UNIT 12 COGNITIVE LEARNING AND ITS ORGANISATION

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12.1 INTRODUCTION

Cognitive learning refers to the learning processes and experiences resulting from application of brain. The learner’s intellectual development and functioning is the focus of cognitive learning. It encompasses most of the learning events occurring either in school or out of the school situations. In many cases cognitive learning also provides the foundation for psychomotor and affective learning programmes. It happens because of the need of the individual to acquire knowledge and understanding of the concepts and other related aspects, which would later serve as the basis of the psycho-motor or affective learning. For example, an individual attempting to acquire the skill of driving a motor vehicle should know about the different parts of the vehicle, which are directly involved in the process of driving. These aspects of learning involve cognition. Similarly, to give an example of affective learning it is seen that a person’s attitude towards an object, a person or an issue changes when he/she acquires knowledge and understanding of the learning theme.

As such, cognitive learning plays a vital role in the individual’s intellectual and mental functioning. The individual’s mental and intellectual alertness influences his/her behaviour.

12.2 OBJECTIVES

After studying this unit you should be able to:
- understand the meaning, nature and scope of cognitive learning;
- state the different processes through which cognitive learning takes place;
- explain the importance of cognitive learning;
- describe the elements of cognitive learning and how they are related to each other; and
- explain the organisational procedure of the different elements of cognitive learning.
12.3 COGNITIVE LEARNING

12.3.1 Meaning of Cognitive Learning

Cognitive learning has its origin in the term cognition, which refers to a broad spectrum of activities, such as, thinking, conceiving, reasoning, knowing, understanding, establishing relationship etc. A number of psychologists have used the term cognition to refer to intellectual behaviours in which the underlying characteristics are of abstract nature. Broadly, cognition is understood as a general concept embracing all forms of knowing. It includes perceiving, imaging, reasoning, judging etc. Cognition is differentiated from conation and affection.

There are four basic units of cognition. These units are schema, symbols, concepts and rules. Siann and Ugwuegbu (1985) have differentiated and distinguished among the different units of cognition. The term Schemata (plural schema) has been extensively used by Piaget (1975) in his stage approach to cognitive development. Schema, according to Ault (1977) are stored conceptualisations of experiences, the ways of organising prior sensory events. They are necessarily not pictorial representations or images, nor are they tied to language. Schema in the simplest form refers to the idea of something.

A symbol generally refers to a thing it represents, signifies or indicates other than itself. For example, the word ‘God’ refers to the concept of God. Similarly the picture of a horse refers to a distinct kind of four footed animal called horse having a number of special features and characteristics which differentiate it from all other kinds of animals; but the picture itself is not a horse. Likewise, the symbols used in mathematics, for example, a triangle or quadrangle etc. refer to certain classes of geometrical figures. Symbols are also used to indicate different forms of traffic signals on the roads, mathematical operations and formula of musical notations etc. All such symbols refer to different classes of objects, events, operations, symptoms, actions and the like. Symbols are also used in lieu of certain verbal expressions through language to explain the respective representations.

A symbol enables an individual viewer to get the mental picture of all the characteristics and features of the object, which the symbol represents. The symbolised characteristics give rise to concepts in the mind of the individual. A concept refers to a general idea or meaning usually expressed by a word, symbol, sign or attribute. The concept is formed by means of combination of several elements, characteristics or features of the objects concerned, which are gathered through different sources and are stored in the forms of experiences. Ausubel (1978) and Entwistle (1985) explained concepts as objects, events, situations or properties that possess certain critical attributes and are designated through some symbols or signs. Klausmeier and Ripple (1971) defined concepts as mental constructs characterized by their psychological meaningfulness, structure and transferability, which enable an individual to cognize the features and events belonging to the same class and as different from the features and events belonging to other classes. A concept also helps in cognizing its co-concepts or sub-concepts. For example, when we say the concept ‘school’ it brings in automatically to mind its related concepts like the class, students, working personnel, teaching-learning situation and several such other sub concepts. The sub-concepts or co-concepts enable the person to get the clues of tracing out the relationship existing among them and also to find out solution to the problems arising from them involving the main concepts. A proper understanding of the concept may help the person to get clue for understanding some other concepts remotely related to it. For example, the process of flying of a bird may help in understanding the flying mechanism of an aeroplane.

The concepts may be in the form of concrete objects, events and ideas. These are comparatively simpler concepts. There are also concepts which are complex and
abstract in nature. These have comparatively higher difficulty level of understanding and conceptualization. For example, the concept of a peh is easier to understand because of its simple and observable features and characteristics, such as; shape, size, colour and texture. On the contrary, the complex concepts like sincerity, kindness, socialism etc. have many abstract characteristics, and are thus more difficult to comprehend and conceptualise. Usually the attributes of abstract or complex concepts are of varied nature and are different. For example, the features necessary for explaining the concept of ‘kindness’ are not similar to those required for explaining the concept of ‘solidarity’.

The fourth unit of cognition is the rule or principle. Usually a rule or a principle is established when there is a need for finding out the relationship between two or more concepts. For example, at the day break, the darkness of the night vanishes. This statement comprises of concepts like (i) the day break, which is an event and (ii) the darkness vanishes which is another event. These two concepts are correlated with each other and governed by the general rule that darkness vanishes because of the presence of light.

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12.3.2 Nature and Scope of Cognitive Learning

You know that most of the school learning programmes involve cognitive learning. The teachers usually put a lot of effort and time in enabling the learners to acquire various facts, concepts, rules and principles and cognitive skills related to the subject areas they are teaching, like language, mathematics, science and social science etc. The learning exercises involved in such processes are the different forms of cognitive learning. These processes, as we may analyse, involve the learners’ ability of cognition or the cognitive skills, and hence the cognitive learning.
Organising Learning

Such learning programmes definitely involve various mental processes of which perception, concept formation, memory and reasoning are the major ones. These processes encompass many sub-processes all of which refer to some sort of mental functioning in relation to cognition.

Information processing is a major strategy of cognitive learning which attempts to describe how the knowledge of various objects, ideas, facts, concepts of the world outside and inside one’s own environment is acquired, stored and retrieved from memory. This mental process of the individual is quite analogous to the functioning of a computer in which the information is fed from outside, processed, and stored. The same information when needed is retrieved for use and restored.

The processes of association and generalization assist the cognitive learning. The individual acquires new knowledge by associating his/her previous knowledge with the new ones and the process of generalization enables him/her to apply the acquired knowledge in new relevant situations.

Cognitive learning is not confined to the acquisition of knowledge for which it provides the base. It also leads to higher mental processes like understanding, analysing, reasoning, synthesizing, comparing and evaluating. It gradually broadens the mental horizon.

Cognitive learning provides the base for psychomotor and affective learning. For the purpose of acquiring psychomotor skills an individual has to acquire the basic knowledge and understanding of the skill related to learning situation, comprising of the methods, materials and appliances for which the cognitive learning provides the base. Similarly, cognitive learning enables an individual to acquire factual knowledge relating to the various aspects of affective learning. Affective learning covers the modifications of the learner’s behaviour in the feeling domains like interests, attitudes, temperament, sympathy etc. These modifications are usually possible because of the knowledge, understanding and similar processes of cognitive functioning. As the individual is exposed to the stimulus causing affective learning, he/she acquires new type of experiences, which affect his/her previous feeling tone resulting in modifications in affective learning.

Cognitive learning is facilitated by different cognitive processes. These processes enable the individual to acquire and retain knowledge about various objects, events, facts, principles etc. and to apply it as and when required. These processes have been discussed in the following section.

12.3.3 Processes of Cognitive Learning

The cognitive process is facilitated by perception, concept formation, memory and reasoning. These processes do not operate as water tight compartments and are not mutually exclusive. These are interrelated and often overlapping.

a) Perception

Perception is the interpretation of sensations acquired by the sense organs. In other words, it is the interpretation of the sensory experiences. It may also be defined as the sensation as it is interpreted through the learning experiences of the individual. The role of perception is seen in the gestaltic process of learning in which the perception of the whole or the total situation is interpreted in the context of achieving the goal of learning. In this process the learning situation is perceived in relation to the psychological field, which includes the theme or object of perception including the situation, the perceiver and the complex psychological background relating the two.

The quality of learning depends upon the nature of perception. The clearer the learner perceives, the better is the learning. This process is affected by the individual’s age, as the quality of perception is known to improve with age. It is also influenced by attention and earlier experiences of the perceiver.
b) **Concept Formation**

Concept formation is another important process of cognition. The nature of concept as a unit of cognition has been discussed earlier. The concepts help to classify the objects both animate and inanimate, ideas, principles and events those relate to use in the environment.

In the process of categorising we tend to seek commonality of characteristics among the objects or elements of which the category is to be formed. As a result, a new category is formed. In other words, this is the formation of a new concept. The terms concept formation and concept attainment or concept learning have subtle differences in their meanings and uses. Concept attainment or concept learning refers to acquisition of a concept, which is already existing. But concept formation refers to, as the term implies, structurising a new concept. In certain cases, the learner’s concept learning or concept acquisition may be just equivalent to concept formation. In case of a new learner the concept learnt is new to the learner, and is as good as the formation of a new concept. In view of this, the terms concept formation and concept learning are often used synonymously to refer to the process of abstraction of a set of qualities, properties or features that can be taken to represent a concept (Arthur, 1985). However, it may be observed that the term concept formation is restricted to the actual acquisition of the concept whereas the term concept learning is used for the conditions under which one learns to apply the concept which is already formed or learned.

c) **Memory**

Memory is another important aspect or process of cognitive learning. It refers to the storage of learned or acquired experiences of a person. Without memory learning is not conceivable. It is a function of the mind that is responsible for retaining information about stimuli, events, images, ideas etc. after the original stimuli are no longer present. The term is also used to indicate storage of information in the individual’s mind. The information so stored can be recalled by the individual. The term may also refer to the information retained in the mind. Memory is a very complex mental process. It has wider application in teaching-learning process. It is affected by certain internal as well as external factors concerning the individual, the material to be retained in memory, and the learning environment which may not be within the individual’s control. There are a number of inter-individual and intra-individual differences in memory. For example, one may have better memory for numbers than words.

d) **Reasoning**

Reasoning is the fourth process of cognition, which is almost a culmination of the earlier stated three processes, namely; perception, concept formation and memory. Reasoning involves all these processes in some form or other. Actually they form the basis of reasoning, which is considered as one of the highest mental activities. It involves logical analysis of the facts, events, principles in the way of establishing cause and effect relationship. Learning of principles and abstractions is possible due to the process of reasoning.

These refer to the processes of thinking and mental recognition of cause and effect relationships. This helps to predict an event on the basis of an observed cause and in some other cases affects the influence of an appropriate cause on an observed event. The validity of the process of reasoning is judged from the point of view of its accuracy in predicting the cause and effect relationship.

Reasoning is closely related to problem solving activities. In our problem solving behaviour we formulate certain hypotheses and test them to arrive at an appropriate solution of the problem. Thus, the process of reasoning involves the mental activities concerning formulation and testing of hypotheses to find out solutions of the problem(s).
Reasoning as well as the problem solving ability of the individual develop with age. Although reasoning and problem solving competencies appear at an early age, reasoning remains confined to concrete and personal objects and mostly to the child’s immediate environment. As the child grows older, there is a gradual increase in his/her ability to state a problem in words and to verbalise its solution (Garrison et al., 1967).

Check Your Progress 2

Note: Write your answers in the space given below.

1) Name any three internal factors which affect cognitive learning.

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2) Mark the following statements T or F for true and false statements respectively.

a) Cognitive learning is confined to the acquisition of knowledge and understanding. (  )

b) The external factors that affect the learner’s cognitive learning refer mostly to the social factors. (  )

c) Cognitive learning is mostly affected by the learner’s perception. (  )

d) Recognition is concerned with the storage of one’s acquired knowledge. (  )

e) Reasoning and problem solving are independent of each other. (  )

12.4 ORGANISATION OF COGNITIVE LEARNING

We have discussed earlier broadly the meaning of cognition and the term cognitive learning as derived from it. The cognitive learning theory deals with the problems of how individuals gain knowledge and understanding of the objects, facts and principles surrounding them in their environment and how through their cognition they act in relation to their environment (Bigge, 1981). In the context of learning the term environment does not refer to the physical environment of learning alone. It encompasses the overall characteristics of the learner, the goals of the learner, the demands of what is to be learned and how the learner interacts with his/her immediate total environment. The cognitive learning as we have discussed earlier constitutes mainly the learning involving the mental processes. Out of all the mental processes involved in cognitive learning the major ones are perception, concept formation or concept attainment, memory and reasoning. For strengthening the cognitive learning process we need to organise these processes effectively.

12.4.1 Organising Perceptual Learning

Perception as a process of cognitive learning has been discussed earlier. In the discovery approach there is thrust on perception of the total learning situation. Unless the total situation is perceived by the learner, learning cannot be fully effective. Perception provides the base for cognition. The term perception refers to a coherent unity of the sensory inputs like, visualising, listening and feeling an object or stimulus, which the individual has to perceive or about which the individual needs to acquire perceptual
experiences. Perception is defined as the process of determining the meaning of what is sensed (Klazkay, 1984). For example, an individual senses a stimulus with his/her sense organs by way of seeing it, or listening about it, or feeling its shape, size, texture etc. and also in some cases by smelling or through taste. Through perception the individual also differentiates the characteristics of the stimulus in focus from similar other objects or stimuli.

Researches have focussed on three major characteristics of sensing stimuli, such as the visual sensory register, auditory sensory register and tactile sensory register. Perception starts with sensing processes. The data or the information gathered through the sense organs are interpreted by the sensory registers resulting in perception. Thus perception assists in acquiring information, which lay the foundation of cognitive learning. It covers the entire sequence of events from the presentation of the stimulus physically to its phenomenological experience. Thus, the perceptual process includes the physical, physiological, neurological, sensory, cognitive and affective components. Thus the term perception is used in a very broad sense.

Perception, by its very nature plays a significant role in cognitive learning. The individual acquires various experiences through different sense organs, which are interpreted in relation to the individual’s previous learning experiences, already existing in his/her mind. These previous learning experiences may be in the form of schema, symbol, concept and rule. The new experiences in the form of information, facts, objects and such other elements are associated with the previous experiences through a type of mental process, broadly termed as information processing. Through this mental activity the new concept inputs which may be in the form of idea, image, fact and knowledge are considered as parts of information organised and stored in the mind. This storage may exist in its real form or in a modified form. However, it is the new learning experience for the individual, which adds to his/her existing stock of cognitive experiences. Thus perception helps in acquiring new information, which serves as the basis for developing the individual’s cognitive experiences.

In the previous paragraphs we have discussed how the perceptual process helps in acquiring new ideas, facts, concepts etc. which are translated to information through information processing. The acquiring of new information does not remain at knowledge level only. It may be pointed out that acquiring of knowledge is the fundamental step for cognitive learning. Cognitive learning is not limited to the act of knowing or gathering new fact, idea or information; it further continues in terms of higher mental processes like understanding, analysing, reasoning, comparing, synthesizing and evaluating. As such, perception and perceptual process help in laying the foundation for activating or leading the mind towards higher mental processes.

The information processing models of the mind’s thought and action view that the cognitive and perceptual operations take place in stages, such as input, coding, storage, retrieval, decoding and output. According to many psychologists, the information processing involves classic mental processes of perception, memory, thinking, reasoning, decision making, problem solving etc. (Reber, 1985). In the process of acquiring higher intellectual abilities, perception plays an important role through a process that Piaget referred to as adaptation. Adaptation as a mental activity consists of either changing the response to the environment or changing the current schemata to reconcile with the environment. The process of adaptation takes place in two forms, assimilation and accommodation. Assimilation takes place when the individual’s existing schemata influence his/her response to the newly experienced stimulus. For example, a child may be having the schema of a writing equipment, say pencil. When he/she sees a pen, which is another form of writing equipment, he/she confuses it with the pencil because the pencil schema is already there in the mind. On the other hand, the process of accommodation changes the already existing schemata. Continuing with the previous example, the child after perceiving the second stimulus (the pen), in the proper perspective finds out its differential feature and thereby his/her previous or the former
Organising Learning

schemata get modified; rather new schema is formed. Therefore, the most important thing in cognitive development, as you have seen, is the perception of the learning situation or the learning environment.

The learner’s capacity for cognitive learning depends upon certain external and internal factors. Among the external factors, the learner’s environment at home and community are important. Along with this, the learning environment at the school also largely affects cognitive learning. Therefore, emphasis is placed on providing better learning environment at school and home for ensuring improvement in cognitive learning. The role of perception in the individual’s cognitive development is not confined to formal learning situation only. Eggen and Kauchak (1992) pointed out that other factors also influence the individual’s cognitive development. For example, social development of the individual has a very significant contribution in such adjustment and the self-management as an effective member of the society. This is possible through proper social interaction during which the individual acquires numerous cognitive competencies in the social context. Piaget also postulated social interaction as a critical factor in the cognitive development of the individual (Hensen and Eller, 1999). Vygotsky emphasised the role of social and cultural influences on the cognitive development of children. An important element in the process of the children’s cognitive development occuring through social and cultural interaction is that this process need not be awaited for long, till they enter fullfledged social life as grown up and responsible members of the society. Vygotsky gave importance to cultural factors in cognitive development alongwith the individual’s growth process.

There is need to place emphasis on perception for the development of cognitive learning. Perception takes place through different sense organs. If more and more sensory perceptions can be involved in the learning process, the learning will be strengthened. In classroom learning situations there is thus, the need for emphasising the use of visual perceptions of the students along with the teachers auditory communications, accompanied by the verbal interactions between student and the teacher and vice versa. The teacher should try to explore, and use improved type of teaching-learning strategies for enabling students to acquire learning experiences through different sensory perceptions. As summarised by Hensen and Eller (1999) some of the instructional strategies for improving perceptual learning in class room context as suggested by Piaget, Bruner and Vygotsky are as follows.

The teacher requires to know the child’s potentials for learning. He/she should also try to understand the child’s learning style, and the characteristics of learning process in order to ensure better learning. Further, he/she should understand the mental operations taking place in the learner’s mind when he/she perceives the objects of learning; so that the teacher can devise and use appropriate techniques for each individual learner to learn effectively.

The teacher should keep in mind that learning takes place better through use of concrete objects in case of the young learners. Therefore, the teacher should try to use or relate their learning materials to concrete objects, facts, events, phenomena and the like. The approach should be such that the learners can use their sensory perceptions in different ways, like feeling, seeing, listening, manipulating and other sensory perceptions. In case the school learning programme has limitations for providing direct learning experiences, steps can be taken to provide such experience through audio-visual and other types of teaching aids.

The teacher should try to utilise the discovery approach to enable students to find out the results of learning by participating in some learning activities. In other words, the techniques of learning by doing should be adopted by the teacher or by directly involving the learners in the process of learning. For such an approach, the teacher’s instructions need not be confined to classroom situation. Field trips and other observational methods and techniques should be made available to the learners so that they can acquire the desired learning experiences through direct participation. In learning situations where
direct learning experiences cannot be provided, teacher should attempt to give vicarious learning experiences through contrived and simulated learning situations that make room for indirect observation.

The teacher should allow the students to proceed at their own pace of learning and according to their individual capacity. It may be remembered that, there are individual differences among the learners in their speed and capacity of learning. A teacher should give attention to individual learners.

According to Vygotsky, the social experiences of the learner have impact on his/her cognitive process. The learner gets ample opportunity to develop his/her cognition through adequate social interaction. Normally the young learners in schools have almost no scope for social interaction in their day to day social life. Therefore, the teacher should organise simulated social situations under appropriate settings to provide them social experiences through necessary interactions.

### Check Your Progress 3

**Note:** Write your answers in the space given below.

1) Name and indicate the nature and types of learning caused through various sensory perceptions.
   
   a) .................................................. ..................................................
   
   b) .................................................. ..................................................
   
   c) .................................................. ..................................................
   
   d) .................................................. ..................................................
   
   e) .................................................. ..................................................

2) How do sensory perceptions help in cognition?
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3) Mark the following statements as true or false by indicating T or F respectively as the case may be.
   
   a) Auditory communications are not necessary in perceptual learning. (T/F)
   
   b) Adaptation results both from assimilation and accommodation. (T/F)
   
   c) Sensory experience has little effect on cognitive learning. (T/F)
   
   d) Perceptual learning has no role in acquiring higher intellectual abilities. (T/F)

### 12.4.2 Organising Concept Learning

Learning of concepts is an important objective of school education programme. But concept learning is not confined to formal learning situations. We learn various concepts in real life situation. Certain aspects of it have been discussed earlier in this unit. However, it should be noted that concept learning lays the foundation for cognitive learning.
Concept formation and concept learning are often used synonymously to refer to the process of abstraction of a quality, property or set of features that can be taken to represent a concept. However, some authors use the term formation for actual acquisition of the concept; and the concept learning to indicate the conditions under which the individual learns how to apply a known or acquired concept. For example, the formation of the concept of ‘triangle’ refers to acquiring some idea about the nature and characteristics of triangles whereas the learning of that concept goes beyond the scope of acquiring such information. The learning of the concept of triangle by the child is indicated by his/her capacity to identify the shape of a triangle among the shapes of various other geometrical figures. Both concept formation and concept learning occupy vital position in the process of cognitive learning. The classroom instructional objectives are directed towards them.

Acquiring of information is the basis of concept formation which ultimately leads to concept learning. Information is acquired through various sources and different sense organs, as discussed earlier. When a piece of new information is acquired it is processed in the mind leading to the formation of a concept on the basis of its interaction with the related concepts stored in the mind. The processing of any information in the mind takes place according to certain rules and principles. Concept learning as well as the learning of principles are closely related to language learning, because most of the concepts are in the form of symbols and are experienced in the form of words.

According to Carroll (1964) in a meaningful verbal or written expression, there is complex relationship among the words used leading to mean a concept. In this process a word either in the verbal or in the written form conveys certain meaning to the listener or the reader. Such meaning leads to the formation of a concept. It is essential that a particular word conveys the same meaning to the communicator as well as to the receiver or listener. Anything contrary will lead to a confusing situation for conveying the concepts. Therefore, the meanings of words are to be given in societal acceptable forms. There are several instances of words conveying the meanings of different concepts, but they do not convey different meaning to the speaker as well as the listener.

The basic consideration is that the concepts are socially standardised and have wider acceptance. There are also instances of some concept words conveying different meaning. Usually such concept words create confusion for the speaker and the listeners. In the learning of children, particularly in the case of language learning, use of such concepts should be avoided. It seems thus evident that language facilitates concept learning. In some cases concept learning may also be possible without the use of any language or by using a language, which is not well developed. But in such cases concept learning is not found much effective; for example, concepts cannot be well developed through the use of uncommon dialects, and concept learning can not be facilitated. It remains restricted in applicability.

Let us now discuss some of the practical approaches to concept learning. As concept learning is facilitated through the use of language, greater emphasis should be placed on explaining and exposing the concepts through the use of language. This means greater use of the meaningful, precise and understandable language for expressing the concepts for the benefit of the learners.

The learners’ expected competency in the use of concepts is to be kept in mind while teaching him/her about the concepts. In other words, the learning outcomes in respect of a concept should be assessed in terms of the learner’s competency in using that concept.

Concept learning is found facilitated by sequencing the related concepts. While sequencing the concepts, attention should be given to their difficulty levels. The easier concepts are to be taken up first and then the more difficult ones. The sequencing of concepts is to be considered also from the point of view of their concreteness. The
concrete concepts should be presented first followed by the abstract ones. The learning of abstract concepts poses difficulty for the learner’s understanding in the absence of concrete examples. In this context, it may be pointed out that the complex concepts should be reduced to simpler forms before presenting.

Before presenting the new concepts to learners, there is need to ascertain their entry level behaviour in respect of such concepts. In case the learner has no idea or knowledge of the new concepts, the first task would be to make verbal associations with the concept. There is lot of commonality between verbal learning and concept learning (Underwood, 1966). The following key points should be emphasised in concept learning.

- Attributes of the concepts should be emphasized in explaining them.
- The concepts are to be worded in correct terms, which would convey the meaning and nature of its functioning or any other remarkable characteristics.
- The nature of the concept needs to be explained and made clear to the learner because knowledge of the definitional and structural characteristics of the concept facilitate its learning.
- Both the positive and negative attributes, characteristics and examples of the concepts are to be presented to the learners for a better grasp of them.
- The concepts to be learned should relate to the day to day life experiences of the learners. Learning by doing, discovery learning and problem-solving are considered suitable strategies for the learning of concepts in relevant situations.
- In the course of concept learning, provision should be made for feedback on interim attainment by the learners.
- Concept learning can be better accomplished through concrete situations. Presentation of concrete objects and events relating to the concept facilitates the learning of such concepts. But this may not be exactly possible in many situations. In lieu of the concrete or real objects provision may be made through contrived or simulated situations.

12.4.3 Associational Learning

Learning through association or associational learning is not situation or time specific. The process of associational learning starts from the early stage of an individual’s life and continues till the end. It cannot be compared with any formal learning situation. Rather it takes place in all possible informal and formal learning situations, at home, at school, at work and in the community. The basic element in this learning is the process of association. Association refers to the process of relating learners’ present experience with his/her earlier experiences for using these relationships in the present and future course of learning (Skinner, 1960). The process of associational learning has made the human civilization possible to make progress from primitive to modern life. The individual’s learning experiences gained through both the real and vicarious situations become more meaningful if related to his/her previous experiences. The present learning experiences are aroused through the process of association with the earlier related experiences. As a result of such association the present experiences take on a new meaning. Memory functions as an essential aid in learning through associations, but association does not help in memory. However, memory is an important part of associational learning and it helps in strengthening associations.

Through the association process, the child starts to associate symbols with objects, for example, the word ‘pen’ with a particular type of writing material; the chemical symbols with a particular type of chemical compound or a reaction. The associational learning takes place inside as well as outside the classroom situations.

The associational learning can be categorised as automatic association, concept formation and generalisation. All of these are mostly verbal and symbolic in nature.
They usually follow the sequence from facts to concepts and from concept to generalisations. Facts are often regarded as automatic associations, for example, 'mammals' refers to a category of animals rearing their offsprings on breast feeding; 3 multiplied by 2 gives the same results as 3 added 2 times and the word 'toy' means a type of play material for kids.

In order to make the learning meaningful and clear, the association between the word, fact or information and its meaning should be made automatic.

**12.4.4 Generalisation in Learning**

Generalisation refers to establishing relationship between two or more concepts or facts on the basis of certain rules, laws and principles. The generalizations are not arbitrarily made. It is deriving and establishing relationships among concepts, facts and phenomena etc. For example, we know the conceptual fact that \(2+2+2=6\) which is the process of addition of three 2s. We also know that 3 times 2 is equal to 6 or we say \(3\times2=6\). We can take similar other examples and can establish the relationship between two separate conceptual facts that the process of multiplication in arithmetic involves repeated addition of the same number for the given number of times. Through such generalization the learner is able to acquire a new generalised concept which is based on certain simpler conceptual facts. In this example, the conceptual facts are (i) continuous addition of the same number for a given number of times leading to a result of summation; and (ii) simple arithmetic multiplication of the given number by the number of times of the previous case. The results of both the arithmetical operations establish the new generalized concept that 'multiplication is continuous addition'.

The process of generalisation of concepts has the characteristic of transferability. The transfer may be within the same situation or extend to other situations. This is also true for all types of concepts in general that the generalized concepts assist in problem solving. The processes of generalizations of concepts and problem solving are mutually dependent on each other. Generalizations facilitate in problem solving situations and in some cases generalizations are made through problem-solving.

The learner’s level of attainment in concept learning is indicated through his/her ability for drawing generalizations from the learning of the related concepts. When an individual has acquired certain concepts he/she should have the ability to apply these concepts in other relevant situations. It may be in the form of presenting a problem involving these concepts. In view of its utility in education emphasis is placed on the learner’s ability for making generalizations in classroom teaching-learning situations.

### Check Your Progress 4

1) Fill in the blanks in the following sentences.

   a) Concept formation and ........................................ are used synonymously to refer to the process of abstraction that can be taken to represent a concept.

   b) There should be greater emphasis on ................................ for making the concepts meaningful.

   c) Attainment in concept learning can be better tested through the learner’s competence in ..........................

   d) The concepts to be learned should relate to the day to day ........................ of the learners.

   e) Concept learning can be better accomplished through ........................ situation.
12.4.5 Strategies for Enhancing Memory

Memory plays an important role in cognitive learning. Much of cognitive learning coming under school education depends on memorization. Even the higher cognitive learning processes, like analysing, reasoning, synthesizing and evaluating etc. have their base in memorization. Without memory it is difficult to conceive of learning. Memory is interlocked with perception; and perception serves as the basis for cognitive learning. In a sense, the development of human civilization has become possible mostly because of human memory. All inventions, discoveries and developments in scientific, technological and social fields are based on this. The continuity in scientific innovations and experiments is maintained because the scientists and the innovators are capable of remembering what has already been done and accomplished in earlier experiments and innovations made. In other words, such things have been retained in their minds because of their memory process and are recalled and reproduced at the time of need in subsequent activities. We also find that learning phenomenon depends upon the learner’s capacity for memorizing.

All intellectual activities are made possible because of our memory. Though we use the term memory as a single mental process, it has different functions. These different functions are exercised by the process of memory. The functional processes covered under memory are the act of memorization (consolidation of information), and retention (memory) vis-a-vis loss in retention (forgetting). Therefore, memory has three primary functions of memorizing, retaining and remembering. Memorizing is the act of internalising or processing of information; retaining is the storage of information; and remembering is the storage of recalling, reproducing or recognizing the information stored in memory. Remembering is just the opposite of forgetting, referring to loss of information from memory. These processes by their nature are very inter-related. One of the major advances made in the arena of cognitive learning is the idea of representing the mind as an information processing system that determines the flow of information and how it is acquired, stored, represented, revised and accessed in the mind (Pelligrini, 2001).

Piaget’s theory of cognitive development is recognised by some educational psychologists as the nearly complete systematization of how cognitive development takes place (Sternberg, 1984). However, some psychologists are of the view that his theory lacks in providing details of how individuals develop cognitively. It does not answer how the individuals think and learn. Information processing theory suggests the way to study cognitive development, how the brain deals with the information received by the sense organs.

Processing of information starts with their storing. Appropriate analyses of the stored information takes place in the cognitive system like the storage of information in a library. The items of information are stored in the form of cognitive units. Atkinson and Shiffrin (1968, 1971) are of the view that there are three forms of storage in terms of the duration of their lasting, method and process of retrieval and the reasons of failure of being stored for longer duration. Firstly, there is sensory registering of the cognitive units. There are as many sensory registers as there are types of sense perception. The information in the form of environmental stimuli enter the sensory storage system, but this information is stored for a very short duration may be for the part of a second after which they are lost. The second type of storage holds the information comparatively for a longer period, but not in its original form. This is also the short-term storage of information which is known as short term memory (STM) or working memory. This type of memory is needed for sorting out the cognitive units or items which are to be remembered from those which are not to be remembered. The items which are not to be remembered are forgotten. For example, in doing a multiplication in arithmetic we are required to multiply the integers. As soon as we get a multiplied value, we use it at that particular place as per the need of the process and then we forget it. Those bits of information are not kept in memory for subsequent
use. Immediately our attention goes to another item in the process. In this manner, we forget many units or items. The work of Ebbinghaus towards the end of 19th century pointed out a clear distinction between short term memory (STM) and long term memory (LTM) earlier used as primary and secondary memory respectively. The STM as proposed by him has the capacity of being retained for about seven units. At about the same time Wundt demonstrated that the storage load of STM is limited to six or seven units, which has also been later supported by Meller, who referred to that magic number of seven units. Meller has used the term 'chunks' for these units (Dobson et al., 1981). The third type of memory, that is, the long term memory (LTM) has no such limit in terms of units and nothing is lost from it. But it so happens that at times we forget something that was in our LTM earlier, may be some years ago. Though we do not find the traceability of such information in our memory, it can be traced if we use a suitable searching strategy. For example, we might have forgotten certain specific events on our first day in college or how we enjoyed our visit to a place. But the total event can be traced back in our mind if we find certain related aspects connected with those events or occurrences. However, long-term memory (LTM) is very important for us. It contains two different types of information—semantic information referring to the information relating to the use of words, and the procedural information, referring to the information-related to the procedures and approaches of how the things are done.

In order to remember the information, facts, ideas and such other cognitive elements for a long-time and to be able to use at the time of need, the individual has to make a concerted effort. For example, the individual has to repeat or rehearse his learning from time to time to remember the content for a longer period. However, the short-term memory and long-term memory storage are processed by different mechanisms and strategies, which are mostly governed by the information processing theory, otherwise known as 'cybernetic' theory. Basically this approach to study memory involves (i) the process of storage in memory and (ii) the process of retrieval of the information from the memory at the time of need.

The entire process of memory from input phase to the output phase is divided into four stages, namely; acquisition, encoding, storage and retrieval. The first one deals with how the individual acquires information. It has been discussed earlier. The second one ‘encoding’, implies the transformation of the acquired information into a form, which can be processed in the memory system mostly in relation to the earlier learning experiences. Out of the acquired information if something is to be remembered then the storage must take place. For that purpose the encoded information is transferred to the memory system. The fourth and final stage, retrieval, involves the tracing out of the required information stored in the memory and relating it to the present situation for use as per need.

Earlier we have discussed about schema, one of the basic units of cognition which refers to the stored conceptualization of experience. It refers to a type of idea about the acquired information stored in the mind. It does not have any specific form. It may have a visual or verbal form or may be a combination of the two forms. The perceptual experiences of an individual are acquired in the form of schemata and subjected to the process of memory. The role of schema in the process of memory is widely recognised. When the individual is exposed to a new material, the idea about the material is incorporated in the existing structure of his/her knowledge. The schema of the new material interacts with the related schemata learnt earlier and stored in the mind. As a result of such interaction, there is the possibility of reconstructing of the old schemata in the memory leading to a new memory structure. It may be completely different from the old memory structure or may have some resemblance to it or exactly identical. The structural change in the new schemata, is due to some new information acquired through the present schema or schemas which were missing in the earlier ones.
Because of the importance of memory in cognitive learning there is need for enhancing memory skills. Memorization depends upon certain internal factors of the learners. The important ones are; the learners’ age and maturation level, need, interest, motivation and the like. Unless the learner is intellectually mature for understanding and acquiring the desired cognitive learning experiences, he/she may not be able to memorise the contents of learning. Sustenance of the learner’s interest and motivation in the learning process are affected by his/her needs of learning. Unless the needs of the learner are satisfied through the learning process, he/she lacks genuine interest in it. As a result, the entire process becomes almost futile and ineffective. In case of classroom learning the students’ interest and motivation are also affected by certain external factors like, appraisal of students’ performance by the teacher, the parents, the learning tasks and materials, the learning environment, the process of examination and evaluation. These factors affect the learners’ achievement motivation, which directly or indirectly influences the process of memorisation of the learners. The learners’ lack of interests in the learning contents will also affect the process of learning and memorising.

The teacher may use certain techniques for improving the memory of the learners. In this connection they should give importance to developing the learners’ meta-memory skills. It relates to the learners’ awareness of their own memory processes and capabilities. The learners’ problem solving memorization skills can also be developed through enhancement of meta-memory skills.

Certain mnemonic devices are also used for enhancing memory. Mnemonic device or mnemonic is a term usually used to cover any technique for committing the learning material to memory or for improving one’s memory. Let us discuss examples of such mnemonics.

Pairing or associating the new learning materials with something memorable to the learner is one way of remembering. For example, in order to remember a new telephone number, one may pair it with another figure like his/her date of birth which is usually in the individual’s memory or in case of remembering a new name we may pair it with another familiar name of a friend or relative. Similarly, certain new information to be remembered can be paired with some familiar type of material, which is already in the individual’s memory. There is no common formula for such pairing. It is to be devised and used by the individual himself/herself.

Another mnemonic device for remembering certain long term phrases, terminologies, or a list of some specific terms/words is to use acronyms. Acronym refers to a pronounceable abbreviation of a multi-word term composed with the first letters of each word. For example, in order to remember the colours of rainbow (violet, indigo, blue, green, yellow, orange and red) we try to memorise the term VIBGYOR, coined by using the first letters of the seven colours. Likewise the name Culture Fair Intelligence Test can be remembered by using the acronym CFIT and the basic formula for finding out the standard deviation of an ungrouped set of scores can be remembered by memorising the term ‘RMSD’ or simply RMS for Root Mean Squared Deviations (Root of the mean of the sum of the squared deviations). Similarly PQ4R is a mnemonic which can be used to organise classroom activities in sequence for improving students’ retention. The mnemonic stands for Preview, Question, Read, Reflect, Recite and Review. Some other mnemonics are Acrostics, Link method, Loci method, Peg word technique and Keyword technique (Henson and Ellor, 1995).

Another important strategy for facilitating learners’ understanding and remembering is the use of advance organizers containing new concepts prior to presenting the information to help the students organize new information into meaningful concepts. Advance organisers are related to what the students already know about the new information as well as the materials to be comprehended and memorised by students.
Quite similar to the use of advance organizers, another technique known as 'keyword organizer' is used for the purpose. In this technique the teachers emphasise the important concepts and words of the lesson to be learned, prior to and after the presentation of the lesson. Such technique is also used in developing the text books and other such learning materials by printing the key concepts and words in bold types so that the reader gives more emphasis to it.

The teachers as well as learners can devise other suitable techniques for improving their memory.

**Check Your Progress 5**

1) Briefly explain the meaning of mnemonics and their uses, limit your answer to 150 words.

2) Explain the following terms within 25 words each.

   a) Long-term Memory

   b) Functions of Memory

   c) Information Processing

   d) Stages in Memory
In view of its nature, reasoning has significant role in cognitive learning. The cognitive learning enables the learner to adjust and adopt himself/herself effectively with the environment and to solve various problems that he/she comes across in life situation. As such, problem solving is considered as an essential aspect of cognitive learning. All the cognitive processes have the ultimate aim of assisting in solving problems in one way or other. The experiences gained through perception and concept formation cannot be of any use if they function in isolation of each other. For example, simple perception of an object or event without a subsequent action will yield no benefit to the learner. Perception helps and leads to concept formation; and the concepts are retained in mind through memory. The concepts so retained are to be retrieved and used by the individual, when needed. The simple retrieval of the concepts will have no meaning unless proper relationships are established among them. A number of isolated informations cannot help the learner in solving any problem. For solving any problem the learner needs to establish logical relationship among the informations relating to the problem, on the basis of which he/she can formulate hypotheses or tentative solutions to solve the problem. The reasoning process assists in establishing such relationship. In many instances of cognitive learning we have to depend upon the process of reasoning. The individual’s reasoning ability develops with increase in age and maturation. It is caused mostly by the individual’s environmental experiences. The reasoning ability of a child is not mature like an adult as the child lacks adequate experiences in comparison to the adult. According to Garrison (1967) although reasoning and problem-solving behaviour appear at an early age, the reasoning ability at early stage is confined to concrete and personal things in the child’s immediate environment. As the child grows older, there is significant increase in his/her ability to state a problem in words and also to verbalize its solution. The children usually have poor reasoning ability because they lack experiences. As a
child grows up he/she gathers more and more experiences, and his/her ability to reason out the problems that he/she faces develops gradually. Therefore, the reasoning ability proceeds from simple to complex.

In order to improve the reasoning ability of young learners, the teachers in classroom situations are required to provide a variety experiences to them. Such experiences can be related to classroom and school situations and to outside school environment. The experiences relating to outside school environment like the various social and community experiences can also be provided to the learners through simulated programmes in the class and the school. By participating in such activities the learners can gain required experiences relating to different social events. The activities for providing such experiences can be integrated with the curricular as well as co-curricular programmes of the school. The participation of learners in such programmes and activities will help them to develop their reasoning ability.

The individual’s reasoning ability may be of different types like verbal, numerical and spatial etc. These are required for solving the different types of problems befitting their nature. Most of such reasoning abilities are developed through various curricular programmes. The teachers organize different types of learning activities in different curricular subjects and arrange for participation of the learners in such activities to provide them ample scope for development of the relevant reasoning abilities. Besides, the curricular activities, the reasoning abilities can be developed through different co-curricular activities like quiz programmes, puzzles, debates, literary competitions, games etc. Such co-curricular programmes relating to different types of reasoning abilities need to be identified and organized keeping in view the scope and facilities available in the institutions. There is also need for taking into consideration the interest and requirement of the students so that their whole-hearted participation in such programmes can be ensured.

Check Your Progress 6

1) Fill in the blanks in the following sentences with suitable words given in the brackets
(imagination, situation, controlled thinking, analysis, problem, perception)

a) Reasoning is explained as a process of ....................., which originates from ................ that the individual intends to solve.

b) Cognitive learning enables the learner to .................. himself / herself successfully with the environment and to ................ in life situations.

c) The individual in order to solve a problem needs to establish .............. ......................... among the ...................... related to the problem.

2) Mark each of the following statements true (T) or false (F).

a) Reasoning as well as problem-solving behaviour appear at the early stage of the individual’s growth and development. (T / F )

b) Social experiences cannot be provided to the learners through simulated situations. (T / F )

c) Mnemonics help in correct perception. (T / F )

d) A learner’s metamemory skill is not related to the awareness of his/her own memory process and capabilities. (T / F )
Cognitive learning plays a vital role in an individual’s life by providing a direction to his/her mental and intellectual developments. It influences individual’s behaviour. Cognitive learning is based on the process of cognition, a psychological construct. It comprises of four basic units such as schema, symbol, concept and rule.

Cognitive learning involves various mental processes of which perception, concept formation, memory and reasoning are the major ones. Perception involves the interpretation of an individual’s sensory experiences, and it helps in acquiring knowledge about various objects, facts and concepts etc. with the assistance of other basic mental processes. Acquiring of knowledge about objects, facts and concepts etc. forms the basis of cognitive learning, on the foundation of which the individual gradually acquires higher mental abilities.

There is need for organising the processes of perceptual learning, concept learning, memory and reasoning for effective cognitive learning.

Perceptual learning takes place through sensory experiences gained by the individual through various sense organs. Therefore, in all the learning situations there is need to emphasise the acquiring of sensory experiences in as many ways as possible. Perceptual learning helps in acquiring higher mental abilities through the activities of adaptation, assimilation and accommodation. In the formal learning situation there is need for providing various sensory perceptions, understanding of the learner and the learning process, using concrete learning materials, emphasising learning by doing approach, and participatory learning for ensuring better cognitive learning.

Concept learning serves as the foundation of cognitive learning because concepts are the basis of cognition. Language facilitates concept learning. Meaningfulness of the concepts make the process of concept learning smooth and effective. The basic processes involved in concept learning are learning through association and generalization. New learning is to be associated with previous learning in meaningful ways. The generalizations in learning are based on principles, rules or laws. Both of these processes strengthen concept learning vis-a-vis cognitive learning. Generalization serves as the indicator of concept learning. It helps in problem-solving and vice-versa.

Organisation of memory is an essential aspect of cognitive learning. It serves as the key for the cognitive development of the individual. Progress of human civilization has been made possible due to human memory. Memory has three distinct functional aspects, namely; the acts of memorizing, retaining and remembering. The mind’s act of information processing has a role in this. Memory depending upon the nature of retention may be of short-term or long-term. All the information that we acquire are not retained in our memory. Many informations are not required to be retained. We have to forget many things for our benefit. However, many essential informations are to be retained, and remembered when needed. Memory has four stages; acquisition, encoding, storage and retrieval. There are different strategies for enhancing memory. In classroom learning the teachers may use certain techniques, like improving the meta-memory skills of the learners by using mnemonic devices. The mnemonics refer to a technique used to facilitate the memorising of the terms, concepts, figures etc. There are various devices like pairing and use of acronyms, advance organisors, keyword organiser etc. The learner may think of such other mnemonic devices according to the situational and personal convenience.

Reasoning as a process of cognitive learning plays an important role in problem solving and in individual’s adjustment. Suitable learning experiences through various curricular and co-curricular activities need to be provided to the learner for developing reasoning ability.
12.6 UNIT END EXERCISES

1) Make a list of five problems inherent in the process of cognitive development of the socially deprived learners.

2) Suggest ten strategies for improving sensory perceptions. Point out the strategies difficult to adopt in classroom teaching.

3) Discuss with your co-learners how the process of association of ideas influences cognitive learning.

4) Discuss the need of generalisations in cognitive learning and how this process is related to problem solving.

5) List five learning situations in which short term memory (STM) is required, and five situations in which long term memory (LTM) is required.

6) Cite any three examples of different learning situations in which the advance organizers have been used.

12.7 REFERENCES AND SUGGESTED READINGS


