

ii) Woodworth and Schlosberg call memory as the ability for doing it over again for "what one has learned to do."

iii) Merriam Webster defines memory as, "the power or process of reproducing or recalling what has been learned and retained especially through associative mechanisms."

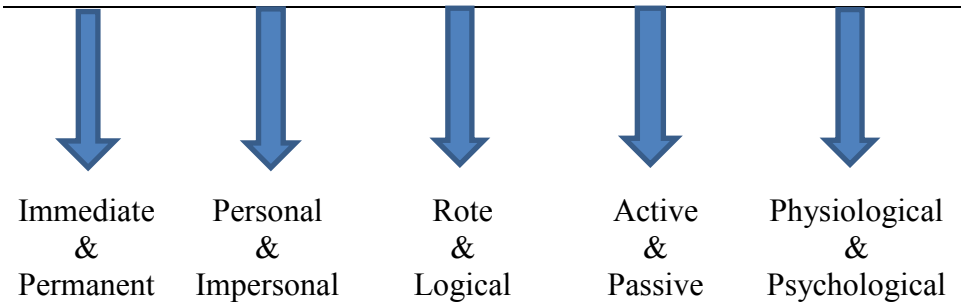
Thus, memory is a complex process involving learning, retention, recall and recognition. Learning means modification of behaviour, retention means to retain the experiences gained for sometimes in memory, recall means to revive the past experience mentally without seeing them and recognition means identify the experiences.

### 3.3.2.a Characteristics of memory:

1. Memory is the superior (logical or intellectual) cognitive process
2. Memory is an active, subjective, intelligent reflection process of our previous experiences.

3. Memory is essential to learning
4. **Memory decays with age.**
5. Memory is the ability to take in information, encode it, store it, and retrieve it at a later time.

### 3.3.3 Types of Memory:




- Immediate and Permanent memory,
- Personal and Impersonal memory,
- Rote and Logical memory,
- Active and Passive memory,
- Physiological and Psychological memory.

**1. Immediate and permanent memory:**
When things are memorized and recalled immediately, it is called immediate memory. When things are recalled after lapse of time, it is called permanent memory. Under permanent memory, it is possible to remember a thing permanently.

**2. Personal and impersonal memory:**
When personal experiences are recalled, then it is called personal memory. When facts are remembered or recalled without any references to personal experience it is called impersonal memory.

**3. Rote and logical memory:**
When things are learnt without understanding their meaning, it is rote memory and when things are learnt with insight, understanding and logical thinking, it is known as logical memory.

**4. Active and passive memory:**
When things are memorized with deliberate attempts or efforts, it is a case of active memory. For example, in the examination hall the students make attempts to remember things of past. When things are remembered without making any deliberate effort or will, it is called passive memory. For Example, the stimulus Khalsa College of Education reminds me immediately of my principal, my colleagues, my students, and so on. It is passive memory.

**5. Physiological and psychological memory:**
If by order, without any proper attention, it is possible to do a thing then it is called physiological memory. For Example, typing, cycling etc. If a particular thing is recalled quickly in serial order, then it is called true and psychological memory. Psychologists call it as the best memory.

### 3.3.4 Factors affecting Memory:

1) **Nature of material:** Retention is influenced by nature of material. The following specialists in the material should be retained:

i) **Meaningfulness of material:** Meaningful material is retained longer because if affords opportunity for organisation and development of relationship. Meaningless sensations do not remain for the long in the mind.

ii) **Prose and poetry:** Material in the form of prose and poetry is retained over longer periods.

iii) **Motor skills:** Motor skills are retained over longer periods than abstract subjects like science and mathematics.

iv) **Intensity:** The intensity of the stimulus assists in the retention of a subject. Distinct sensations like strong light, extreme beauty or ugliness can be retained for a longer time. Weak or indistinct sensations do not stick in the mind for any length of time.

v) **Amount of material:** The more extensive the amount of material learnt, the better the retention.

vi) **Pleasantness of the material:** Materials which have pleasant emotional tone tend to be better retained than those which are unpleasant.

2) **Amount of learning:** The extend of retention is directly related to the amount of learning. Retention will be more if the amount of learning is large. A topic studied more retains longer in mind as compared to the topic studied less intensively. Thus, over-learning has positive effect on memory.

3) **Methods of learning:** The methods of learning too significantly influence the retention of the learner. Whole method, recitation method, spaced method and original learning are few methods which results in better and linger retention.

4) **Good health:** A person with good health can retain the learnt material better than a person with poor health.

5) **Speed of learning:** The faster the learning the better the retention.

6) **Mental set:** Retention is greater when the material learnt is studied with the intent to remember it over a long period than when it is studied with the set to learn it only for immediate recall.

7) **Sleep or rest:** Sleep or rest immediately after learning strengthens connections in the brain and helps for clear memory.

8) **Attention:** While studying a subject, if greater attention is paid to the subject the retention will be better as compared to that of material learnt will less attention.

9) **Interest:** Retention also depends on interest. The retention is greater when we have learnt the topic or subject in which we are more interested.

10) **Individual difference:** Individual differ with regard to their power of retention and recall.

Some can retain much better, but their recall is limited. While other cannot retain for long period but they can recall easily soon after they have occurred.

**Activity 3.3**

Make a list of types of memory

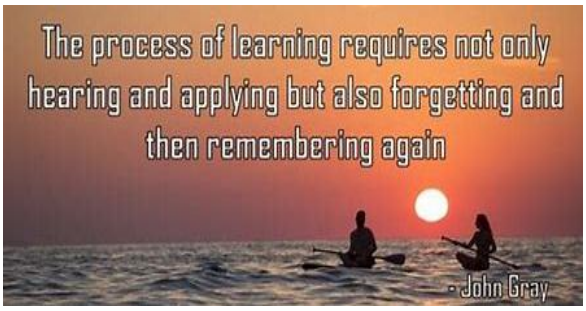
**Check your progress 3.3**

**Notes:** a) Write down the answers in the space given below.

1) Describe types of Memory in detail

2) Which are the factors that affect memory.

## 3.4 FORGETTING




### 3.4.1 Concept of Forgetting:

Forgetting and remembering are just two facets of the same coin. Both have equal importance in one's life. Generally, we are very much worried about remembering and give very less importance to forgetting. But, forgetting is of no less value. It is an essential parameter for learning process. Unessential, improper and irrelevant things should always be forgotten in order to make room for the learning of essential and relevant ones. Therefore, learning is actually a boon to us.

### 3.4.2 Meaning and Definition of Forgetting:

**i)** Munn (1967) defines forgetting as "the loss, permanent or temporary, of the ability to recall or recognise something learned earlier."

**ii)** Drever defines forgetting as "failure at any time to recall an experience, when attempting to do so, or to perform an action previously learnt."

**iii)** Bhatia defines forgetting as, "the failure of the individual to revive in consciousness an idea or group of ideas without the help of the original stimuli."

Thus, forgetting refers to failure to recall or retain information into present consciousness. It is **apparent loss or modification of information already encoded and stored in an individual's short or long- term memory.** Forgetting is a past that is no longer a part of me.

### 3.4.2.a Characteristics of Forgetting:

1. Forgetting is inevitable process of life having both positive and negative values.
2. It is the opposite remembering.
3. To forget means not to be able to remember a material learned earlier.
4. Forgetting is rapid at first, but slows down with the passage of time.
5. Forgetting involves both verbal and nonverbal learning.

### 3.4.3 Types of Forgetting:

Passive & Natural | Active & Morbid

- Passive and Natural forgetting
- Active and Morbid forgetting

**1) Passive or Natural forgetting:**
The kind of forgetting in which there is no intention of forgetting on the part of the individual is known as Passive or Natural forgetting. In this kind of forgetting one has not to make any deliberate efforts. In a quite normal way, with the lapse of time, one gradually forgets, things experienced and learned earlier.

**2) Active or Morbid forgetting:**
It is also known as abnormal forgetting. In this forgetting one deliberately tries to forget something. This kind of forgetfulness, as Freud explains, originates from repression. Under this process, the painful experience and bitter memories are deliberately pushed into the unconscious layer of mind and are left there for forgetting.

### 3.4.4 Causes of Forgetting:

**1) Retroactive inhibition:** Inhibition of the earlier learning and recall by later learning is known as retroactive inhibition. The interpolated activity between original learning and its recall causes forgetting. It is called retroactive because the interference is with the memory of events that came before the interfering activity. For example, a student learnt about motivation in psychology last week, this week he learns about perception. Now he tries to recall information about motivation but the points pertaining to perception will come to his memory.

**2) Proactive inhibition:** If the earlier learning interferes with later learning and inhibits recall of new material, it is known as proactive inhibition. This usually happens when the previous learning is better than the present one. For example, we meet somebody in a party yesterday, today while remembering those names we recall the names of people we met last week.

**3) Passage of time:** Due to the passage of time most of the experiences are forgotten. As Ebbinghaus found that after 20 minutes about 72% is retained, after 1 hour 44% is retained, after 6 days 36% is retained and after 1 month only 21% is retained.

**4) Learning methods:** When the teacher does not use the method, which are according to the physical, mental, emotional and social levels of the child, then forgetting occurs.

**5) Over learning:** Learning material that has been over-learned without proper spacing strains our nerves and is easily forgotten.

**6) Fatigue:** When the organism is tired various toxins are formed and these poisonous substances disturb the brain and hence fatigue causes forgetfulness.

**7) Emotional excitement:** When the individual is under fear, anger or any other emotional disturbances then he is likely to forget learnt material.

**8) Lack of repetition:** When we do not repeat the task learnt again and again then there is tendency to forget that task because memory traces become fainter and fainter.

**9) Distraction and doubt:** When there are too man distracting elements and if there is any doubt about the validity of the material learnt, then we are likely to forget it easily.

### 3.4.5 Educational implications of Forgetting:

1) Knowing and understanding the student and helping him to overcome the traumatic experience and unwanted feelings.
2) Use the memory enhancing techniques and adjustment of curriculum.
3) Creation of conducive environment in the classroom.
4) Methodologies of teaching should incorporate the theories of memory and forgetting.
5) Creating awareness of the different memory levels of children.
6) Comprehensive and thorough initial learning or teaching should be undertaken.
7) The greater the acquaintance with the material the greater will be the remembrance. Hence over-learning is a must.
8) Teacher should teach the topics using maxims like; 'from known to unknown'

Distributed practice should be encouraged rather than massed practice, because it enables the learner to learn without on-set of fatigue.

**Activity 3.4**

Make a list of types of Forgetting. And explain them in brief.

**Check your progress 3.4**

**Notes:** a) Write down the answers in the space given below.

1. Define Forgetting. And causes of forgetting.

2. What are the factors responsible for forgetting? How will you help children remember the learned facts?

## 3.5 LET US SUM UP

Thus, in this unit we have discussed learning plays significant role in all walks of human life. All our best attempts in the field of education are directed to make the pupil learn properly. And this learning is related to few mental processes. These mental processes are thinking, memory and forgetting.

**Thinking:** All of us encounter some problems in our day to day life. These problems may be of different types. But soon after facing the problem we try to solve it and get relief. Prior to solve a problem, we think of it and try to find out the possible solutions. Therefore, we can assume that without thinking we cannot solve the problems. Thinking about the problem is a pre-condition to solve the problem. While we plan education and academic subjects. At that time, we aim at developing thinking power of the learners. Therefore, this unit has made an attempt to understand the psychological concept of thinking and its different types.

**Memory:** An individual learns many things and gain variety of experiences in life. But not all of his gained experiences stored in his mind for his future use. Some are forgotten in due course of time and some are stored in the mind for longer period of time. The recall and retain of this stored material depend on memory. Amount of learning depends on one's memory power Learning and memory re closely related to each other.

Therefore, this unit discusses about the types of memory and factors which affect memory power.

**Forgetting:** Along with memory forgetting is also very important too. Forgetting cannot be completely destroyed. If forgetting does not take place then life will be burdened with unpleasant experiences and become miserable. If the process of forgetting becomes fast, it is also not possible to do anything in life. In fact, amount of forgetting should be reasonable. Learning and forgetting are also closely related. Therefore, this unit discusses about the concept, types and forgetting and also discusses about the factors which causes forgetting and educational implications for forgetting.

## 3.6 UNIT END EXERCISES

1) Define Thinking. Explain in detail types of types of thinking
2) Explain the concept of memory. Discuss the factors affecting memory
3) Explain in detail types of memory.
4) Define forgetting. Give its different types.
3) Describe the causes of forgetting. What are the educational implications for forgetting?

## 3.7 REFERENCES AND SUGGESTED READING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# 4

# TECHNIQUES OF LEARNING

**A. Creativity: Meaning, Process, Teacher's Role And Educational Implications**

**B. Problem Solving: Meaning, Steps And Educational Implications**

**C. Metacognition: Meaning And Educational Implications**

**Unit Structure**





## 4.0 OBJECTIVE

After reading this unit you will be able to:

- Define the meaning of creativity and its process
- Explain the role and educational Implication of creativity
- Describe meaning and steps of problem solving
- Explain the educational implication of problem solving
- State the meaning of Meta cognition
- Describe the educational Implication of Metacognition.

## 4.1 INTRODUCTION

Any kind of curricular content can be taught by the different techniques of learning like creativity, problem solving and metacognitive skills. The teacher's task is not how to teach problem solving but rather than how to

teach social science or science by the method of problem solving. Teacher should provide such a environment where student can use their metacognitive abilities and predict or inference new original, ingenious, unusual thought and knowledge. The purpose of this unit is to explain different learning techniques with its educational implication.

## 4.2 MEANING OF CREATIVITY

The cultural, scientific and the social progress of any country depends on the extent of the development of creativity among citizens. In the history of the world there had been several philosopher, poet, writer and scientist, mathematician who were turned out of their school, condemned as backward students, but who created great work in their later life. Hence in modern time's progressive nations try to develop creativity in their new generation. Therefore, the concept of creativity occupies a very important place in educational psychology. Howard Gardner defines the creativity individuals as a person who regularly solves the problems, fashion products or define new questions.

**Definition:**
The meaning of creativity is to think or do something differently. Creativity is defined as the tendency to generate or recognize ideas, alternatives or possibilities that may be useful in solving problems, communicating with others and entertaining ourselves as well as others. The following definition of creativity will help in the understanding of its meaning-

**Berk, 2002** "Creativity is the ability to produce work that is original, but still appropriate and useful"

**Guilford,** "Creativity sometimes refers to creativity potential sometimes to creative production, and sometimes to creative productivity."

**Thurston (1955)** "Any action is to be creative if it has immediate solution to the kind of thinking which has always been innovative."

**E.P. Torrance (1965)** "Creative thinking is the process of understanding errors un received, and rare elements, making concepts in their relationship imagining notions and making tests ,carrying results to other persons and making improvement by reviewing the concepts."

The above definition of creativity point out that it means original thinking, new types of association, divergent thinking and behavior, new solutions of old s problems, flexibility and a new approach in different field of life. The creative person is very ample aware about his difficulties. His thinking is dynamic, flexible, original and novel.

Wilson, Guilford and Christensen observed that creative process is any process which produces something new- an object or an Idea including a

new form or arrangement of old elements. The new creation must contribute to the solution of some problem.

## 4.3 PROCESS OF CREATIVITY

Torrance was of the view that the process of creativity is similar to the steps in scientific method. The central element of both is the production of something new. According to Wallas, Csikszentmihalyi) the Stages of the Creative Process are as following-

**Preparation:** becoming engrossed, we become aware that something is not right, we are sensitive to a stress – which will create a gap, a need, an experience that stimulates us to act and pull together resources and create new things.

**Incubation:** This stage is not direct, and often spontaneous in nature. It happens in the perimeter of our thinking. This is when it is best to do a non-demanding task (not undemanding or too demanding), so as to let your mind come up with creative idea.

**Illumination/Insight**: This is the thunderous moment, at this point individual get insight of the idea that was incubating moves from the subconscious to the conscious mind.

**Verification/Evaluation**: this is where the analytical, convergent thought processes jump into action. Is the idea valid, accurate, or valuable?

**Elaboration**: This is where we add to and connect our ideas, where we build upon an idea with relevant information and details. The creative process is not linear.

**Role of teacher in Creativity:**
School is the proper place where an organized effort should be made to develop the basic foundations for creativity in children. Deliberate attempts need to be made to develop an environment of creativity among them. Some important roles of teachers are as following-

1. **Identification of the creative child:** both the test and non-test techniques can be used to identify the creative child. Guilford and Merrifield developed test techniques that measures fluency, flexibility, originality, redefinition and sensitivity to problems.
2. **Find out the Factors in the school that hinder creativity:** the present education system of India largely encourages rote learning, it rarely calls upon children to think and use their creativity.
3. **Strategies for developing creativity:** creativity is likely to flourish in an environment where teachers values independent and free thinking of their children. Some strategies like brain storming, gaming, extensive reading and self-evaluation can be used by teachers.

4. **Providing creative learning environment and experience in the classroom:** teacher should follow the given guidelines to promote creativity in children-

   a. Provide a safe, permissive and worm environment
   b. Allow students to ask unusual questions
   c. Appreciate imaginative and unusual ideas of the students.
   d. Assure students that their ideas have value.
   e. Evoke originality in thinking.
   f. Arrange lectures of creative personality.

## 4.4 ROLE AND EDUCATIONAL IMPLICATION OF CREATIVITY

A decent classroom situation always has some elements of creativity which makes the class more interesting and interactive. The correct mix of creativity along with curriculum helps students to be innovative and also encourages them to learn new things. In fact, creative expression plays a key role in a student's emotional development. Some of the important educational implication of creativity are as following-

- **Study make enjoyable:** Creative classrooms give an opportunity for students to learn new concept with fun. Students are always fun loving and including creative activities along with curriculum gains their interest for learning.
- **Choice of manifestation or expression:** The creative classrooms provide opportunity to students that they express themselves. A creative approach to learning makes them more open with the various activities that come their way and gives them a feeling of accomplishment and pride.
- **Emotional development:** Creative expression is important for students to trigger up their emotional development. When they can show off their true emotions in a creative manner in their classrooms, they can build up good confidence level.
- **Enhances thinking capability:** Creativity can stimulate imaginative thinking capability in students. That is why teachers promote activities such as open-ended questions, creative team building activities, brainstorming sessions and debates amidst busy curriculum schedules. Some teachers tactfully use these techniques to teach tough lessons to make children learn with fun and ease.
- **Reduced stress and anxiety:** Encouraging productive discussions as well as making the classroom layout more flexible all matters a lot in gearing up a creative classroom atmosphere and reduced the stress of students.
- **Boosts problem solving skills:** Creative problem solving can be encouraged in classrooms that help students to think out of the box and

be more imaginative and innovative. With this way, the problems or opportunities are redefined by the students and the solutions or responses would be more innovative.

- **Improves focus and attention:** Playing memory games, taking regular breaks and intervals to bring in some creativity and setting a flexible classroom environment can make a lot of improvement in their attention span.
- **Better communicators:** A classroom environment that promotes creativity opens them a world of communication. Students can make better conversation and stimulate innovative thinking and talking sessions in their free time.
- **Follow passions:** Working out the passions in addition to excelling in academics is important for a student to come up successful in life. A good classroom environment should give space for students to follow their passions whether it is music, dance, poetry, drawing or other art forms
- **New attitude:** Open-ended questions and classroom discussions are two popular creative teaching strategies that help students to develop an innovative or new attitude.
- **Initiate lifelong learning:** A curious mind always loves to learn more and the creative classrooms can build up a curious mindset in children through unconventional ways.

**Check your Progress – I**

**Q1. Choose the correct option**

1) Creativity is likely to flourish in an environment which values _____and_____.
(Free thinking, Independence, Delinquency)

2. Brain storming technique emphasizes the importance of _____thinking (convergent, divergent)

Q.2 Illustrate the role of teachers in the promotion of creativity.

Q.3 List few characteristics of creative personality.

## 4.5 MEANING OF PROBLEM SOLVING

Problem-solving is the ability to identify and solve problems by applying appropriate skills systematically. Problem is any situation in which you are trying to reach some goal and must find a means to do so. Thus problem solving is situation where individual creating new solution for problems. Problem Solving aids us to deal productively with problems in our lives. Important problems that are left unresolved can cause mental stress and give rise to escorting physical strain. Problem solving skills can be used to realize even the most distant dream with the power of determination and persistence. One is constantly being challenged with problems, whether big or small, both at home and at school. Some people rise up and come out with flying colors as they see those problems as opportunities for development. They know a systematic way of tackling problems which always works. This raises their self confidence and self-esteem.

**Charles E.Skinner**
"Problem solving is the framework or pattern within which creative thinking and reasoning take place. The state of tension created by unsatisfied wants and drive the individual exercise his greatest efforts and to use his best language techniques-observation, prediction and inference to control the difficulties that hinder progress toward his goal of want satisfaction".

**Jiddu Krishnamurti**
"Few can really understand the problem, the answer will come out of it, because the answer is not separate from the problem."

Successful problem solving and successful living are identical. Culture itself is but a record of how our ancestors have solved various problems. A major goal of education is to help students learn in ways that enable them to use what they have learned to solve problems in new situation. In short problem solving is a process—a continuous activity in which students begin from what they know to discover what they don't know. It comprises overcoming difficulties by generating hypo-theses, testing those predictions, and arriving at satisfactory solutions.

## 4.6 STEPS OF PROBLEM SOLVING

As you know, problem solving is the process of identifying a problem or a goal, generating ideas to solve the problem or reach the goal, and testing out those ideas.

Jhon Bransford and Berry Stein (1993) use the acronym **IDEAL** to identify the five steps;

**I** Identify problems and opportunity.
**D** Define goals and represent the problem
**E** Explore possible strategies

**A** Anticipate outcomes and act
**L** Look back and learn

The following steps are guidelines for helping make this process happen. Even though problem solving does not necessarily follow these exact steps and not all problems have a specific solution, we can use these guidelines to encourage and assist children as they solve the problems they meet each day.

**1. Identify problems and opportunity:** The first step, is identifying a problem exists and treating the problems as an opportunity, begins the process. Finding a solvable problem and turning it into an opportunity is the process behind many successful inventions.

**2. Define goals and represent the problem:** After identifying the problem students should define and represent it in correct manner. To represent a problem and set a goal students need to focus attention on relevant information, understand the structure of it and activate the mental mechanism to solve the problem.

**3. Explore possible strategies:** Help students think about what they need to try out their solutions. Make sure they know they can use materials in usual or unconventional ways.in conducting search for the solution students can adapt the method of algorithm, analogical thinking and heuristic method etc.

**4. Anticipate outcomes and act:** After representing the problem and exploring the possible solution, the next step is to select a solution ant anticipate the consequence.

**5. Look back and learn:** after anticipating the consequences student can choose a solution strategy and implement it, evaluate the results by checki8ng for the evidence that confirms or contradicts the solution**.** In the case of failure or contradiction students can look back trying for another idea or plan of action.

## 4.7 EDUCATIONAL IMPLICATION OF PROBLEM SOLVING

Problem-solving is, and should be, a very real part of the curriculum. It presupposes that students can take on some of the responsibility for their own learning and can take personal action to solve problems, resolve conflicts, discuss alternatives, and focus on thinking as a vital element of the curriculum. It provides students with opportunities to use their newly acquired knowledge in meaningful, real-life activities and assists them in working at higher levels of thinking.

1. Students can easily understand the problem. It's important that students understand the nature of a problem and its related goals.

Problem solving encourage students to frame a problem in their own words.

2. Describe barriers, students are capable to understand any barriers or constraints that may be stopping them from achieving their goal.
3. Capable of Identify various solutions: if the nature and parameters of a problem are understood, students can select one or more appropriate strategies to help resolve the problem. Students need to understand that they have many strategies available to them and that no single strategy will work for all problems. Here are some problem-solving possibilities:
4. Problem solving enables to work through a selected strategy or combination of strategies until it becomes evident that it's not working, it needs to be modified. As a result students become more proficient problem-solvers
5. Students feel very comfortable putting a problem aside for a period of time and tackling it at a later time. For example, scientists rarely come up with a solution the first time they approach a problem. Students should also feel comfortable letting a problem rest for a while and returning to it later.
6. Students can evaluate their own results. It's vitally important that students have multiple opportunities to assess their own problem-solving skills and the solutions they generate from using those skills.
7. Student can perform task quickly and few errors.
8. Enable to deal with problems at a deeper level.
9. Hold more information in working and long term memories
10. Effective method for monitoring students' performance.

**Check your Progress – II**

Q1. Choose the correct option

1. Problem-solving is the ability to identify and solve_____ by applying appropriate skills_____. (Problems, Independently, systematically)

2. _____ and _____techniques enhanced the skill of problem solving (convergent, heuristic, algorithm)

Q.2 Describe educational implication of problem solving method.

Q.3 Explain the full form of acronym

## 4.8 MEANING OF METACOGNITION

**Introduction:**
Metacognition essentially means cognition about cognition; that is, it refers to second-order cognitions: thoughts about thoughts, knowledge about knowledge or reflections about actions. So if cognition involves perceiving, understanding, remembering, and so forth, then metacognition involves thinking about one's own perceiving, understanding, remembering, etc.

Metacognition is that the ability to look at however you process thoughts and feelings. This ability encourages students to know however they learn best. It additionally helps them to develop consciousness skills that become vital as they develop. Those who have developed metacognition area component able to assess their thought processes and reframe the approach they assume to adapt to new things. Using metacognition, students gain associate understanding of the things, processes and strategies that employment best for them. They will discover that a way that works for one category doesn't work for all of them or that finding out for one subject may need longer than another.

Through the method of trial and error, students achieve some strategies and fail in others before attempting once more.

**Definition:**

**Flavell (1978**) referred to it as 'knowledge that takes as its object or regulates any aspect of any cognitive endeavor'

**Moore (1982)** defines it as 'an individual's knowledge about various aspects of thinking'

**Gavelek & Raphael** defines it "as the abilities of individuals to adjust their cognitive activity in order to promote more effective comprehension'

**Donald Meichenbaum et.al.** describes metacognition as peoples "awareness of their own cognitive machinery and how the machinery works**"**

**Schunk,2000"**Metacognition is the strategic application of this declarative, procedural, and conditional knowledge to accomplish goals and solve problems.

**On the basis of above definition, we can say-**

**Metacognition involves three kinds of knowledge:**

**Declarative;** declarative knowledge about yourself as a learner, the factors that influence your learning and memory, and the skills, strategies, and resources needed to perform a task- knowing what to do.

**Procedural** knowledge: or knowing how to use strategies and

**Conditional** knowledge: to ensure the completion of the task - knowing when and why apply the procedures and strategies.

Teachers can assist students cultivate metacognition with a variety of strategies. Teachers can provide students with information about how the brain processes information, how it forms knowledge and memories, as well as the impact stress has on these abilities. Teachers can also inspire students to identify what they don't understand and discuss how they can confronting the unknown or new knowledge which is an integral part of the learning experience.

To help students recognize and utilize metacognitive abilities to - understand how they learn best:

- Schedule time for students to reflect on the learning process and see how their knowledge has changed.
- Provide opportunities for students to reflect on what was difficult for them to learn versus what was easy and why and which study habits or strategies worked and which ones didn't and why.
- Encourage students to understand how people get answers, both wrong and right, and the processes used to get to these points.

## 4.9 EDUCATIONAL IMPLICATION OF METACOGNITION

- A number of assignments can help student's practice reflexive thinking, which is an activity that encourages metacognition. For instance, essay exams encourage higher-level thinking, helping students activate additional knowledge in the learning process.
- Teachers can also assign students to assess their own beliefs regarding issues like race, bias or other held beliefs. This assessment pushes both personal growth and understanding of how beliefs are formed and how they can evolve. In short, any assignment that encourages students to figure out the answers on their own helps them to work through the learning process and refine their learning skills.
- Group work and collaboration further enable students to develop metacognition as these skills help students to work through problems in new ways. Working with others enables students to look at problems

from new perspectives and helps them to understand how they might better approach problems in the future.

- Students receiving instruction on metacognition develop skills that will make them more successful in their academic and professional careers. The better able a student is to understand how he or she learns, remembers and processes information, the more information he or she will ultimately retain. This ability is further linked to developing better memory skills, which is a predictor of future academic success.
- Students who understand how they learn are better able to create situations that promote learning. For instance, learners might know that they need to study in a quiet room, at a certain time of day, or with notecards in a class that requires a lot of memorization. Alternatively, he or she might know that writing requires a different sort of setting or time allotment all together.
- While there is a lot to teach in a day, encouraging time for reflection on the learning process enables students to better understand their own learning processes. This, in turn, provides students with the skills to study and complete coursework more efficiently and successfully

Metacognition is a 'tool of wide application' and its development gains additional importance and interest because of this fact. As cognition comes into play whenever we operate intellectually in any domain, the same can also apply to metacognition. Often the difference between two students- one a successful learner, and the other a struggling learner – is effective use of metacognitive processes. Identify strategies that teachers can use to enhance the role of metacognition in instruction.

**Check your Progress – III**

Q1. Choose the correct option

1. Metacognition is the _____about our own _____processes. (Knowledge, understanding, thinking schema)

2. Metacognition involves three different kind of knowledge-
   a._____ b._____ c._____.

## 4.10 LET US SUM UP

❖ This unit covers the following topics

- The cultural, scientific and the social progress of any country depends on the extent of the development of creativity among citizens.
- School is the proper place where an organized effort should be made to develop the basic foundations for creativity in children. Deliberate attempts need to be made to develop an environment of creativity among them.

- Problem solving is the framework or pattern within which creative thinking and reasoning take place.
- Jhon Bransford and Berry Stein (1993) use the acronym **IDEAL** to identify the five steps;
  - **I** Identify problems and opportunity.
  - **D** Define goals and represent the problem
  - **E** Explore possible strategies
  - **A** Anticipate outcomes and act
  - **L** Look back and learn
- Metacognition essentially means cognition about cognition; that is, it refers to second-order cognitions: thoughts about thoughts, knowledge about knowledge or reflections about actions
- Metacognition is the strategic application of this declarative, procedural, and conditional knowledge to accomplish goals and solve problems

## 4.11 UNIT END EXERCISE

Q.1 Explain the meaning of creativity and its educational implication.

Q.2 What are the ways or steps of getting correct solution.

Q3. Explain briefly three metacognitive skills and how teacher can use better metacognitive strategies to improve students.

Q4. Describe meaning of problem solving with its educational implication.

Q.5 Short notes

a. Any Four educational implication of creativity

b. Writes on the process of creativity.

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## PRACTICAL WORK

**Educational Psychology – Semester IV**

(Note: These Practical Works – Guidelines/Samples are intended for the students of S.Y.B.A. (Education), I.D.O.L. only.)

**YOU are expected to do the two practical works; Practical Work – 1 and Practical Work – 2, mentioned below in the unit structure, for 20 marks as an integral part of your course.**

❖ **Unit Structure**

✓ ***Practical Work - 1***

- **Sample of an Experiment on Learning Styles to be recorded in a Psychology Journal**

✓ ***Practical Work – 2***

- **Sample of an Experiment on Concept Formation to be recorded in a Psychology Journal**

***Practical Work – 1: To perform an experiment on Learning Styles and record it in an experimental psychology journal.***

**Sample of an Experiment on Learning Styles to be recorded in a Psychology Journal**

**Aim:** To determine whether subjects remember more information when presented kinesthetically, orally or visually.

**Materials:** 4 Different sets of 30 flashcards (the flashcards should have easy pictures of animals, objects or nouns), 10 boys and 10 girls of age range between 11-14, paper, pencils and stopwatch or timer.

**Procedure:** 1. Gather the necessary materials mentioned above. The flashcards should be similar in appearance and level of difficulty. Prepare answer key for each set of flashcards. The answers need not to be in the same order but you must know which cards were used for each of the tests. 2. Gather the subjects and build rapport with them. Give the subjects the tests in small groups. 3. For each test, provide each subject a piece of paper. Ask each subject to write his or her age and gender at the top of the paper and number their papers 1 to 30. When the subjects are done, tell them to put their pencils on the table. 4. For the first test, show the subjects each flashcard from one set for five seconds without saying anything. Be sure each subject can see the flashcards well. After all the flashcards have been shown, give the subjects five minutes to write down what they saw on the flashcards. At the end of five minutes, collect their responses. 5. For the second test, repeat step 3. Then say each word on the second set of flashcards without showing the flashcards to the subjects.

Read the cards slowly and clearly, pausing five seconds between each card. After all the flashcards have been read, give the subjects five minutes to write down what they heard. At the end of five minutes, collect their responses. 6. For the third test, repeat step 3. Then show and say each flashcard from one set for five seconds. Be sure each subject can see the flashcards well. Read the cards slowly and clearly, pausing five seconds between each card. After all the flashcards have been read and shown, give the subjects five minutes to write down what they saw and heard. At the end of five minutes, collect their responses. 7. For the fourth test repeat step 3 except they do not need to put their pencils down. 8. Provide each subject an additional piece of paper. Show and say each flashcard from another set while encouraging the subjects to write the word on the additional piece of paper. Be sure each subject can see the flashcards well. Read the cards slowly and clearly, pausing five seconds between each card. After all the flashcards have been read and shown, collect the additional piece of paper that the subject wrote the words on. Then give the subjects five minutes to write down what they saw and heard and wrote. At the end of five minutes, collect their responses. Thank your subjects for their participation. 9. Correct the results of the four tests. Record the data on a chart. 10. Analyze the data and draw a conclusion.

**Introspection:** As the experiment began the subjects were pretty excited looking at the flashcards. As it these were simple and easy to understand, the subjects enjoyed the experiment from start to the end. When the subjects analyzed the similarities and differences in the flashcards they were even more excited and understood the aim and appreciated it. The subject also hoped that their respective school teachers shall adopt such a teaching styles that suits their learning needs in the regular classroom teaching.

**Conclusion:** With the help of observation and analysis, subject's need of learning style can easily be understood. There exist individual differences with respect to their learning styles and pattern. Learners with diverse talents and learning styles must be respected by the teachers. Teachers shall engage students in activities and encourage cooperation among students. Encourage more and more teacher-student interactions rather, it is important to promote two-way communication in the classroom teaching. Teacher must give prompt feedback.

**Educational Implications:** A teacher must understand that students learn differently as compared to a traditional-general method of teaching. Every student is unique and has different level of understanding as compared to other students. It is most important that students must not be compared to each other. It is essential to understand that no one teaching method is enough to teach effectively and efficiently in order to reach to every student understanding level. It is challenging to address every student's learning styles all the time. Thus it is important to use differential teaching method in the class. Teacher must adopt a balanced teaching approach in teaching for allowing the diverse learning styles of the students. Teacher

must include demonstrations and examples while teaching theory and models for easy understanding of the students with varied learning styles (especially for intuitive and sensing learners). Teacher must try to include both visual and verbal information, numerical and algebraic examples along with abstract concepts (especially for inductive and deductive learners). Most importantly, teacher must encourage students to participate actively in the classroom discussion and reflecting on the materials by giving positive reinforcements at regular intervals (especially for active and reflective learners). Memory: a person's ability to remember information. Auditory: to be understood through hearing. Visual: to be understood through sight. Kinesthetic: to be understood through action or touch. Memory and learning go hand in hand, in order to learn something you need to remember it and do something with it. Hence, memory is essential to all learning but people learn in different ways. Some people learn better by seeing while others by listening and others by doing.

***Practical Work – 2: To perform experiments on Concept Formation, Recall and Recognition, Rote and Logical memory; and record them in an experimental psychology journal.***

**Sample of an Experiment on Concept Formation to be recorded in a Psychology Journal**

**Aim:** To study and find out the process involve in the concept formation.

**Materials:** Set of twenty five pictures, stopwatch, paper and pen.

**Procedure:** The experimenter motivated student and built up rapport with them. The experimenter gave instruction and asked the subject to draw four columns. Column 1 for serial number, column 2 for picture number, column 3 for picture name and column 4 to describe the picture as per ones observation were asked to be drawn. The experimenter gave 1 minute to observe and describe the picture. The experimenter measured time with the help of stop watch. After the subject made the observation and description, they were asked to read out the observation and analyze it.

**Observation Table:**

| Sr. No. | Picture No. | Name of the Picture | Description of the Picture |
|---|---|---|---|
| 1 | 14 | Gokee | Children are playing |
| 2 | 11 | Gokee | Daughter is playing with her father |
| 3 | 16 | Yakee | Spending time with partner |
| 4 | 12 | Gokee | Mother and daughter having fun |
| 5 | 18 | Yakee | There are few businessmen |
| 6 | 2 | Ruku | There is a family of dog |
| 7 | 20 | Yakee | Husband and wife arranging flower pot |
| 8 | 19 | Yakee | There are two men playing |

| | | | |
|---|---|---|---|
| 9 | 8 | Jakoo | A boy selling flowers |
| 10 | 6 | Jakoo | A lady is sitting on a chair |
| 11 | 9 | Jakoo | A picture of Jawaharlal Nehru |
| 12 | 22 | Viki | Death of military person |
| 13 | 13 | Gokee | Two children are playing |
| 14 | 2 | Ruku | Picture of tiger in T.V. |
| 15 | 23 | Viki | A boy is driving |
| 16 | 5 | Ruku | There is a picture of snake charmers |
| 17 | 17 | Yakee | A couple in an romantic mood |
| 18 | 24 | Viki | A road or a highway |
| 19 | 15 | Gokee | A small girl roaming free |
| 20 | 1 | Ruku | Riding a horse |
| 21 | 25 | Viki | Well lighted foreign evening scene |
| 22 | 7 | Jakoo | Felicitation of Sonia Rajput |
| 23 | 10 | Jakoo | A picture of dinner set |
| 24 | 21 | Viki | A picture of independent women |
| 25 | 4 | Ruku | A squirrel on a jackfruit |

Later, the experimenter gave two sets of fill in blanks and subject solved it based on their analysis. The two sets with the statements are given below:

| ***SET-I*** | ***SET-II*** |
|---|---|
| 1. Every mother loves her child. | 1. All Gokee are children. |
| 2. In India, father is the head of the family. | 2. Yakee are given more importance in a family. |
| 3. For companionship people keep pet animal. | 3. We give Jakoo to show inspiration. |
| 4. A ship is a means to cross ocean. | 4. We can see Ruku in jungle. |
| 5. To make a home beautiful we keep flower. | 5. Viki helps people in transport. |

After this, the experimenter discussed the answer of the fill in the blanks and asked the subject to correct their answer. The experimenter said the one who scored high have good concept formation.

**Introspection:** When the experiment started the subject was little confused as to how to describe the picture, the names of the pictures as these were in Japanese and appeared little funny. When the subject analyzed the similarity and found the concept the method was appreciated. The subject also believed that this method is worth to follow in regular classroom teaching.

**Conclusion:** With the help of observation, analysis and generalization, subject can easily understand formation of concept. There are individual differences in concept formation. The concept formation becomes easier if the experience is repeated. To help concept formation, the number of experience should be increased. Concept formation involves a mental process.

**WORD WITH MEANINGS:**

| | | |
|---|---|---|
| Jakoo | = | Flower |
| Gokee | = | Child |
| Viki | = | Vehicle or transport |
| Ruku | = | Animal |
| Yakee | = | Man |

**Educational Implications:** 1) The most efficient way of building concept is to have the learner experience the object directly. However, when direct experiences cannot be provided indirect experiences should be given. 2) The audio-visual aids used must be relevant and clear. Teaching must be based on similarity of content and technique. 3) Rote memorization must be discouraged. 4) Students can formulate concept by using the inductive-deductive method of learning. The combination of both processes is often more effective, that is, the teacher can reach the concept by example-rule-example approach. 5) The language is an important tool in the formation of concepts. Through proper use of language concept can be developed and communicated.

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