
UNIT 16 BEHAVIOURISTIC LEARNING THEORIES AND THEIR INSTRUCTIONAL APPLICATIONS

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16.1 INTRODUCTION

The primary responsibility of teachers as we know is to help children learn. How do teachers select educational goal or educational procedures, and how do they organize the classroom depends on how they conceptualize the teaching learning process.

All teachers have certain beliefs or a theory about learning. That is the fabric of their teaching strategy. If we carefully observe teachers conducting their classes we can infer their basic assumptions about the teaching learning process, although the teachers concerned may not be able to articulate their beliefs. For example, a teacher who directs and controls all students' activities operates under one set of beliefs. And a

teacher who tries to create conditions for the students to be able to make their decision and learn on their own operates under an entirely different set of beliefs. Some teachers may believe that the best way to learn is to repeat the content time and again until it is well set in students' mind. So he/she gives to students exercises which involve revision or repetition of the content learned. But there are teachers who hold the view that repetition is not and cannot be the best way for attaining higher level learning objectives. Based on such beliefs about learning, psychologists have developed different theories of learning. These theories of learning are grouped under two major schools of thought: (i) behaviouristic theories; (ii) cognitive - field theories including information processing and humanistic theories. In this unit we shall deal with behaviouristic theories of learning.

Contemporary behaviourists (often called S - R psychologists) view environmental factors as stimuli, and the resultant behaviour, as responses. They attempt to demonstrate that *behaviour is controlled by environmental contingencies of external rewards or reinforcements which form links between behavioural responses and their effects (or stimuli)*. Teachers who accept the behavioural perspective assume that behaviour of students is a response to their past and present environment and thus all behaviour is learned.

For example, the classroom trouble makers "learn" to be disruptive, because of the attention (reinforcement) they get from peers; withdrawn students learn that their environment does not reinforce gregariousness and they become reserved and silent. Thus any behaviour can be analysed in terms of its reinforcement history. The teachers' responsibility, therefore, is to construct an environment in which the probability of reinforcing students for correct or proper behaviour is maximized.

In this unit we discuss the four major perspectives related to behaviourism. These perspectives are: classical conditioning, applied behavioural analysis, social learning theory, and cognitive behaviour modification.

16.2 OBJECTIVES

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

- explain the basic paradigm of classical conditioning;
- describe the procedures used in applied behavioural analysis for modifying behaviour;
- explain and use shaping of behaviour to develop complex behaviour;
- state behavioural principles and use them in designing a lesson;
- explain how Skinner's views of learning differ from other behaviourists;
- differentiate between classical and operant conditioning;
- state the difference between negative reinforcement and punishment;
- discuss the role of reinforcement in operant conditioning; and
- examine social learning theory with its application in learning of social behaviours.

16.3 CLASSICAL CONDITIONING THEORIES

Behaviourists conceived of a living organism as a self maintaining mechanism. They assumed that the essence of human machine is a system of receptors (sense organs), conductors (neurons), switching organs (brain and spinal cord) and effectors (muscles) attached to levers (bones) - plus, of course, fueling and controlling organs such as stomach and glands (Bigge and Hunt 1980). Having thus defined the human being on the pattern of a machine, the pure behaviourists have almost completely eliminated

any mentalistic concepts. With this concept of a human being the behaviourists, especially Watson, based psychology on the concepts of physics and chemistry. To them, mind and all kinds of mentalistic concepts were irrelevant to scientific inquiry and hence not appropriate for the real task of psychology. These psychologists saw learning as a process of building conditioned reflexes through the substitution of one stimulus for another.

The principles of behavioural psychology are used both in designing teaching-learning strategies and in behaviour therapy to treat numerous personal and social problems such as anxiety, aggression, and depression. Two theories of classical conditioning, proposed by Pavlov and Watson, are discussed here.

16.3.1 Classical Conditioning of Pavlov

Ivan Pavlov (1849-1936), a physiologist by profession, while working with dogs incidentally came across an interesting learning phenomenon, now called *Classical Conditioning*. Pavlov found that when a bell was sounded just before a hungry dog was presented with food, after several trials, the dog would salivate simply at the sound of the bell. Pavlov identified the food as unconditioned stimulus (an example of a stimulus that produces some observable response without prior learning). The bell which had no particular meaning for the dog became a conditioned stimulus because of its association or pairing with the food, which elicited a conditioned response - the salivation.

This kind of learning came to be called **Classical Conditioning** or **Stimulus Substitution**. A schematic representation of classical conditioning is given in Fig. 16.1.

Before Conditioning

CS (bell)	—————→	no response or irrelevant response
US	—————→	UR (Salivation)

During Conditioning

CS (bell)		
US (food)	—————→	UR (Salivation)

After Conditioning

CS (bell)		CR (Salivation)
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Fig. 16.1: Classical conditioning

Pavlov observed that when a dog was conditioned to salivate at the sound of a bell, it would also salivate at other similar sounds such as that of a siren, even though the new stimuli were never used in training. Once a particular stimulus was associated with a response, other similar stimuli were also able to elicit the response. He called this phenomenon *Stimulus Generalization*.

16.3.2 Watson's Behaviourism

John B. Watson (1878 - 1958) used for the first time the research findings of Pavlov in the United States of America. Watson started believing that learning was a process of conditioning reflexes (responses) through the substitution of one stimulus for another. According to him humans are born with a few reflexes and emotional reactions of fear, love, and rage. Rest of human behaviour is established by building new S-R-connections through conditioning.

In one of his most famous experiments, Watson conditioned an eleven month old child to fear a white rat, which was very friendly to him earlier. Watson made a loud noise

(unconditioned response or U R) whenever the rat was presented to the child. It resulted in fear response (unconditioned response or UR). When this exercise was repeated several times the child became fearful (conditioned response) just on the sight of the rat (conditioned stimulus, or C S).

Although Watson rejected some of Thorndike's ideas (see section 16.4.1), he saw great promise in one of his secondary laws of learning, namely, associative learning. According to this law a learner can make response associated with any situation to which he/she is sensitive. In other words any possible response can be linked to any stimulus. Watson demonstrated that such learned fear (conditioned response) can also be unlearned by the process called extinction. This is accomplished by repeating the CS without following it up with US, presenting the rat without making the loud noise. Many students' attitudes are learned through classical conditioning.

Check Your Progress 1

Note: Write your answers in the space given below.

- 1) Name different behavioural approaches to learning.
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- 2) Define the basic paradigm of classical conditioning or stimulus substitution.
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- 3) Explain with example the process of "extinction".
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- 4) What is stimulus generalization?
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16.4 APPLIED BEHAVIOUR ANALYSIS

In this section, we discuss Thorndike and connectionism, Skinner and operant conditioning, difference between classical and operant conditioning, relation of applied behaviour analysis to operant conditioning, discrimination learning instruction, consequent stimuli, primary and secondary reinforcement schedule of reinforcement, extinction and spontaneous recovery and shaping.

16.4.1 Thorndike and Connectionism

E.L. Thorndike (1874 -1949), one of the well known American learning theorists propounded a theory called connectionism. Thorndike posited that learning was a process of "stamping in" or forming connections between a stimulus and a response.

He formulated connectionism and more specifically the "laws of learning" by studying the effect of "reward" on animals. In one of his well known experiment, Thorndike used cats which were placed in a "puzzle box" - a small cage with a door that would open if the hungry cat placed inside pulled a string hanging inside the cage. Food was placed outside the cage. The cat therefore, would strive to come out of the cage. Usually the cat walked around, clawing at the floor, jumping at the side of the cage, and many more movements until the cat pulled the string by chance which opened the door, and had the food. Thorndike repeated the experiment several times in similar situations. As the experiment was repeated, the cat took less and less time in pulling the string. A time came when the correct response was stamped in. In that situation as soon as Thorndike placed the hungry cat inside, the cat pulled the string without making any irrelevant movements and came out. After the cat hit upon the correct response it was immediately rewarded and thus gradually the connection between stimulus and response strengthened. Thorndike's research on animals gave him his most important law of learning - The Law of Effect (Thorndike 1931). It states:

When a modifiable connection is made between a situation (stimulus) and a response, and is accompanied or followed by a satisfying state of affairs, the strength of that connection is increased. When an annoying state of affairs goes with or follows a connection, the strength of that connection is decreased (P. 71).

However, in his later writings, Thorndike modified the law of effect, which is called by some writers as "truncated" law of effect. In the modified form Thorndike eliminated the negative or annoying part of the law of effect, because he found that punishment did not necessarily weaken the strength of the connection. You can very well see that when students are punished by teachers for bad behaviours, they do not necessarily avoid showing such unwanted behaviour. On the contrary, they are very likely to indulge in more and more unwanted behaviours as a result of being punished. This may happen because of 'reaction formation'.

Another law of learning given by Thorndike was the "law of exercise", also called "law of use and disuse". It stated that the more a stimulus response connection was practiced or used, the stronger it became; the less it was used, the weaker it would become. As Thorndike put it "Other things being equal, exercise strengthens the bond between a situation and a response". He modified this law also in his later writings because he found that practice without reward was ineffective. Connections are strengthened only by rewarded practice. Thus the law of effect led to the use of concrete rewards, and the law of exercise led to exercise, practice, and drill for all subjects but such practice need to be rewarded properly.

16.4.2 Skinner and Operant Conditioning

Like Thorndike, Skinner also considered reward or reinforcement as the most important element of learning process. We tend to learn a response if it is immediately followed by reinforcement. However, Skinner preferred the term reinforcement to reward because he made a difference between the two terms. Reward according to Skinner, is a subjective interpretation of behaviour associated with pleasurable event, whereas reinforcement is a neutral term. Reinforcement is simply defined as an effect that increases the probability of a response. It is, therefore, discussed in terms of observable or measurable event. We reward people, we reinforce behaviour (Skinner, 1968, p.106). Skinner called this approach *experimental analysis of behaviour*. He believed that the purpose of psychology is to predict and control behaviour. According to him all behaviour is learned, and therefore, principles of psychology can be applied in the classroom for bringing a change in pupils' behaviour.

Skinner identified two types of responses in the learning process: *respondents* and *operants*. Respondents are elicited by specific stimuli such as Pavlov's bell. In a respondent situation, an individual learns merely by being in the situation and responding

to it. But not all behaviour is of this type. In reality most human behaviour is operant behaviour which is emitted and not elicited.

16.4.3 Difference between Classical and Operant Conditioning

Skinner's conditioning is called operant conditioning whereas that of Pavlov's and Watson's conditioning are called classical conditioning. The process of operant conditioning is a learning situation in which a response is made more probable or frequent as a result of immediate reinforcement. Of all the possible responses that could be emitted in a given situation, only those responses become dominant or more probable which are reinforced.

In classical conditioning the consequences of a behaviour carry no weight in the learning of that behaviour. Reinforcement is unnecessary because the stimuli bring about the desired response.

Operant conditioning although closer to Thorndike's connectionism than to Pavlov's conditioning theory yet is different from Thorndike's explanation of learning. Thorndike felt that the reward strengthened the bond that existed between stimulus and response, whereas Skinner felt that what is strengthened is not the S-R bond but the probability that the same response will occur again.

16.4.4 Applied Behaviour Analysis and its Relation with Operant Conditioning

Initially Skinner developed his principles of operant conditioning by experimenting upon animals - pigeons, monkeys, cats, rats. Later he wrote about how these principles can be applied to complex human behaviour. In his well known novel *Walden Two* (which is about a utopian society based on operant principles) he explained the generalizability of these principles to humans. In another book authored by him 'Science and Behaviour' he explained how these principles can be applied to social institutions like government, law, religion, economics, and education.

In 1960s, the operant principles began to be applied for shaping human behaviour in applied settings. These principles worked well in hospitals, for therapeutic use, schools, prisons, and other institutions. The major shift in emphasis from basic laboratory research on animals to applied applications to human beings led to what is now called *applied behaviour analysis* which may be defined as the application of operant principles in clinically or socially significant behaviours to bring socially desirable change in human behaviour. Teaching a mentally retarded individual certain basic skills to enable him/her to live independently or teaching a delinquent child to live cooperatively with peers and other members of the society are examples of socially significant behaviours.

In the literature both the terms *behaviour modification* and *applied behaviour analysis* are used in describing behavioural interventions. However, psychologists prefer the term *applied behaviour analysis*, because it describes the change of behaviour by application of behavioural principles. The term behaviour modification may involve the use of many other procedures like hypnosis, psychoanalysis etc.

16.4.5 Role of Discrimination Training in Instruction: Discrimination Learning, Stimulus Control and Stimulus Generalization

To explain the process of operant conditioning we don't need a stimulus to initiate a response; whereas in classical conditioning the nature of the stimulus itself initiates a response. However, in operant conditioning we can talk about a response being brought under the control of a discriminative stimulus (S^D). The discriminative stimulus is a signal that increases the probability of a response. This is best explained in Skinner's

research with rats placed in a box, called the Skinner box. This box is equipped with a lever, light, food tray and food-releasing mechanism. By providing a *reinforcing stimulus* (S^R) food, the researcher can train a rat to push the lever only when the light (S^D) is turned on. If the rat pushes the lever when the light is off, it receives no reinforcement. Light is a cue that makes the responses of lever pushing to occur more likely. Later, the rat can be taught to push the lever only when the light is off. Behaviour is said to be under stimulus control when the response varies depending on what stimulus is present. If the reinforcement is contingent only on the correct response, more learning transpires.

Stimulus Generalization: Sometimes behaviour learned in one situation will be performed in other situations even though the behaviour is not reinforced in the new situation. For example, stimulus generalization occurs when a child responds politely to a teacher in the same way as he/she responds to his/her parents.

16.4.6 Consequent Stimuli: Negative Reinforcement and Punishment

In operant conditioning two kinds of reinforcements have been described - positive reinforcement and negative reinforcement. Positive reinforcement is the presentation of a stimulus that, when added to a situation, increases the probability of a response to occur. An individual, however, may also receive negative reinforcement, which is the termination of an unpleasant stimulus (aversive stimulus - such as inconvenient environment, isolation etc.) that, when taken away from a situation, also increases the probability of a response to occur. Punishment, on the other hand, is the presentation of an unpleasant stimulus (such as reprimand), that decreases the probability that a response will occur. Another form of punishment attempts to decrease behaviour by taking away a pleasant or reinforcing stimulus. This type of punishment is commonly used by teachers when they remove students from class activities or even the class until students are ready to demonstrate proper behaviour. This procedure is called *time-out*. Note that positive and negative reinforcements seek to increase the probability of a response, whereas punishment aims to suppress a response.

16.4.7 Primary and Secondary Reinforcement

The reinforcing stimuli which work towards the satisfaction of physiological needs of an animal (such as food, water, sex etc.) are included in the category of primary reinforcements. But most reinforcements in educational environments are learned and thus secondary reinforcements. Money for example is not reinforcing to an infant, but in later life it becomes powerful in affecting behaviour.

Behaviourists group secondary reinforcers in three categories: social reinforcer (social acceptance), tokens (physical objects like money, grades, prizes etc), and activities (free play, listening to music, trips). The premise behind using activities is Premack's principle which states that given two associated activities, the more preferred may be used to increase the rate of engaging in the less preferred. In other words an interesting activity on which a person spends good deal of time can reinforce behaviours in an activity in which a person is less interested and spends less time. If a child likes to work on computer but does not like to read, it may help to tell the child that he/she can master computer operations only if he/she reads and studies relevant subjects.

Havinghurst points out (and it is a common observation as well) that different people react differently to various types of reinforcers. Some students are motivated by being praised verbally in front of their peers, others get motivated when they are given good prizes for their accomplishments. The expression "different strokes for different folks" best summarizes this point.

In selecting a reinforcer age should be considered a factor. It is a common experience that a small child can be motivated by simply giving him/her an eraser or a good pen, but for an adult it may not act as a reinforcer at all.

16.4.8 Schedule of Reinforcement

A schedule of reinforcement refers to a time plan of when and how often a response is reinforced. Through experiments with rats, pigeons and humans, Skinner identified some important relationship between the way in which reinforcement is administered and the rate of learning or extinction.

Reinforcement may be continuous or intermittent. The teacher may reinforce correct response each time or periodically. For administering intermittent reinforcements there are two choices: reinforcing a proportion of responses (a ratio schedule) or reinforcing responses following a lapse of time after the previous reinforcement (an interval schedule). Both ratio and interval schedule then are of two types: fixed and variable.

A fixed ratio schedule is based on presenting the subject with a reinforcer in a given ratio. In a 3:1 ratio, for example, he/she will be reinforced when he/she had made 3 correct responses. For example, students may be given free time for 15 minutes after they have correctly solved three sums in mathematics.

A variable ratio schedule is based on presenting the subject with a reinforcer after an average number of responses. The exact number of responses may vary, from one reinforcer after every three responses to one reinforcer after every 20 responses. In this schedule the subject never knows the exact number of responses required for reinforcement. Outside the realm of education, we find an example: Slot machines work on a variable ratio schedule of reinforcement. Another example, the farmer never knows when he will have good weather conditions to harvest a good crop.

Fixed interval schedule is based on the constant unit of time between reinforcement. Grading students after they have worked for two weeks is an example of fixed interval schedule.

A **variable interval schedule** provides reinforcement following the first correct response after a lapse of time. As in the variable ratio schedule, the subject never knows when the next reinforcer is due. The reinforcement schedule is based on variable interval. Sometimes the reinforcement may be after 10 minutes, sometimes 2 minutes after the appropriate behaviour.

Each of the different schedules produces its own pattern of responses. The continuous schedule is most effective in teaching new responses. In the case of fixed time interval the rate of responses is lowest, because the subject knows that it is only after a fixed interval that the response will be reinforced. So he/she sleeps over time and starts responding when the time interval is very near.

Here are some reinforcement rules which may be kept in mind.

- 1) In teaching a new task reinforce immediately rather than permit delay between response and reinforcement.
- 2) In the early stages of a task reinforce every correct response. As learning occurs, make it necessary to have more correct responses prior to reinforcement. Gradually shift to intermittent reinforcement.
- 3) Reinforce improvements or steps in the right direction. Don't insist on the perfect performance on the first try.
- 4) Don't reinforce undesirable behaviour.

16.4.9 Extinction and Spontaneous Recovery

The operant condition has effectively been used not only in strengthening desirable behaviour, but equally well it has worked in the removal of undesirable behaviour. Extinction is a process whereby a learned behaviour or response either becomes less and less frequent or disappears completely as a result of repetition while receiving no

further reinforcement. Whereas the passage of time after reinforcement has no effect upon loss of an act or habit, extinction is the effective way of removing an operant from the habit repertoire of an organism. Whereas mere forgetting is the loss of a habit through the passage of time, extinction requires that the response be emitted without reinforcement.

Spontaneous Recovery: The extinction process includes the interesting phenomenon of spontaneous recovery. Even after prolonged extinction an organism, at the beginning of another session of an activity in which it has been trained but it is no longer reinforced, will respond often at a higher rate for at least a few moments.

16.4.10 Shaping: A Method for Developing New Behaviours

By now we have learned that the key to learning is the immediate reinforcement of desired behaviour. But what happens if the desired behaviour is not a part of students behavioural repertoire? How can you reinforce students for performing complex behaviours if they never perform them. To solve this problem the behaviourists use a procedure called *shaping* or *successive approximation*. In such a procedure reinforcement is applied to responses that successively approximate (or become increasingly closer to) the desired behaviour. Students need help in responding appropriately at the lower or pre-requisite levels in shaping behaviour. This special help physical, visual or verbal is called prompting. However prompting should not be used for long otherwise the students will acquire a habit of being prompted and will not develop independent habit. Before asking students to identify verbs from a list of words, the teacher can give a prompt by first defining what a verb is.

Check Your Progress 2

Note: Write your answers in the space given below.

- 1) Define the laws of learning propounded by Thorndike.
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- 2) What is the basic difference between classical conditioning of Pavlov and Watson, and connectionism of Thorndike.
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- 3) Why did Skinner replace the word reward as used by Thorndike, with reinforcement? How do the two terms differ?
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- 4) What is the difference between emitted response (operant) and an elicited response (respondent)?
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16.5 SOCIAL LEARNING THEORY

In this section you will learn about social learning, types of modelling, and social learning in the classroom.

Since the early 1940s, behavioural psychologists have been interested in understanding how children acquired social behaviours. These behaviours include cooperative, competitive, affiliate, assertive, aggressive, moral-ethical, and other social responses. Social responses are learned as a result of observing the behaviours of others. Such learning is referred to as modeling or observational learning.

Bandura and Walters (1963) first stated that an individual could model behaviour simply by observing the behaviour of another person. They departed from traditional operant conditioning explanation that the individual must perform and be reinforced for his/her responses for learning to occur. Later Bandura (1969, '77) proposed the most comprehensive and widely accepted theory of modelling. He named it as *social learning theory* (which also is known as *observational learning*). According to Bandura, children must learn social behaviour by observing the actions of significant people in their lives, their parents, sibling, teachers, peers, and television heroes.

Bandura (1977) rejected the unidirectional view of the effect of environments on the individual, the major thesis of the S-R-perspective. Instead, Bandura's central theme was *reciprocal determinism*, a process by which personal factors, environmental factors, and behaviour all operate as "interlocking determinants of each other". In social learning theory both behaviour and environment are changeable, and neither is the primary determinant of behavioural change. For example, aggressive children expect other children to react hostilely towards them. This expectation causes the aggressive child to act aggressively. As a consequence other children respond to child's aggressive behaviour more aggressively, thereby strengthening the child's initial expectation. Aggressive children thus create through their actions a hostile environment, while children who favour friendly mode of response generate an amicable social milieu (Bandura, 1977).

16.5.1 Types of Modelling

According to Bandura (1969) modelling behaviour can be grouped into three categories: the *inhibitory - disinhibitory effect*, the *eliciting effect*, and the *modelling effect*. The inhibitory -disinhibitory effect makes a response less frequent or allows it to occur by influencing the response consequences of a model. Generally, we become inhibited when we observe others experience unpleasant consequences for engaging in behaviour similar to ours. Bandura (1967) demonstrated how children disinhibit their fear of dogs. He had children watch a film in which a child who did not fear dogs was playing with a dog in party setting. He found that children lost their fear after viewing the film.

A model can also have an eliciting response on an observer by facilitating a response repertoire already present in the observer. Facilitation occurs when an unlikely response becomes more probable. Observing a friend donate time to collect for annual cancer drive in your community may motivate you to volunteer your services for various charitable activities.

The final category, modelling effects, is to develop new responses through the observation of a model. This category has important implications for education. Children learn many new behaviours by observing the behaviour of parents, siblings and peers. The small boy who watches his older brother move a kitchen chair to the cupboard to reach a cookie, will probably attempt the same behaviour later.

16.5.2 Social Learning in the Classroom

Children learn a great deal in the classroom by observing the behaviour of the teacher. Through such observations of teacher behaviour they learn new skills (e.g., maths problems, art projects, science experiments). They also learn logical thinking and problem solving behaviour by observing how teachers demonstrate these by thinking aloud as they solve problems on the black board, and by displaying intellectual curiosity, emotional control, respect for and interest in others, and good listening and communication habits. Teachers who display such characteristics tend to induce the same qualities in children. There is always a kind of *reciprocity* in how teachers behave with children. If a teacher shows a caring and rational behaviour towards his/her students, these behaviours will be modelled by the students and they are likely to display the same kind of behaviour towards teachers as well as with others in their interactions. However, the teachers who show negative behaviour also inculcate the same qualities in students (Good and Brophy, 1978).

Check Your Progress 3

Note: Write your answers in the space given below.

- 1) How does social learning take place in children?
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- 2) What is the basic difference between modeling and shaping of behaviour?
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- 3) What is meant by the term '*reciprocal determinism*'?
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- 4) Explain with examples the terms *inhibitory- disinhibitory effect, eliciting effect* and *modelling effect*.
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- 5) Give examples of social learning in the class room.
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16.6 COGNITIVE BEHAVIOUR MODIFICATION

The latest development in behavioural psychology is the incorporation of various cognitive processes (i.e., thoughts, perceptions, expectancies, self-statements) as base within the behavioural framework. The theoretical framework in which these approaches are grounded is that children and adolescents have *deficient cognitive processes* that guide and control their behaviour. If the cognitions that direct or control behaviour can be altered, behavioural change will occur. These approaches are called *cognitive behaviour modification*, cognitive behaviour therapy or self-control. Bandura (1977) in his social learning theory provided much of the theoretical support for the use of these approaches in the treatment of behavioural, emotional, and academic problems. A few of these cognitive behaviour techniques and therapies are briefly described in the following section.

16.6.1 Self-management

Quite a few of self-management or self-control therapies were developed during 1960s and 1970s. As we have studied earlier, in traditional approaches to applied behavioural analysis, the teacher uses positive reinforcement and other procedures (e.g. modelling) to improve student behaviour. Once the desired behavioural changes are attained, the external control of teacher is allowed to shift to the student (self-regulation). The procedure, adopted for shift of control from external to the internal (from the teacher to the self), involves *self-assessment*, *self-monitoring*, and *self-reinforcement*. In self-assessment the student himself/herself determines whether he/she has performed specific behaviours. In self-monitoring, the student monitors and records his/her performance of certain behaviours. After a period of time, the procedures permitting students to reinforce themselves for appropriate behaviours are gradually removed and control is shifted to reinforcers in the students' natural environment, like grades, social status, achievement feedback.

These self-control techniques can be made more and more cognitively oriented. One way individuals can be taught to control their own behaviour is through self-instruction. Luria (1966) observed that as children get older, they are able to inhibit behaviours not only by following adult instructions but also by responding to their own self directed instructions. Vygotsky (1962) described a progression from overt language to internalized talking and finally to silence. He pointed out that self-talk is important because it provides self-guidance.

16.6.2 Self-verbalization

The theory that supports self-verbalization training indicates that an individuals' inner speech influences his/her cognition (thinking) and guides behaviour. Meichelbaum and Goodman (1971) developed a cognitive modification programme called, *self-instructional training* to teach impulsive children to work more slowly and carefully. Each child observed a model performing a task and was asked to simultaneously verbalize the procedure used. The model then verbally instructed the child while the child performed the task. Then the child performed the task while whispering the instructions to himself or herself. Finally the child performed the task silently (using correct self-instructions).

Meichelbaum and Asarnow (1979) used self-verbalization training programme in an academic area (to increase reading comprehension). They were guided by the following questions: What should poor readers say to themselves before, during, and after reading a selection that would help to enhance their understanding? By the last training session the poor readers internal dialogue became something like the following.

Well I have learned three big things to keep in mind before I read a story and while I read it. One is to ask myself what the main idea of the story is. What is the story

about? A second is to learn important details of the story as I go along. A third is to know how the characters feel and why. So get the main idea and watch sequences.

The researchers reported improvement in reading skills of students who received training as compared to control group who did not receive self-verbalization training.

16.7 LET US SUM UP

In this unit, behavioural approaches to learning have been dealt in some detail. It has been shown that the principles of behavioural psychology of learning can effectively be used in instruction and in behavioural therapy. The main idea behind behaviouristic psychology of learning is that learning is a change in overt behaviour of the learner occurring as a result of reinforced practice. This learning change in behaviour is observable or testable. The unit centers around four perspectives: classical conditioning, applied behaviour analysis (operant condition and connectivism of Thorndike), social learning and cognitive behaviour modification. Early behavioural psychologists (Pavlov & Watson) viewed learning as forming connection between a stimulus and a response. Whereas Skinner believed that all behaviour is learned which occurs because of operant conditioning - a situation in which a response is made more probable as a result of reinforcement. Applied behaviour analysis is the extension of operant conditioning principles to change behaviour of humans in natural settings. While discussing operant conditioning it was made clear that behaviour is influenced by various types of reinforcements differently - fixed and variable ratio; fixed and variable interval. Further, shaping of behaviour was also discussed. Under social learning perspective it was argued that modelling procedures are important in developing new behaviours. In addition observational learning occurs and it occurs without immediate reinforcement. Reinforcement in social learning theory is viewed as an incentive rather than as a consequent condition of behaviour. Vicarious reinforcements and self-reinforcements can be effective alternatives to direct reinforcement. Under cognitive behaviour therapy it was discussed that cognitive processes can be incorporated in behaviour approaches to help individuals guide and control their behaviour.

16.8 UNIT END EXERCISES

- 1) According to Skinner "we are all products of operant conditioning. We learn appropriate and inappropriate behaviour according to the same principle". Discuss this statement and give your observations about your own behaviour.
- 2) What are primary and secondary reinforcers? Identify at least eight secondary reinforcers.
- 3) What is "shaping of behaviour"? How can you use shaping to change the behaviour of your students? Discuss.
- 4) Differentiate by citing examples, classical conditioning from operant conditioning.
- 5) Discuss stimulus discrimination and response generalization with their application in daily life.
- 6) Discuss different types of schedules of reinforcement citing example in each case.
- 7) What is "modelling"? How does it help learn socially desirable behaviour?
- 8) What is the difference between extinction and forgetting? Give examples.
- 9) Distinguish between a respondent and an operant.
- 10) What is reciprocity of behaviour? How does it operate between teachers and students?

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UNIT 17 GESTALT AND COGNITIVE-FIELD PSYCHOLOGY OF LEARNING

Structure

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- 17.2 Objectives
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17.1 INTRODUCTION

The second major family of contemporary learning theories is Gestalt-Field psychology, also called cognitive-field, which originated in Germany during the early part of 20th century. Its four leaders were Max Wertheimer (1880-1943), Wolfgang Kohler (1887-1967), Kurt Koffka (1886-1941), and Kurt Lewin (1890-1947). Gestalt is a German word for which the closest English translation is an organized whole "configuration" or a "pattern".

In subsequent years other names such as organismic, field phenomenological and cognitive field psychology have evolved and become associated with gestalt-field psychology. The position of Gestalt psychology was formally stated by the German – Philosopher-psychologist – Max Wertheimer in 1912. The central idea behind his thinking was that an organised whole is greater than the sum of its parts. For example, a triangle is greater than the sum of the three line segments that form it. This is because of its gestalt. According to gestalt psychology learning phenomenon is closely related to perception, and, therefore, they define learning as reorganisation of the learner's perceptual or psychological world.

Gestalt psychology emerged as a reaction to mentalistic concepts advocated by Herbart and other traditional psychologists on one side and the molecular or atomistic approach to understanding of human behaviour as propounded by Watson, Thorndike, and others on the other. Wertheimer and other gestalters vehemently criticized the behaviouristic view that everything we see or think is an assemblage of tiny pieces like those of jigsaw puzzles. Instead they advocated that we see objects as wholes. They further advocated that our perception is meaningful when we perceive them as wholes rather than mere accumulation of sensations, images, or ideas. We learn not by associating bits of experiences but by forming new gestalts.

17.2 OBJECTIVES

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

- relate perception with learning;
- understand the different laws of perception and draw out their relationship with learning;
- explain the purpose and uses of cognitive-field psychology;
- draw the difference between cognitive field theories of learning and the S.R. theories;
- elucidate understanding of perception as a relativistic - interactional approach;
- identify and define the key constructs of cognitive field psychology with the help of diagram (s); and
- discuss learning as an insightful process.

17.3 GESTALT PSYCHOLOGY AND LAWS OF PERCEPTION

Wertheimer and his associates formulated a series of “laws”, called the laws of perception. These laws are identified by concepts *pragnanz*, *similarity*, *proximity*, *closure*, *good continuation*, and *membership character*. Law of *pragnanz* is in fact the basic law of perception which includes the other laws to explain it. According to the basic law of *pragnanz* if a perceptual field is disorganized, when a person first experiences it, he /she imposes an order on that field in a “predictable” way. The predictable way follows the remaining other five laws. *Similarity* means that similar items (dots for instance) tend to form a group in perception. *Proximity* means that perceptual groups are favoured according to nearness of their respective parts. *Closure* means that closed areas are perceptually more stable than unclosed ones. *Good continuation* is closely related to closure; it means that in perception one tends to continue straight lines as straight lines and curves as curves. According to the law of *membership character* a single part of a whole does not have fixed characteristics. It gets its characteristics from the context in which it appears. For example, a patch of colour in a painting derives its quality from the context – the surrounding picture pattern – rather than from anything inherent in itself. Similarly the behaviour of a child will be determined from the contexts he/she happens to be in. If the child is in the company of his/her peers, away from the influence of parents his/her behaviour will be different than when he/she is sitting on a dining table with other members of the family. The viewer while perceiving the field imposes an organisation that is characterized by stability, simplicity, regularity and symmetry.

Kohler and Koffka the other two colleagues of Wertheimer publicized the Gestalt psychology in United States. Kohler is known for his experiments on chimpanzees.

Through his celebrated study (*The Mentality of Apes* 1925), he set out to test Thorndike's hypothesis of trial and error - that learning is a matter of trial and error in which correct responses are gradually stamped in. *Köhler* observed that in addition to what may be called *incidental learning his apes displayed some kind of insightful learning*. Koffka (1924) in his book "The growth of Mind" criticized Thorndike's trial and error hypothesis and other ideas of behaviourism.

17.3.1 What is Perception?

In the 1950s the emphasis was on conditioning, particularly the operant conditioning. But as 1970s approached an increasing number of psychologists turned their attention to perception and memory again. These two categories represent the intake and the storage of information. Edward C. Carberette and Morton P. Friedman in their work "*Handbook of Perception*" give a comprehensive account of perception and related phenomenon.

Perception is a process through which the living organism maintains contact with the environment. This contact is maintained, in the case of humans, through complex system of sense organs and a muscular structure through which the sense organs can be directed to receive information from particular parts of the environment.

The essential features of perception can be demonstrated by a reader to himself/herself by leafing through the pages of an encyclopedia until a page is turned that presents a picture. Look at the picture for half a second and then turn the page quickly. If you do that you will pick up some general features of the picture. You will be able to tell whether it is a scene of the countryside, a factory, or a human figure. If it is a human figure, by chance, you will notice some central object in the picture rather than a mass of detail. If the picture was exposed for more than half a second you would have certainly started to scan various sections of the picture. Thus you can demonstrate for yourself the selective nature of perception.

In our present era of research on learning the focus of the work is on perception and memory. The former involves the intake of information and latter relates to storage. These two, the perception and memory, are intimately related, for what is perceived depends upon what is already stored. The mechanism of perception maintains contact between the organism and the environment. While perceiving the organism does not give equal emphasis to every stimulus that impinges on the sense organ. The perceiver recognises only a part of that to which he/she is exposed. The perceptual field is commonly divided into a central area, which is highly structured and constitutes the focus of attention, and the peripheral areas in which there is very little structure. The terms figure and ground have long been used to make the distinction.

What one perceives is related to what one expects to perceive, and what one expects to perceive depends upon what one has remembered. That is, perception is dependent upon memory. When the incoming information is structured in a way that it leads to adaptive behaviour, it is called veridical perception. The perceptions of the child are less veridical than those of adults.

There is overwhelming evidence to indicate that learning may take place through perceptual exposure to the world. At one time psychologists thought that learning took place only when a response was followed by some kind of feedback or reinforcement, but that does not seem to be the case. Perceptual learning does take place without any form of feedback or reinforcement. One can learn in a situation merely by being there.

Kurt Lewin, working in tune with the spirit of gestalt psychology added a number of new concepts and coined new terminology mostly borrowed from physics. To the field psychology, he gave the name *Topological* and *Vector psychology*. Lewin's theory also contributed to the concurrent cognitive field psychology.

Check Your Progress 1

Note: Write your answers in the space given below.

- 1) What is meant by the term Gestalt?

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- 2) Name the different laws of perception.

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17.4 COGNITIVE-FIELD APPROACHES TO LEARNING

17.4.1 Meaning of Cognitive-Field Psychology

The cognitive-field theory of learning is closely related to and derived from cognitive and field psychological theories of learning. The cognitive aspect of the cognitive-field theory deals with the problem of how people gain an understanding of themselves and their environment, and how, using their cognitions they act in their environments. A *psychological field* consists of the simultaneous, concurrent interrelationships of a person and his psychological environment in any given situation. Therefore the central idea of the theory is that all psychological activity of a person at a given time is a function of the totality of coexisting factors that are mutually interdependent.

Bigge and Hunt (1980) explained this point further in relation to diverse fields: an astronomer uses field to describe the universe and predict the orbit of stars. A biologist relates the cells to their location in the growth "field". A physicist uses field in his/her study of the structure of an atom. Similarly a cognitive-field oriented psychologist uses field to mean the total psychological world in which a person lives at a given time. It includes psychological past, present, and future, also certain concrete or imaginative levels of psychological reality, all interpreted as simultaneous aspects of current situation.

Cognitive field psychologists draw heavily on the field psychology of Kurt Lewin (1890-1947). Although, Lewin had focussed not on psychology of learning but on psychology of motivation and perception, he was concerned about the application of his theory to learning. Lewin used the comprehensive concept of *life space*. Life space includes everything one needs to know about a person's psychological environment at a given time.

Lewin's field psychology is more exactly known as *Topological* and *vector psychology*. In developing his psychology he borrowed ideas and concepts from other disciplines especially geometry and physics. The concept of *topology* has been borrowed from geometry and *vector* from physics.

In addition to Lewin there are other thinkers who significantly contributed to cognitive field psychology. Some of these include G.W. Allport, Albert Ames Jr., G. Rogers, J.S. Bruner, A.W. Combs, John Dewey, Rollo May, Donald Snygg, Edward, C. Tolman and others.

17.4.2 Purpose of Cognitive-Field Psychology

The purpose of cognitive field psychology is to formulate relationships which one can use, with reasonable certainty, to predict the behaviour of an individual in a particular life space. In order to understand such relationships one needs to consider the psychological environment as a pattern of interdependent facts and functions. Cognitive field psychology is in a way interpersonal social psychology which one can use to effectively understand people as interacting persons. In the interaction process a person and his/her psychological environment are considered interdependent variables and not simply as dependent or independent variables. The cognitive field psychology was thus developed for helping teachers understand other people, especially the students. In addition, this psychology is extremely helpful to understand the self.

Within the cognitive-field theory of learning, what is important is an interactional process with which a person attains new insights or cognitive structures or changes the old ones. According to the cognitive field psychologists there is no reality which is completely independent of our experiencing it. Things in themselves have no meaning, meaning is assigned to them only as a result of interaction between person and the environment. The cognitive psychology of learning describes how a person gains understanding of himself/herself and his/her universe so constructed that his/her self and the psychological environment compose a totality of mutually interdependent, coexisting factors.

17.4.3 What is Insight?

Insight is the grasp of a situation that often goes deeper than words. To have insight into a situation is to realize its meaning, a basic sense of or a feeling for relationships, a feeling for pattern in a life situation. Learning according to cognitive-field psychologists is a change in insight or cognitive structure. A child or a youth in a learning situation is not unfolding according to nature, neither is one being passively conditioned always to respond in a desired manner. Rather one is always differentiating and restructuring oneself and one's psychological environment. One is thus, gaining or changing one's insight. Learning then is a dynamic process whereby through interactive experience insights or cognitive structures of life spaces are changed. Insights or cognitive structures are answers to questions like how something is made up, what is related to what, how one does something, of what good a thing or action is, and what one should be doing. Insight or cognitive structure may be preverbal or non-verbal. One may gain insight before one has words to express it.

17.5 SPECIAL FEATURES OF COGNITIVE-FIELD THEORY

There are certain features of the cognitive field theories which are distinctly different from the S-R conditioning theories. The most important of these features are:

- cognitive-field theories lay emphasis upon psychological functions rather than objects;
- they focus upon contemporaneous situation;
- they adopt relativistic - interaction approach;
- the interpretation of intelligent behaviour is purposive.

These features are briefly explained in the following section.

17.5.1 Emphasis on Psychological Functions

According to cognitive field theorists a fallacy committed by the behaviourists is their tendency to describe the character of an activity only by its physical aspects and to

neglect the great effect of psychological setting. To be psychological in one's pursuit a cognitive field psychologist looks at the world through the eyes of the learner. So the cognitive field psychologists emphasize psychological functions, relationships, and events as contrasted with physical objects and their movements.

A psychological interpretation of life opens the way for extensive use of systematic constructs. Whereas a behaviourist makes his/her generalization on the basis of objective data, a cognitive-field psychologist deliberately uses constructs that go beyond the observable data. A construct is an invented idea. It is not directly observable but is formed from the observed data. A 'need' defined psychologically is an example of a construct. As such it is not observable, yet it is a crucial functional concept in the study of human activity.

17.5.2 Focus on Contemporaneous Situations

The behaviourists as we understand, use historical approaches to study human behaviour while the cognitive-field psychology is ahistorical approach. Whereas the former is the study of the past of individuals in order to predict their future, cognitive field psychology studies the present of person to apprehend their present and thereby predict their future.

They always begin with a description of the current situation as a whole, the psychological field or the life space, and study the various aspects of the situation. Aspects of the field are not viewed as isolated elements or mutually exclusive but as always interdependent. A psychological field is contemporaneous, which literally means, all at one time. It is a construct of such nature that it contains everything psychological that is taking place in relation to a specific person at a given time.

The principle of contemporaneity means that psychological events are activated by conditions that prevail at the time behaviour occurs. There is a kind of continuity of life space in the past, present and even the future. The past psychological fields do have their trace or residue in the present field which influences a person's behaviour. Trace is a region or condition of the present life space that has similarity to a characteristic of earlier life spaces. Furthermore, the goals of an individual, as psychological facts lie in the present, constitute an essential part of the current life space. The contents of the goal lie in the future and may never occur, yet they constitute as aspect of the present life space and hence, influence it. A person's psychological field that exists at a given time contains the views of the individual about his/her future and his/her past. So any psychological past or psychological future is a simultaneous past of a psychological field or life space that exists at a given time. So, psychologically there is no past or future except as it enters into the present.

17.5.3 Relativistic-Interactional Approach

When a person perceives what is "out there", he/she does not develop a photographic image of exactly what is "out there". Instead he/she views, selects, combines, separates and places into context the objects of his/her experience. Furthermore, it is only through viewing of patterns of experience as a whole that he/she comes to understand, and thereby to explain his/her experiences (Bigge and Hunt, 1980). Psychologically speaking, our perception of the world is neither an objective physical nor objective social representation, or a *one-to-one* correspondence between such aspects of the world and our experience of them. There is no known way that a person can experience the absolute nature of things-in-themselves. What a person does experience is that which he/she makes of what he gains from his/her environment as he/she pursues his/her vicarious goals. Accordingly, cognitive-field theory represents a relativistic, as opposed to an absolutistic mechanistic way of viewing human beings and their learning process.

The basic principle of relativism or interactionism is that nothing is perceivable or conceivable as a thing-in-itself. Every thing is perceived or conceived in relation to other things. A thing is perceived as a *figure* against a *background*, experienced from a given angle or direction of the environment. Reality is thus defined not in objective, physical terms but in psychological perceptual ones.

The term interaction is commonly used by both behaviouristic and cognitive field theorists in describing the person-environment process through which reality is perceived. But in defining the term *interaction*, the two learning families distinctly differ. Interaction for the S-R conditioning theorists means the serial alternating reaction, first of the organism and then of the environment. But for field psychologists it implies that the interaction of a person and his/her environment is simultaneous and mutual, both participate at the same time. The alternating reaction in behaviouristic psychology is passive. The person is regarded as the passively waiting receiver of the stimuli. Similarly the environment is also passively waiting for the reaction (response) of the individual. The behaviourists think of interaction as involving only physical processes, that is, material objects reacting to other material objects. It is just like interaction of molecules in a chemical compound, a chain of causes and effects; stimuli are causes and responses are effects.

But for the cognitive field psychologists, the interaction refers to the relationship between a person and the psychological environment in which the person purposefully tries to give meaning to the environment. Here the psychological concept '*person*' is much broader than the biological concept '*organism*'. The interaction is the *simultaneous mutual reaction* (SMR) of the person and his/her environment. Perception in such a situation is a cognitive experiential process. It does not mean mere consciousness. A child playing in the yard behaves differently when his/her mother is at home than when she is out. Our behaviour or interaction depends upon our perceptions. Two persons observing the same phenomenon or event occurring 'out there' may behave or react differently, because they perceive the event differently. When the second child, for example, comes in the family, the first child sizes up, perceives the situation. Whether the first child feels rejected depends not upon the physical stimuli as such that he/she receives from the parents but upon what he/she makes of the relationship of the parents, and the second child. The important question is not, 'Do the parents actually favour child number two?', but rather, 'Does child number one "sees" the child number two as favoured over himself/herself?' In this situation the parents and the other child are key aspects of each child's and parents' psychological environment. The way child number one perceives the situation has important bearing upon the environments of child number two and the parents.

The cognitive field psychologists thus conceive of "experience" as being dependent upon the perceptions of the individual. They regard experience as rooted in insightful behaviour. It is a psychological event that involves a person's acting purposefully in anticipation of the possible consequences of such actions. So experience is also interaction of a person with ones perceived environment. This is what Dewey meant when he said, "An experience is always what it is because of transaction taking place between an individual and what, at that time, constitutes his environment".

17.5.4 Purposiveness of Intelligent Behaviour

A human being is born as a very complex biological organism in a social environment. Throughout life he/she learns by trying various acts and seeing what happens. Thus through one's purposive living an individual develops as a person or a self. The form of the development of selfhood depends upon the learning resulting from the purposive interaction of the person and his/her psychological environment. Within the cognitive-field psychology, purposive is virtually a synonym for intelligent; it signifies an intentionality that need not be conscious. When an individual is behaving purposively, he/she is pursuing his/her goals in the light of the available insights, he/she is behaving

intelligently. The goals towards which the individual strives psychologically exist in ones present *life space*. The phenomenon of goal has its essence in expectation, not in its actual realization. Although the content of the goal may be in the future, or may not occur at all, the goal as a psychological fact necessarily lies in the present life space. For example, a student's goal to become a teacher is a goal towards teaching as the student now sees it.

The purposiveness of the cognitive field psychology is immanent in - operating within, not transcendental to - not extending beyond the world of experiences; it prevails in work a day life situations. Purposiveness so construed simply means that individuals act in such a way as to achieve their goal or goals, satisfy their wants or desires in the quickest and easiest way that they think possible under existing conditions. To quote Dewey, "Every intelligent act involves selection of certain things as means to other things as their consequences".

Check Your Progress 2

Note: Write your answers in the space given below.

- 1) What is the difference between a socio-physical and a psychological environment?

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- 2) What is the most essential purpose of cognitive field psychology of perception and learning?

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- 3) What is the basic idea behind "insight"?

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- 4) Define the special features of cognitive-field theory of learning.

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- 5) How is human behaviour purposive?

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17.6 KEY CONSTRUCTS OF COGNITIVE-FIELD PSYCHOLOGY OF LEARNING

The key ideas (constructs) contained in cognitive field psychology can be put into five pivotal concepts and a number of auxiliary one. The essential idea of field psychology is that the meaning of its constructs are mutually interdependent. Each depends for its meaning upon the meaning of all the other. The pivotal concepts are *life space*, *topology*, *vector*, *person* and *psychological environment*. Life space, which is considered the principal construct, is an individual's psychological world or contemporaneous situation, which includes the person and his/her psychological environment.

17.6.1 Concept of Life Space

The concept of life space constitutes an instrument whereby one may objectively study human activity by being, to some degree, subjective. Life space is a model of psychological reality or functional relationships developed for the purpose of describing what is possible and what is impossible for the person studied and of anticipating or predicting what he/she is likely to be thinking and doing now, as well as what his/her subsequent thoughts and actions would be.

A life space represents not the physical objects as such, but functional and symbolic relationships. Hence it includes not only presently perceived objects but also memories, language, myths, art, and religion. In fact there is no one life space but a continuously overlapping series of life spaces. It is the total psychological world, in which a person lives. It includes person's precepts, knowledge, beliefs, attitudes, and his/her time perspective.

A diagrammatic representation of life space and other related constructs is given in Fig. 17.1 but you should remember that it is only figurative.

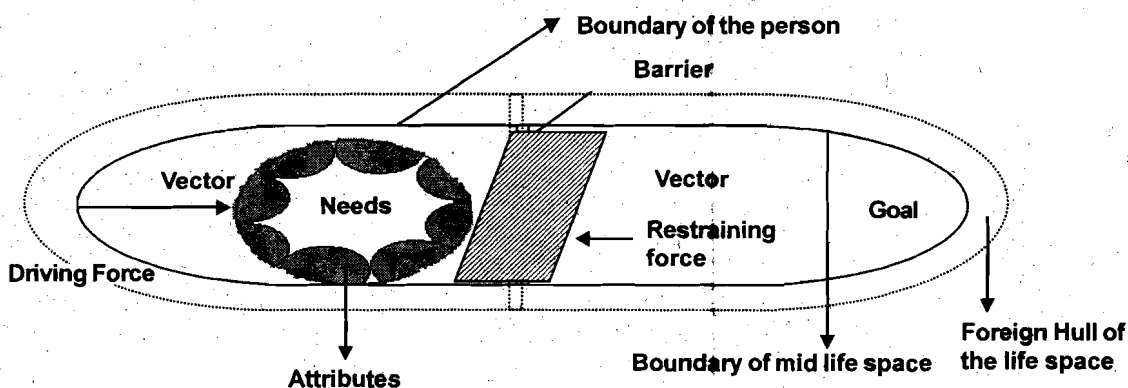


Fig. 17.1: Diagrammatic representation of life space and other related constructs

(Source: Bigge and Hunt, 1980)

Since life space is figurative we should guard against making physical things of the psychological constructs, for the purpose is to symbolize relationships, particularly functional in nature. For example, we should not think of the psychological person as biological organism or of a psychological environment as the physical environment.

The two principal aspects of a life space are a *person* and *psychological environment*. Both are surrounded by a non-psychological *foreign hull*. This non psychological environment is composed of those aspects of the person's physical social environment that are observable by the person studying a particular person but which at that particular juncture have no significance for the person being studied. So a person is within the psychological environment (every thing that one is conscious of) and both are surrounded

by a foreign hull (all those things of which the individual is not conscious at all), and if by chance things enter one's consciousness at a time they may change the entire behaviour of the individual. These non psychological things, observed only by the outsider, can at the next moment become psychological ones for the person being studied.

17.6.1.1 Topology of the Life Space

Topology of the life space is its psychological structure. In mathematics topology is non-metrical geometry which encompasses concepts such as inside, outside, and boundary but have no dealings with length, breadth, or thickness. Topology is concerned with the relative position of the geometric figures being considered. Topologically there is no difference between a circle, an ellipse, a regular or an irregular polygon with any number of sides. A drop of water and the earth topologically are fully equivalent. It is helpful to think of topological plane as made of a highly elastic sheet of rubber; we may stretch, twist, pull, and bend it at pleasure but the relationships it represents remain the same.

There are two basic concepts denoted by the topological space: the connectedness and part-whole relationships. Topologically things may be next to, inside, or outside one another. Size or shape has no significance in a topological figure. Two figures are topologically equivalent, if (and only if) one figure can be made to coincide with the other by an elastic motion. Topologically the three figures shown in Fig. 17.2 are equivalent.

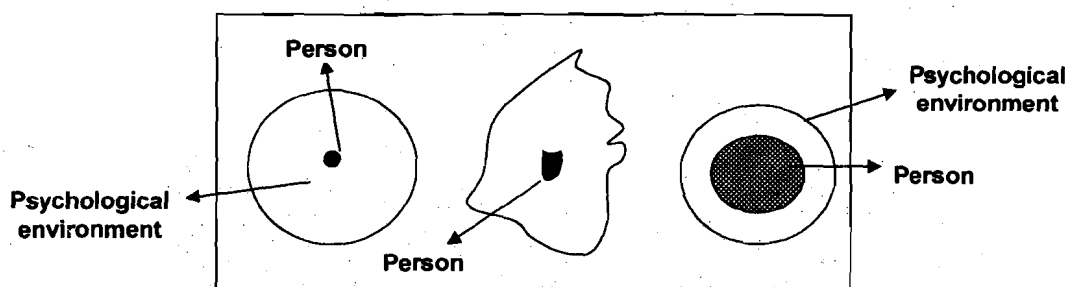


Fig. 17.2: Topologically equivalent figures
(Source: Bigge and Hunt, 1980)

Topological ideas or terms, when applied to psychology represent the position of a person in reference to one's functional goals and the barriers to their achievement.

17.6.1.2 Use of Vectors in Describing Life Space

Whereas topological concepts are used to show what is structurally possible, the vectorial concepts describe the dynamics of a situation – what is happening or is likely to happen. The concept of vector is borrowed from physics (mechanics) where it is used to represent the direction and strength of a force. In psychology a vector represents a force that is influencing psychological movement towards or away from a goal.

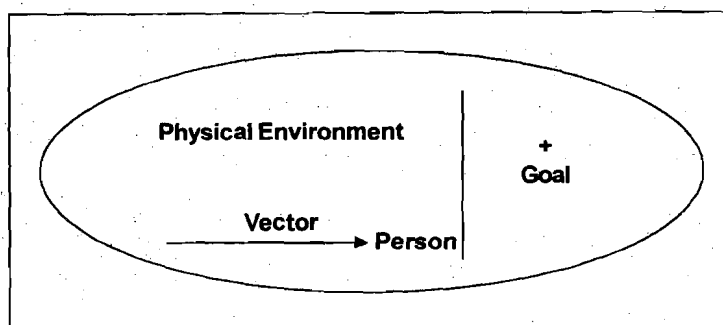


Fig. 17.3: Vector describing life space
(Source: Bigge and Hunt, 1980)

A force is a tendency to act in a certain way or in a certain direction. A vector is a concept equivalent to and descriptive of a psychological force. If there is a single vector force, the movement will be in the direction pointed by the vector points. But if there are two or more vectors acting simultaneously in different directions the movement will be in the direction and strength of the resultant force.

Since vectors are forces which may act in different directions within the topological space, these are described to have valences of the different environmental regions or functional parts of a life space. The vectors represent the attracting or the repelling powers of regions; they maybe either +ve or -ve depending on their attracting or repelling properties respectively. The vector is represented by an arrow that shows the direction, strength and point of application of the respective force. Further, a vector may represent either a driving force or a restraining force. Driving force may be the tendency of the individual to move towards or away from the goal. The restraining force represents barrier or obstacle to the psychological locomotion. It opposes the driving force. Both the driving and restraining forces arise from, the needs, abilities of the person studied, from the actions of other person(s), and from impersonal aspects of the situation.

17.6.2 Psychological Person

The psychological person occupies the position at the centre of the psychological field. The psychological person, however, cannot be identified with the biological person in any circumstance. A person is a purposive behaving self. It represents all that is contained in expressions 'I', 'my', 'me', 'mine'. It is synonymous with 'self', with all the needs aspirations, goals, expectations, abilities, traits, or attainments that one has at a given time. Every individual at a given time is thus a distinctly different psychological person than any other. In the widest possible sense a person or self is the total configuration of all that he/she calls or thinks of as his/her. This can include one's body, speech, clothes, home, parents, siblings, reputation, attainments etc.

Psychologically a person is composed of a *motor-perceptual stratum*, and an instrument to realize the inner personal stratum. The inner-personal stratum represents the needs, interests, goals, expectations, and the preference of the person. Functionally the inner-personal stratum is located at the centre (inner most part) of the psychological person, whereas the motor-perceptual stratum lies between the inner-personal stratum and the psychological environment, and represents the cognitive and manipulative abilities of the person.

17.6.3 Psychological Environment

There is a clear difference in the meaning of the term environment as conceived by the cognitive-field psychologists from that of the behaviourists. According to S-R-conditioning theorists (behaviourists), environment consists of all physical and social surroundings of a person which can be objectively observed in physical terms. Obviously such surroundings can be physically observed or perceived.

The cognitive-field psychologists, on the other hand, think of persons' environment as psychological. A person's psychological environment consists of every thing, function, and relationship, that at a given time, surrounds the person and has a meaning for oneself. It is that part of the physical and social environment to which one is psychologically related. A psychological environment is thus what the person makes of ones physical social environment. What one "makes of" means the way he/she perceives it and gives meaning to it. It is not what is "out there" in a purely physical sense. Anything that might be present physically in the environment, but of which the individual is not cognizant remains in the "foreign hull" of the life space. However, if the individual interacts with it negatively or positively, it no longer remains in the foreign 'hull of the individual's life space and becomes a part of the psychological environment. Unless anything is perceived by the individual it is not a part of the life space or psychological environment even though it is physically existent in the environment.

The psychological environments of different individuals are different, even though they live in the same socio-physical environments. For example, the behaviours of two equally intelligent persons when confronted with the same objective facts may differ drastically, because each one has different purposes and experiential background.

Check Your Progress 3

Note: Write your answers in the space given below.

1) What is life space?

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2) Explain the concept of foreign hull giving examples.

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3) Define the concept of psychological environment of a person.

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17.7 LEARNING: A CHANGE IN INSIGHT

According to cognitive field psychologists an individual in a learning situation is not unfolding according to nature. Neither he/she is being passively conditioned or shaped to respond in a desired manner. On the other hand, one is differentiating and restructuring oneself and one's psychological environment. In this process the individual is gaining or changing insights. Learning is therefore a dynamic process in which, through interactive experience, cognitive structures undergo transformation and new insights are gained. These changes in insights or cognitive structures may be preverbal, or non-verbal. One may gain insight before one has words to express it, or one may achieve insight which is or can be verbalized, or one may accomplish insight that does not get verbalized at all. The fact that animals solve problems by formulating a series of cognitive structures is an evidence of non-verbal changes in insights (Kohler's experiments with chimpanzees). It is an insightful process when a cricketer gets the feel for the correct swing of his bat, when a little girl discovers how to dress herself, when a child gets an idea of carry over in addition or multiplication, or when a college student understands Burtrand Russell's 'Our knowledge of the External World'.

A person's behaviour, to a large extent, depends upon the cognitive structure of his/her life spaces. Good insight into the present life space or situation tends to provide excellent foresight into the cognitive structure of the future life spaces. To understand the dynamics of personality organization as a student of education, one needs to acquire a deep understanding of oneself, one's psychological environment, and their relationship in the current series of life spaces.

According to cognitive-field psychologists one's learning consists of:

- i) one's changes in cognitive structure;
- ii) changes in one's motivation;
- iii) gain in one's muscular control and dexterity.

A change in cognitive structure means development of perceptual knowledge. A change in motivation, is concerned with the vectorial or dynamic aspects of a situation, that is learning to like or dislike certain regions or aspects of the life space. However, it is also possible that changes in motivation can be brought about by changes in cognitive structure. For a person to change the valence of an activity, he/she must change the cognitive structure of his/her related life space.

Primarily growing into a culture through changes in one's group belongingness and ideology and one's development of muscular dexterity also require perceptual changes regarding oneself and the people around and getting the feel of performing various actions. Consequently, learning is a change in cognitive structure.

The process of change in the cognitive structure of one's life spaces occurs through differentiation, generalization and restructurization of the respective regions or aspects.

17.8 LET US SUM UP

Gestalt field psychology is cognitive psychology of learning. It emerged as reaction to both the mentalistic traditional psychology and the atomistic psychology of Thorndike and Watson, called behaviourism. Gestalt is a German word which means a configuration or a pattern. In viewing the world around us, we instead of atomistically viewing it, perceive it as a meaningful whole, not dismantled assemblage of different parts. So gestalt psychology is basically a psychology of perception. It was propounded by German psychologists Wertheimer, Kohler and Koffka. Wertheimer gave us the basic laws of perception: *pragnanz*, similarity, proximity, closure, good continuation, and membership character. As a result of perception, which is governed by these laws, insightful learning takes place which is distinctively different from associative or conditioned learning. To demonstrate insightful learning in sub human primates, Kohler conducted interesting studies on Chimpanzees. Influenced by gestalt psychology, Kurt Lewin furthered cognitive psychology by employing a terminology borrowed mainly from physics and mathematics. Lewin's theory then came to be called topological or vector psychology. The theory was given a special cognitive orientation. The cognitive field psychology of Lewin deals with the problem of how people gain an understanding of themselves and their environment. The theory centres around the idea that all psychological activities of a person at a given point of time, are a function of a totality of coexisting psychological factors that are mutually interdependent. Lewin's basic contribution was the concept '*life space*' which includes everything one needs to know about a person's *psychological environment*. The key constructs of cognitive-field psychology are topology of life space, vector, and psychological person. The life space represents the functional and symbolic relationships, and it includes person's precepts, needs, goal, knowledge, beliefs, attitudes, expectations, memories, language, myths, art, and religion. In fact what constitutes the psychological environment is also a part of life space. The psychological environment comprises everything (functions and relationships) that surround the person at a given time, and has a meaning for him/her. It is what a person makes of his/her physical and social environment. According to the cognitive-field psychologists, learning is a purposive, meaningful activity. It neither unfolds according to nature, nor is passively being conditioned or shaped to respond in a desired manner. On the other hand, it consists of differentiating and restructuring of oneself and one's psychological environment constantly giving rise to new insights. A person's behaviour depends upon the cognitive structure or insights which may be pre-verbal or non-verbal.

17.9 UNIT END EXERCISES

- 1) Briefly explain the laws of perception given by Wertheimer, especially highlighting the law of *pragnanz*.
- 2) What are the special features of cognitive-field psychology?

- 3) Explain the concept of life-space and its relation with psychological environment.
- 4) Discuss how learning is a change in insight and cognitive structure.
- 5) What is meant by simultaneous mutual reaction (SMR)? Give an example of SMR.
- 6) Differentiate the cognitive field psychology from behaviouristic psychology.
- 7) How is perception a relativistic-interactional approach?

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UNIT 18 INFORMATION PROCESSING AND HUMANISTIC APPROACHES TO LEARNING

Structure

- 18.1 Introduction
- 18.2 Objectives
- 18.3 The Information Processing System (IPS)
 - 18.3.1 Short Term Sensory Store (STSS)
 - 18.3.2 Short Term Memory (STM)
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 - 18.3.4 Executive Control: Development of Metacognition (MC)
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- 18.6 The Humanistic Perspective in Learning
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 - 18.6.3.1 Instructional Implications of Rogers' Views
- 18.7 Let Us Sum Up
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- 18.9 References and Suggested Readings

18.1 INTRODUCTION

The behaviourist thinkers tell us that most human behaviours can be programmed and shaped from outside. That is, human behaviour is contingent upon conditions or factors which can be externally controlled using Stimulus-Response conditioning. But the issue remains whether stimulus response and reinforcement can adequately explain the complete learning process. The cognitive thinkers would say, 'no', because they believe that a person's behaviour is always based on cognition, an act of knowing or thinking about the situation in which the behaviour occurs. The cognitivists are concerned with the organization of knowledge, information processing and decision making behaviour - aspects in the cognitive realm.

An important goal of cognitive instruction is to help students to process information in meaningful ways so that they can become independent learners. The type of questions cognitive psychologists ask include: what are the students thinking about during problem solving? What cognitive processes the students engage in? How can the effective learning strategies be taught?

Another goal of cognitive psychologists is to develop independent learners, or self-regulated learners. When given a learning objective the self-regulated students monitor and control their own behaviour by setting manageable goals, using their prior knowledge and considering alternative strategies etc.

This unit in addition to the information processing deals with the humanistic perspectives in education. The humanists hold the view that a child has an inherent desire to explore and to know. According to them learning can best occur when the children perceive it as more relevant to their needs and purposes and when it is self-initiated.

18.2 OBJECTIVES

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

- explain the information processing model of learning;
- identify how information processing system influences learning;
- explain the meaning and functions of the metacognitive knowledge;
- differentiate between declarative and procedural knowledge;
- elucidate the different strategies of learning vis-à-vis the declarative and procedural knowledge;
- use different learning strategies for strengthening the rote and meaningful learning;
- discuss various affective strategies;
- discuss the view of learning conceived by humanistic thinkers;
- clarify how change in perception is related to modification of cognitive and affective behaviour;
- elucidate learning principles as enunciated by Combs, Rogers and Maslow with classroom applications; and
- use humanistic principles to facilitate learning and development.

18.3 THE INFORMATION PROCESSING SYSTEM (IPS)

Let us think about the following questions: How does the human mind acquire information? What determines how much information is learned? How some information is remembered and other information soon forgotten? What can be done to improve the retention of information?

Cognitive psychologists have developed information process model to identify how humans obtain, transform, store, and apply information. In this section the focus will be on how the information-processing approach can be useful in improving classroom instruction and student learning. Figure 18.1 below shows a flow chart used to identify various components in the IPS.

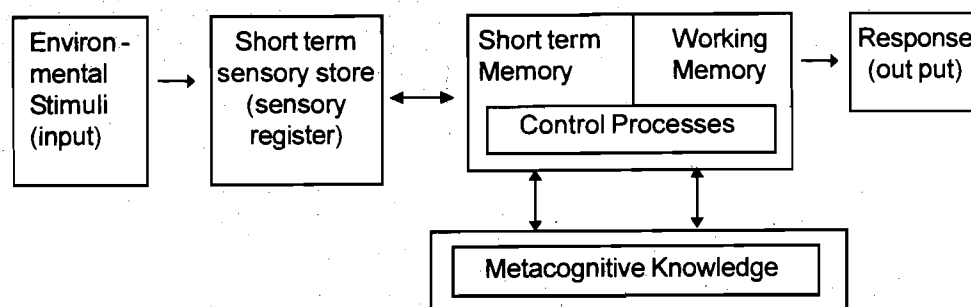


Fig. 18.1: Components in information processing system (IPS)
(Source: Dembo, 1991)

18.3.1 Short Term Sensory Store (STSS)

The sensory information from the environment such as visual perception of words in a text enters the short-term sensory store (STSS). It is stored there momentarily until attended to by the short-term memory. Information that does not enter short-term memory is quickly lost, usually in a fraction of a second. If the student does not attend to information, the question does not arise of it being retained or retrieved. So the most important aspect here is 'attention' which cannot be overestimated in any model of information processing.

18.3.2 Short Term Memory (STM)

In moving from STSS to STM the information is changed to a verbal form involving name coding. Shortly after seeing the letter A, for example, the student will no longer retain the visual pattern but will keep in short term memory the verbal name of the pattern, the letter A. Similarly "Tree house" will be held in memory as tree and house. STM is an active part of the memory system. Between the short-term memory and the long-term memory there exists a component called working memory, which is described as the centre of consciousness in the IPS. Whenever we are consciously thinking about something, or actively trying to remember a forgotten fact, or engaging in fantasy, we are using our working memory.

The information processing capacity of STM is limited in two ways. First, the STM of an adult can hold only 5 to 9 chunks of information at a time. This condition is referred to as the 7 ± 2 Magic Number. New information coming into STM will, if it catches the attention of the student, tend to crowd out the old information already there. For elementary children this capacity is even less. Second, without an active effort from the learner, STM holds information only for a brief time, often less than 30 seconds.

A number of control processes are found to operate at STM level. These processes focus on attention, manipulate information, and organize and assist in the retrieval of information. Some of these central processes operate automatically; others are subject to conscious voluntary control (Mayer 1988).

Now let us look at some of the control processes that are of particular interest to the classroom teacher. Since the STM is limited in the amount of information it can deal with at any given time, chunking or grouping of information is one way of keeping more than nine pieces (7 ± 2) of information in the working memory. For example, it is easy to remember a mobile number 9891285284 if it is grouped as 9891, 285, 284. The STM can handle more information when it is organized into larger units of information. Although STM uses various chunking strategies automatically and unconsciously, these strategies can also be taught to students.

Although the short-term memory retains information for a brief time, it is possible to retain it for longer time if it is rehearsed or repeated. For example, we often repeat the instructions, before they fade away.

18.3.3 Long Term Memory (LTM)

The LTM stores all the information we possess and are not immediately using it. Information enters the LTM through the working, or short-term memory. For retaining information into short-term memory, it must be rehearsed or repeated but to pass it on to LTM it must be "elaborated". The word elaboration here has a specific meaning. It means that the information must be classified, organised, connected, and stored with already existing information in LTM. In this process the working memory always calls up the relevant data stored up in the LTM. For example, when we want to learn about democracy, the working memory will call up our previously acquired knowledge about certain rights of the individuals, like freedom of expression, equality of opportunity, justice, or appropriateness etc.

Encoding is the process of transforming new information into memory for integration. Encoding for storage occurs in one of the two forms - the *episodic* and the *semantic memory*. Episodic memory is the recall of events in our lives. It allows us to recall images of what happened and what was said during the event. Semantic memory stores meaning. Andre and Phye (1986) stated that the semantic memory "contains the generalization we have drawn and acquired through experience" (p. 7). It contains our knowledge of concepts, rules, principles, and skills. When we read a whole book, it is the meaning or the essence of different aspects of the book that are saved, not every thing or anything that we read.

According to Anderson (1985) semantic memory further consists of two types of knowledge. First, *the knowledge about things* (called the declarative knowledge), such as a date, a friend's address, or information of any sort, and the second, *knowledge about how to do things* (called the procedural knowledge) such as solving a mathematical problem, driving a car, swimming in a pond or a running stream. The basic idea about these two types of knowledge was originally given by Gilbert Ryle, a well known positivist philosopher. He named these types as "know that" and "knowing how". The importance of distinguishing these two types of knowledge is that the conditions of learning of these types are different. These two types of knowledge are discussed in more detail later in this unit.

18.3.4 Executive Control: Development of Metacognition (MC)

The last part of IPS is the executive processes which monitor and direct the cognitive activities in progress. These skills are responsible for assessing a learning problem, determining the learning strategies to resolve or solve the problem, evaluating the effectiveness of chosen strategy and changing the strategies to improve learning effectiveness.

The functioning of the executive processes is based on meta cognition, which has two separate but related aspects: 1) Knowledge and belief about cognitive phenomena, and 2) the regulation and control of cognitive behaviour. According to Flavell (1976), meta cognition "refers to one's knowledge concerning one's own cognitive processes and products e.g. learning relevant properties of information or data. Among other things metacognition also refers to active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objectives on which they bear, usually in the service of some concrete goal or objective".

Knowledge and beliefs about cognitive phenomena are involved whenever we assess our ability to perform a task or solve a problem. For example, when we are faced with a new learning situation, an awareness of our learning strengths and weaknesses helps us to decide whether we are likely to succeed or fail in that situation. It is in other words to recognize or realize our own cognitive limitations in a particular situation. The second aspect of metacognition is the regulation and control of our cognitive behaviour which directs our thinking to plan an approach to the learning tasks, to monitor our progress, to check our understanding, and to evaluate our solution.

As part of being a good student, one learns to be aware of the state of one's mind and the degree of one's own understanding. The good student may be one who often says that he/she does not understand, simply because he/she keeps a constant check on his/her understanding. The poor student who does not watch himself/herself trying to understand, does not know whether he/she understands or not. A student who uses metacognitive abilities after reading a book, paraphrases each important section of the book, underlines important facts, and monitors his/her own progress during study and finally evaluates his/her understanding by writing answers to short essay questions.

Check Your Progress 1

Note: Write your answers in the space given below.

- 1) Differentiate between STSS and STM.

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- 2) Define the term 'metacognitive knowledge'.

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- 3) What is executive control and what does it deal with?

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18.4 LEARNING STRATEGIES

Weinstein and Mayer (1985) defined learning strategies as "behaviours and thoughts that a learner engages in during learning and that are intended to influence the learners encoding process, viz. the learner selects, acquires, organises or integrates new knowledge"

These authors have discussed the following types of learning strategies: rehearsal strategies, elaboration strategies, organizational strategies, comprehension monitoring strategies, and affective strategies: Good and Brophy (1990) summarized these types as follows.

Rehearsal Strategies: These involve actively repeating (saying, writing) material or focussing on keyparts of it. For brief rote learning tasks (i.e., arbitrary or unrelated factual information) rehearsal may involve nothing more than repeating the material aloud. For more complex tasks rehearsal may involve repeating key terms aloud, copying the material, taking verbatim notes, or underlining important parts.

Elaboration Strategies: These involve making connection between the new and the familiar. For meaningful learning tasks, elaboration strategies include paraphrasing, summarizing, creating analogies, taking notes that go beyond verbatim repetition, answering questions and describing how the new information relates to existing knowledge.

Organizational Strategies: These include imposing structures on the material by dividing it into parts and identifying the super ordinate - subordinate relationship. In simple rote learning tasks organizational strategies involve breaking of the lists into

chunks. For more complex meaningful learning material, such strategies involve outlining the text creating a hierarchy or networking of concepts, or creating diagrams showing their relationships.

Comprehension Monitoring Strategies: These involve remaining aware of what one is trying to accomplish, keeping track of the strategies one uses and the success achieved with them and adjusting behaviour accordingly. Comprehension monitoring strategies include self questioning to check understanding; taking appropriate action when one does not understand something etc.

Affective Strategies: These include establishing and maintaining motivation, focussing attention, maintaining concentration, managing performance anxiety, and managing the time effectively. From the cognitive perspective, one of the major goals of teaching is to help students to manage and control their own learning. Good learners have been known to have better meta cognitive skills, more effective strategies for selecting and attending to important information and ability to organize material in a more efficient manner than the poor learners (Gagne 1985).

18.5 CATEGORIZATION OF KNOWLEDGE

Anderson (1985) categorized knowledge into two distinct pigeonholes, declarative knowledge and procedural knowledge. These are discussed in the following sections.

18.5.1 Declarative Knowledge

The learning of declarative knowledge can either be meaningful or rote. Meaningful learning refers to learning concepts, procedures, or ideas from sources. The "meaning" in meaningful learning, comes from the learners' ability to relate new knowledge to old knowledge already in memory. Rote learning refers to mastering disconnected or arbitrary learning material. The learning tasks as lists of States and their capitals, the order of colour in the rainbow; or vocabulary are examples of rote learning.

Rote learning can be further categorized into three types:

- *Free Recall:* refers to recall of information, without any specific order or without association with other stimuli, remembering names of your classmates is a free recall task.
- *Serial Recall:* refers to remembering information in a particular order, such as names of the planets in order from the sun.
- *Paired Associate Learning:* involves recalling information that is associated with some stimuli, like the act of remembering the capital of each State or the meaning of English words in Hindi.

In the case of rote learning of whatever type, the teachers in general tell, that to memorize any list the only method is practice, practice, and practice. But the cognitive psychologists offer some advice as to how practice can be made more effective. Research has shown that *distributed practice* at frequent and short intervals is more effective than the *massed practice*. The massed practice method may be effective in learning a large amount of information in a short time, but it is poor method of learning if the retention of information is the goal. Think about the examinations on which you used massed practice. How much of the content did you remember a few days after the examinations?

In memorizing there is also a *serial position effect*. In general a person is more likely to remember information placed at the beginning (primary effect) or at the end (recency effect) of a list than information placed in the middle.

Most people find it difficult to learn a list at one time and find it easier to break the list into small parts. This is called part learning. This method is appropriate, for instance, in teaching the multiplication tables.

The relationship of new and old knowledge can influence the difficulty of learning and recalling data. Learning a task that has the same stimuli and responses, as a previously learned task will be easier than learning material with which you have no previous experience. This situation is called *positive transfer*. For example, a youngster, who has learned, how to keep a room tidy at home will find the same skill helpful in keeping the camp tidy. *Negative transfer* occurs when two tasks have the same stimuli but require a different response. Learning Italian after learning Spanish can be difficult because it is easy to confuse the Spanish and Italian words for the same concepts.

Forgetting : Forgetting is known to be an overwhelming impediment to learning. One of the explanations for this phenomenon is that interference from previous or subsequent learning does occur. When the interference is due to previous learning, it is called *proactive inhibition*. But when subsequent learning interferes, the phenomenon is called *retroactive inhibition*. Our ability to recall and use metric measurements, for example, can be hampered by our familiarity with English measurement system. This is proactive inhibition. An example of retroactive interference is the difficulty experienced by a student who finds that learning English in a second period interferes with learning German in the first period. Learning a second programming language on computer such as FORTRAN, may inhibit our ability to recall the commands and format of previously learned BASIC.

18.5.1.1 Using Learning Strategies for Improving Declarative Knowledge

a) *Rote Learning*

- i) **Rehearsal:** As indicated earlier information when repeated or rehearsed can be retained. Rehearsal is done by repeating the information to oneself subvocally or loudly. In the class the students often repeat to themselves the spellings of new vocabulary, multiplication tables, a poem etc.
- ii) **Elaboration:** One of the reasons that rote learning is often considered uninteresting is that it has a low level of meaningfulness. Few connections are made between the new information and old knowledge. One of the ways to facilitate rote learning is thus to increase the meaningfulness of the material by creating connections between the new data and the information student already knows.

To establish useful linkage between the new data and visual images or semantic knowledge we often make use of *mnemonics*. Use of mnemonics can be very useful in improving serial recall learning or in the learning of factual material such as names, categories, sequences, or groups of items. Mnemonics that are useful for serial recall employ the loci method, acronyms, peg word method, and key word method.

- **Loci Method:** In this method the student creates a mental image of a familiar place such as the classroom. In this image several easily identifiable locations are determined. The student then associates each individual item on the list with a particular location in the image. If you have to learn the state capitals of India, you can imagine different State capitals at different locations in the visual image of the classroom with a big map of India which covers the entire floor area of the room. Now you can imagine yourself walking through the room and reaching different state capitals and naming them. In this way the list of state capitals is made more meaningful through association with visual image.
- **Acronyms:** use the first letter in each word to form a mnemonic VIBGYOR, for example, gives the order of the colour of rainbow - violet, indigo, blue, green, yellow, orange, and red. Similarly there may be a sentence mnemonic that uses the first letter of each term as the first letter of each word in a sentence. My very efficient mother just sat up near pop - gives the names of planets in order from the sun: Mercury, Venus, Earth, Mars, Jupiter,

Saturn, Uranus, Neptune, Pluto. Another kind of acronym involves taking the first letter of series of words. Dad, mom, sister, brother can be used to help students remember the four steps in long division: divide, multiply, subtract and bring down or BODMAS: Bracket, Of, Division, Multiplication, Addition, and Subtraction.

- **The peg word method:** uses visual imagery and semantic association in remembering serial data. For instance, items in a list are associated as in visual image with each phrase in a chant: One is a bun, two is a shoe, three is a tree and so on.
 - **Key word method:** A useful mnemonic for learning foreign language vocabulary is the key word method (Atkinson, 1975) which involves creation of an image that relates the English to the foreign word. For example, the Spanish word for *postal letter* is *carta*. An appropriate image might involve a huge postal letter being transported to the post office in a shopping cart.
- iii) **Organization:** A method for increasing meaningfulness of rote memory is to provide an organizational structure. Hierarchical schemes of organization are especially effective. For example, students find it easier to recall the different types of rock when studying geology if an organizational structure is imposed. Learning of names of rocks can be difficult as demonstrated by this list: granite, gabbro, peridotite, syenite, felsite, basalt, pumice, obsidian, shale sandstone, conglomerate, limestone, dolomite, evaporite, organic limestone, coal, slate, schist, phyllite, gneiss, quartzite, marble, and anthracite. This list can be reorganised in a hierarchical fashion as shown in Fig. 18.2.

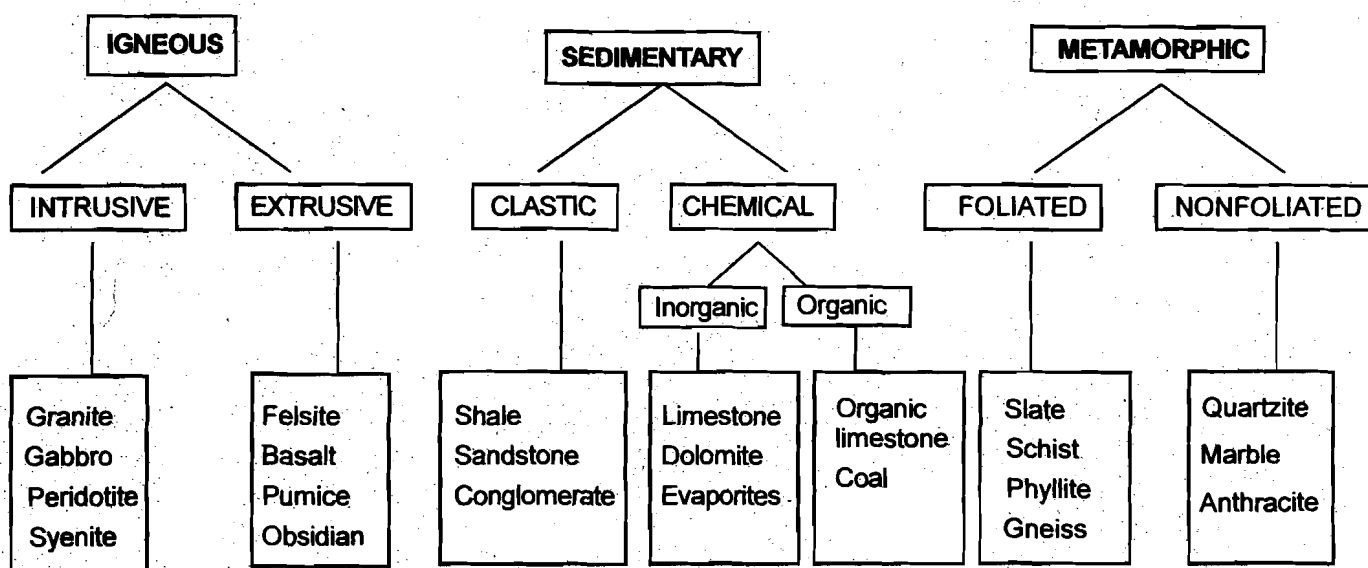


Fig. 18.2: Hierarchical Organization of Rock Types
(Source: Dembo, 1991, p. 281)

b) Meaningful Learning

For the most part teachers deal with meaningful knowledge. Such knowledge gets its meaningfulness from our ability to relate the ideas we have stored in our long term memory. When we gain information about something what we store is the meaning or main ideas contained in the text. There are four strategies which facilitate the storage of ideas in long term memory. *Rehearsal*, *elaboration*, *organization*, and *comprehension monitoring*.

- **Rehearsal:** A method of external storage and rehearsal of textual material is underlining. *Underlining* allows students to quickly locate and review important information in a text.

The student should however underline only the information that they find important, not irrelevant information.

- **Elaboration:** Elaboration means providing more information to what we have said to provide detail, to give examples, to make connections to other issues, or draw inferences from the data. The additional information makes our point more meaningful to the listener and also makes the point easier to remember.

Note taking: When information is presented faster than students can encode it, they will not be able to keep it up. In such a situation, student may choose a method of external storage such as note taking. However, we should take summary note, which encourage reorganization and integration. The notes should be brief and in student's own words that organize and summarize the important points. After taking notes we should necessarily review them. That will allow further elaboration and integration of the material. Simply taking notes and placing them aside for a long time will not be helpful. We should take conceptual notes and stress the main ideas.

- **Organization:** As in the case with rote learning, new meaningful information is easier to remember if it is presented in an organized format, especially if the format is hierarchically arranged. The organization allows the individual to manage data more efficiently in working memory and to quickly locate the needed information stored in long term memory. One method of improving organization of encoded data is to provide written *outlines*.
- **Comprehension monitoring:** A major cognitive function in reading and study is comprehension monitoring. The skilled reader has comprehension goal in mind, such as finding a particular fact or determining the main ideas of a text. The strategy adopted by such a reader will be to skim the text for the fact or read the text for the main ideas. Following the strategy, if the important fact has been located or the main idea grasped, the reader will experience satisfaction at reaching the goal. However, if he/she does not find the fact or the main idea or is not able to comprehend the passage, he/she may experience confusion. If the comprehension monitoring shows that the goal has not been reached, then the remedial steps would be taken such as rescheming the text or perhaps reading the text more carefully.

The following are some strategies for monitoring and improving comprehension of the text.

- Change the rate of reading: speed up your easier sections to quickly get the idea, but slow down for more difficult sections.
- Suspect the judgement: if something is not clear, continue to read, add more information, or clarify the points in the text.
- Hypothesize: when something being read is not clear make it a habit to hypothesize about meaning of the particular passage and read along to see that your guess makes sense.

Adjunct Questions: Questions added to text to influence what is learned from the material are called adjunct questions. These may also be referred to as Focus Questions. The use of adjunct questions has been found effective in a wide range of instructional settings. The placement of questions affects the material that is attended to.

One method of study has incorporated adjunct questions for several decades: *The SQ3R system* (Robinson, 1972). This system encourages the student to *survey* the chapter headings and bold face type, to develop *questions* about materials, then to *read*, *recite* and *review* the material.

Schemata: For comprehension monitoring and problem solving the use of schemata has been found very effective. The schemata (plural of schema) are cognitive structures

that may be created through the abstraction of previous experiences. Schemata make learning easier by providing meaning to the incoming information and reducing the number of things that can be attended to. They provide an organisational structure into which new information can be fitted. Second, they let us know what can be expected from the incoming information. This is the interpretive function of schemata, whereas the former is the organisational function. Hierarchical organisation of knowledge, as in the geology example indicated earlier, demonstrate the organisational function of schemata. In the case of interpretive function, for example, we know that a story will normally have at least one character, a conflict, a beginning, a climax, and resolution.

Advance Organisers: Another way in which schemata have demonstrated their usefulness in promoting comprehension is through the use of advance organisers (Ausubel, 1968). Advance organisers present information to make the lesson more meaningful and easier to understand. In this model we start presenting information from a higher abstraction and generality and help the learner to subsume or integrate new material.

Before students begin studying the caste system in India, for example, a brief presentation of social stratification as an organiser will help them to understand the nature and purpose of caste system. In mathematics teaching the use of number line before proceeding to the addition and subtraction of negative numbers is another example of the effective use of an organiser.

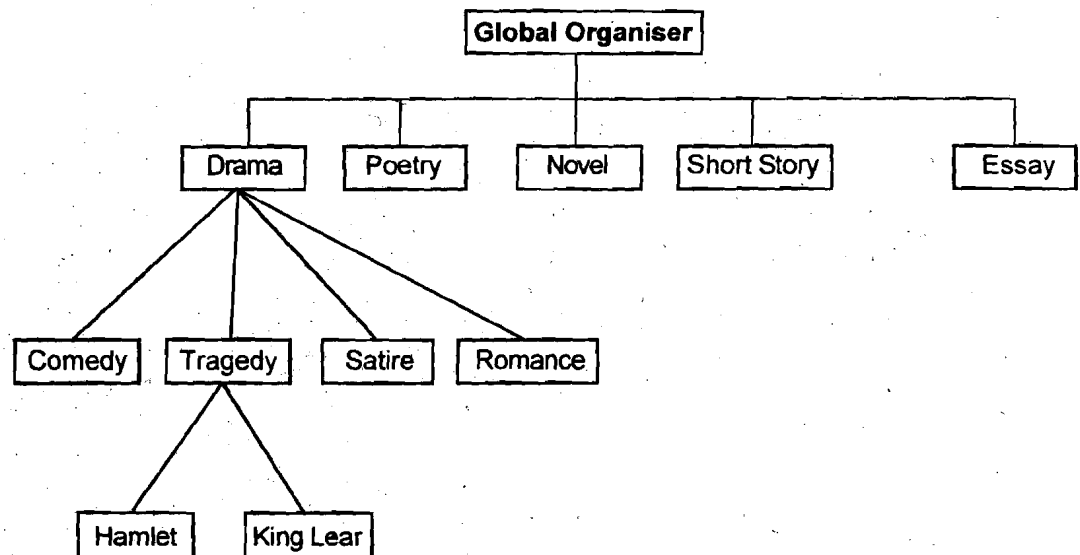


Fig. 18.3: General Organizer in Literature
(Source: Robinson, 1972)

- **Affective Strategies:** The importance of social and personal factors in learning is found related to motivational factors which are very important from the standpoint of cognitive psychologists and educators. Some learning strategies are designed to overcome certain personal factors that interfere with learning. For example, stressful conditions which interfere with learning can be reduced by relaxation training. Similarly attentiveness on academic tasks can considerably improve learning.

To start with let us discuss the attention problems of students which severely distract them from learning. There are some students who filter out appealing distractions and focus on the academic tasks, but there are others who fail to do so. Corno (1987) viewed attention concerns as a self management problem, because students have difficulty in planning and controlling their learning. She believes that students need to be taught to self manage or self regulate their behaviour by the use of learning strategies to handle distraction. Some such strategies are:

- Keep objective focal: Pay attention to what you are doing.
- Avoid visual contact with the distractor
- Isolate self: I will better go to the learning centre.
- Protest: Please I am trying to concentrate here.

18.5.2 Procedural Knowledge

So far we have discussed about declarative knowledge - "knowing that" type which is a major aspect of school learning. Now we shall discuss procedural knowledge. Procedural knowledge tells us how to do thing. It can be thought of as being composed of conditional "if", "then" statements which take the form, if certain conditions apply then a specific action is to be taken. An example of a arithmetic procedure occurs in dividing by fractions. If dividing by a fraction, then invert the divisor and multiply.

18.5.2.1 Using Learning Strategies to Improve Procedural Knowledge

Procedural knowledge takes one of the two forms: *pattern - recognition knowledge* or *action sequence knowledge*.

i) **Pattern - Recognition Knowledge:** This type of knowledge pertains to the ability to recognize and classify patterns of stimuli. One important instance of pattern recognition is the ability to identify new incidents of a concept, or concept learning. A concept represents a group of ideas or things that share some common characteristics and have the same name. Recognizing that platypus is a mammal, because it is a furred animal that suckles its young, is an incident of pattern recognition skill.

Concepts and other pattern -recognition procedures are learned through a process of generalization and discrimination (Gagne, 1985). Generalization is the process of broadening the range of situations in which a specific concept or pattern recognition procedure is found appropriate. The discrimination, on the other hand is the process of reducing the range of situations to which the concept applies, based on some defining characteristics of the concept.

In teaching children various concepts and pattern recognition procedures, the teacher first defines a concept and then gives examples to illustrate accurate application of the procedure. By accurate it is meant that the children will be able to apply the concept or procedure in different but appropriate situations and refrain from applying the concept in an inappropriate situation. The teacher strives for accurate generalization and discrimination. Two conditions promote accurate generalization: i) presentation of true example of concept that are similar on 'defining attributes' but different on 'irrelevant attributes'. The example of mammals meet these two conditions because the attributes of furriness and suckling of the young remain constant. ii) successive presentation of examples is made so that they may be held in working memory simultaneously. Thus while teaching mammals, we should present examples not only of platypus but also horses, dogs, humans, mice and other mammals.

Accurate discrimination is stimulated when there is simultaneous presentation of examples and matched with non-examples. The matched non examples share relevant and irrelevant attributes but vary on at least one relevant attribute.

To give an example, suppose you want to teach students the concept of living and non-living objects, first you will teach them all the attributes that living objects must possess, like movement, growth, response, giving birth to similar species, respiration, excretion and so on. Generalization will be promoted through the use of varied examples of living organisms such as protozoa, fish, mammals, and plants. You will make it clear

how these organisms carry out the above said life processes. To promote discrimination you will provide matched non examples such as crystals that grow but do not carry out other processes such as movements, respiration etc.

For promoting generalization and discrimination another example can be taken from mathematics. Suppose you want to teach the concept of finite sets, then after defining finite set as one in which the number can be counted, you will present some examples for promoting generalizations.

- [5, 10, 15]
- Even number of less than 100
- All apples in the world
- All grains of sand in the world

Some of these sets are no doubt very very large, but at least countable in theory. To promote discrimination you may present matched non examples:

- [5, 10, 15]
- [Odd numbers greater than 100]

ii) **Action Sequence Knowledge:** The second type of procedural knowledge refers to the knowledge of action sequence. Action sequences are first learned as list of steps comprising some procedure (Anderson, 1985). For example, the steps in a physical activity such as driving a car, may first be learned as a series of instructions. The learner consciously proceeds through each step, one at a time, until the procedure is complete. In starting a car the learner might begin by thinking, "First, if the car door is closed, then open the door, second if the car door is open, then sit in the driver seat; if in the driver seat then put on the seat belt; fourth if the seat belt is on then insert the key into the ignition, with practice, however, the procedures become almost automatic. When procedures have been learned to the point of automaticity, another source of error is introduced - the set effect. The set effect results when the carrying out of an automatic action sequence leads to a failure in processing important information which results in inefficient or incorrect performance. For example, when driving home from work, how many times you have forgotten to stop at a store to pick up something? Once the action sequence for driving home from work has been triggered, it can be difficult to interrupt.

There are two major roadblocks to learning a procedure. First is the limited capacity of the working memory. Which is 7 ± 2 as discussed earlier. Any procedure that requires more than nine steps usually is too long to keep in working memory. To overcome this limit, one can be provided with a written list of steps.

A second potential problem in learning a procedure is the absence of prerequisite knowledge. For example, it is difficult for a student to solve a geometric problem if the necessary axioms and theories have not been mastered. The use of *task analysis* is helpful here. Through task analysis the necessary subordinate skills are identified. The teacher can then assess the student's abilities on the subordinate skills. And if necessary he/she can provide remedial lessons on the skills in which students are deficient before teaching the skill.

18.6 THE HUMANISTIC PERSPECTIVE IN LEARNING

The learning theories discussed so far have emphasized the role of environmental and cognitive factors in teaching-learning process. It is true that learning is affected by how students think and act, but it is also seen that students' learning is influenced by

the personal *feelings* and *meanings* they attach to their learning experiences, that is, how people perceive the environment. During the late 1940s, a new psychological perspective emerged because of the work of clinical psychologists, social workers, and counsellors. This movement became known as humanistic, existential, perceptual, or phenomenological psychology. They started to understand a person's behaviour from the point of view of the behaviour as such rather than the observer.

In this section we shall try to see how the humanistic psychology has influenced educational thought and practice. According to humanistic psychology "the behaviour of individuals is determined by how they perceive themselves and the world around them; and second, individuals are not solely the product of their environment, as the behaviourists would have us believe, but are internally directed, or fulfill their unique potential as human beings" (Dembo, 1991). The role of school is not simply to make children smart, but to make them smart and good. From the humanistic perspective, teachers should be concerned with making education more responsive to the *affective* needs of students. Affective needs are the needs that are related to students' emotions, feelings, values, attitudes, predispositions, and morals.

Arthur Combs, Abraham Maslow, and Carl Rogers have contributed immensely to the development of humanistic perspective in learning. They aimed at the development of a genuine concern for learners and respect the worth of others.

18.6.1 Combs' Views on Learning

Perceptual psychologists view behaviour as:

"To understand human behaviour... it is necessary to understand behavior's perceptual world; how things seem from his point of view... It is not the external facts that are important in understanding behaviour, but the meaning of the fact to the behavior. To change another person's behaviour, it is necessary somehow to modify his beliefs or perceptions, when he sees thing differently, he will behave differently" (Combs, 1974, p.15).

To the teacher, a student's wanton destruction of school material is inexplicable. To the students who cannot achieve recognition, status, or prestige in the school, such behaviour (although improper) may be a purposeful act that may bring recognition from peers. That is why the perceptual psychologists hold that to change behaviour, one must change an individual's perceptions. When teachers complain that students are not motivated, the teachers really mean that students are not motivated to do what the teachers want them to do. Yet if teachers selected different activities, they might find totally different reactions on the part of students.

Now let us see how a student's internal perspective relates directly to the learning process. Humanists see two parts in learning: (i) the acquisition of new information, and (ii) the individual's personalization of this information. Teachers make the mistake of assuming that students would learn if the subject matter is properly organized and presented. But meaning is not inherent in the subject matter. It is the individual who instills subject matter with its meaning (Combs et al 1974). The dilemma in teaching is not how to present the subject matter but how to help students derive personal meanings from the subject matter; if they can relate it in some way to their lives, you would have succeeded.

Combs (1981) delineates the major goals of humanistic education as follows:

- Accepting the learner's needs and purposes and creating educational experiences for the development of learner's unique potential.
- Facilitating learner's self-actualization and feelings of personal adequacy.
- Fostering the acquisition of basic skills and competencies (e.g., academic, personal, interpersonal, communicative, and economic).

- Recognizing the importance of human feelings, values, and perceptions in the educational process.
- Developing learning climate that is challenging, understanding, supportive, exciting and free from threat.

18.6.2 Maslow's Views on Learning

Abraham Maslow has been long recognized as one of the leading proponents of humanistic psychology. His work started with the study of human needs and their gratification, which influenced the understanding of human motivation. His theory is primarily based on the assumption that there are two kinds of forces existent in man - one that promotes growth and the other that resists growth. Maslow (1968) states:

One set [of forces] clings to safety and defensiveness tending to repress backward, hanging on to the past, afraid to grow ... afraid to take chances, afraid to jeopardize what he already has, afraid of independence, freedom and separateness. The other set of forces impels him forward towards wholeness of self and uniqueness of self, towards full functioning of all his capacities, towards confidence in the face of the external world at the same time that he can accept his deepest, real, unconscious self (pp. 45-46).

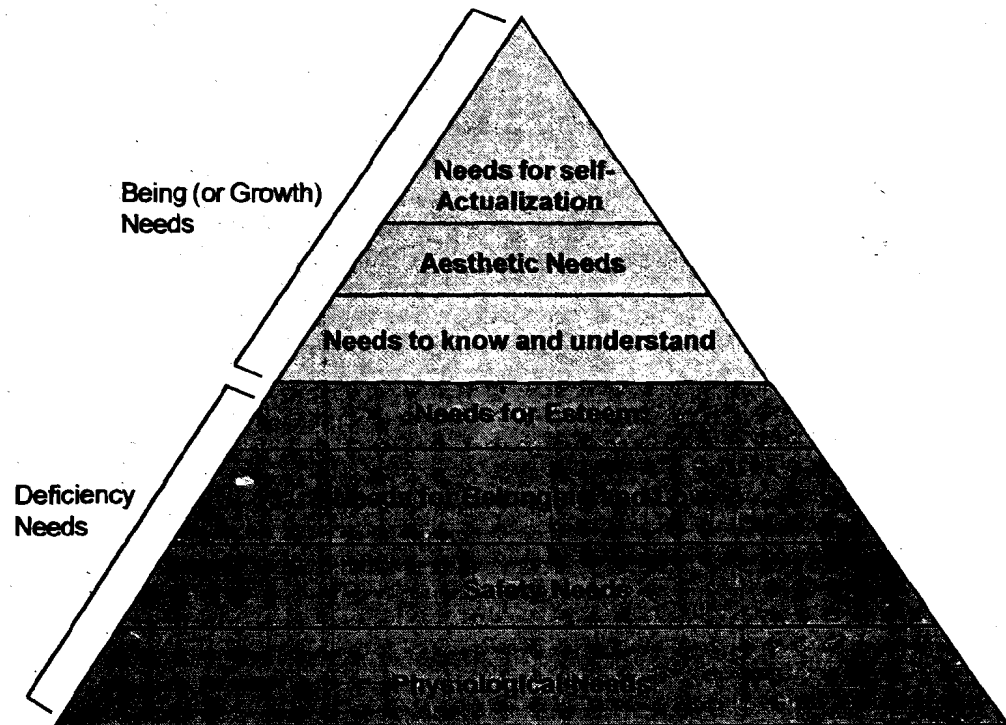


Fig. 18.4: Maslow's Need Hierarchy

(Source: Maslow, 1971)

Maslow believed that some human needs, like physiological needs are basic to other needs and that certain needs must be satisfied before the individual becomes concerned with higher needs.

Physiological needs (food, water, sleep etc.) are most basic and hence demand immediate satisfaction. Once these needs are satisfied, needs at the next level emerge (the safety needs) - the need for good health and for security from harm and danger. In this way the hierarchy goes on.

Maslow assumed that if the lower needs are satisfied, the motivation is directed towards self actualization —the need to develop the self potential, to become what one is

capable of becoming. Self-actualization is "not so much a matter of what a person does, as how much he feels about what he is doing".

Maslow distinguished the first four needs in the hierarchy from the latter ones. He identified the former as *deficiency needs* and the latter as *growth needs*. Generally, the gratification of deficiency needs depends on other people, whereas gratification of growth needs depends more on one's own self.

18.6.2.1 Instructional Implications of Maslow's Views

Maslow's hierarchy of human needs has important implications that teachers should take into account while working with children. A teacher may have difficulty in understanding why certain children do not do homework, are restless in the class or are completely uninterested in class activities. The teacher assumes that the desire to learn is an important need for all children, but Maslow suggested that interest or motivation to learn may not develop until other basic needs have been met. Children who come to school without breakfast or sufficient sleep, or with personal/family problems, anxieties or fears, are not interested in becoming self actualized individuals.

18.6.3 Rogers' Views on Learning

Carl Rogers, a humanistic psychologist, has influenced educational thought and practice to a great extent. He advocated an educational approach that tries to make learning and teaching more humanistic and thus more personal and meaningful. He has given certain important humanistic learning principles, which are central to his educational philosophy. These principles are briefly discussed here.

- ***Desire to learn:*** One of the foremost beliefs of Rogers is that humans have a natural desire to learn. You must have watched children's curiosity and eagerness to explore their environment, to ask questions, and to seek solutions. This inherent eagerness to learn is a basic assumption in humanistic education. In a humanistic classroom, therefore, children should be given freedom to satisfy their curiosity to pursue their interests, and to discover for themselves what is important and meaningful about the world around them. Rogerians have therefore advocated a child-centred approach to education.
- ***Learning should be meaningful to students:*** The second principle that Rogers emphasized is that significant or meaningful learning occurs when students perceive it as relevant to their own needs and purposes. Students learn best and most rapidly when they perceive learning as personally significant. Think of a student who quickly learns to operate a computer in order to enjoy a favourite game. Learning, according to humanistic psychologists, is purposeful and certainly motivated by the need to know.
- ***Learning without Threat:*** The third principle propounded by Rogers is that learning is best acquired and retained in an environment free from threat. The process of learning is enhanced when students can test their abilities; try new experiences, or even make mistakes without the sting of criticism or ridicule.
- ***Self-Initiated Learning:*** For Rogers and other humanists, learning is most significant and lasting when it is self-initiated and when it involves both the feelings and the mind of the learner. If the child is allowed self-direction, the learning becomes highly motivating and gives the student an opportunity to learn how to learn. When students learn on their own, they have an opportunity to make judgements, choices and evaluations.

In addition to being self-initiated, learning should involve aspects of the person - cognitive as well as affective. The humanists call this type of learning (i.e. learning from the 'gut', rather than just from the neck up) as whole person learning. Such a student will feel more personally involved in learning, more eager, more excited over accomplishments, and more motivated to continue learning.

18.6.3.1 Instructional Implications of Rogers' Views

Learning principles and teacher characteristics that Rogers has identified as central to his education philosophy, have been incorporated into his person-centered approach.

Rogers, like other humanistic educators, is not over concerned with teaching methodology. The value of curriculum planning, the scholarly expertise of teachers, or the use of technology are not as important for the facilitation of learning as the responsiveness to students feelings or the quality of interaction between students and teachers. Nevertheless, Rogers (1983) feels that there are certain instructional strategies and methods that are found helpful in promoting humanistic learning.

18.7 LET US SUM UP

The IPS model is used to identify how individuals obtain, transform, store, and apply information. It comprises the short-term sensory store, the short-term memory, the working memory, and the long-term memory. The flow of information through the IPS is monitored by the control of the executive processes called the metacognitive knowledge. Metacognitive knowledge is the process by which individuals think about their thinking. It involves knowledge about one's cognitive processes and active monitoring and regulation of these processes. As one acquires the metacognitive skills, one becomes independent and a successful learner. Students can be taught metacognitive learning strategies to manage and control their own learning.

Knowledge has been described as of two kinds: declarative knowledge (knowing that) and procedural knowledge (knowing how). Declarative knowledge is knowledge about things and can be either rote or meaningful. One can learn declarative knowledge by using strategies like rehearsal, elaboration, organisation, and comprehensive monitoring. Mnemonics are elaboration techniques that help us remember rote material by connecting it to visual images or semantic knowledge. By connecting the material and meaning we make it easier to remember.

For managing information more efficiently in the working memory, one can take notes, review the material and integrate it to what is already learned. One can also outline the text in an organised manner. A well organized knowledge in the long-term memory makes one expert in the area. Comprehension monitoring enables a reader to know whether he/she has understood what is read. Adjunct questions are most effective in promoting comprehension monitoring when these are placed after the text to be read. These also promote transfer. Schemata are cognitive structures that help learners to organise and process information efficiently by providing an organisational structure into which new information can be fitted.

Advance organisers can be used either to activate students' present cognitive structures or to equip them with necessary cognitive structure they do not have. Affective strategies motivate students, focus their attention, and help to reduce anxiety. Self-verbalization can be used to help students monitor and control their attention.

Procedural knowledge is knowledge about how to do things. It is of two types: pattern-recognition knowledge, and action-sequence knowledge. Pattern recognition is learned through process of generalization and discrimination. Such knowledge is involved in concept learning. Problem solving strategies involve the interaction of declarative and procedural knowledge. Procedural knowledge is more difficult to transfer than the declarative knowledge.

Humanistic teachers value educational goals that help students to learn more about themselves and make independent decisions. They prefer learning situations that are student-centered and oriented towards discovery method. They are concerned with individuals' feelings and perceptions as clue to their actions. They identify two parts that are inherent in learning: the acquisition of new information and individuals

personalization of this information. Combs believed that the way individuals perceive their actions is the key to understanding their behaviour. Maslow saw a person's motivational tendency as moving towards self-actualization or self-fulfillment. Rogers believed that individuals have an inherent desire to learn and they are more likely to learn when they perceive that learning is relevant to their own needs and purposes, and when it is self-initiated.

18.8 UNIT END EXERCISES

- 1) Illustrate metacognition with appropriate examples. What are its uses?
- 2) Define different learning strategies.
- 3) What are the two kinds of knowledge? Give examples of each.
- 4) Briefly explain the different comprehension monitoring strategies.
- 5) What is an advance organiser? Illustrate with examples.
- 6) What learning strategies can be used to improve procedural knowledge (learning how)?
- 7) Diagrammatically represent the hierarchy of human needs (Maslow) and explain their relation with human learning.
- 8) Identify the main learning principles as enunciated by Rogers.

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UNIT 19 CONSTRUCTIVISM

Structure

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- 19.2 Objectives
- 19.3 The Idea of Constructivism
 - 19.3.1 Constructivism: Some Definitions
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19.1 INTRODUCTION

You may do well by revisiting the doctrines of behaviourism and cognitivism, studied earlier in this block, to begin the study of constructivism.

What are the assumptions made by behaviourism and cognitivism about the nature of knowledge? Both regard knowledge as static, absolute and final and believe it to exist independent of the learner. So knowledge about the world is preexisting, reliable and constant, and the function of learning and cognition is to gain this knowledge. There is this 'given world of knowledge', and that is what teachers and learners need to be concerned with. In such an instructional model of knowledge, the role of the learner is the acquisition of this fixed world of knowledge, and the role of the teacher is to dispense and transmit this to the learners.

Constructivism holds sharply opposite views about the nature of knowledge. The assumptions made in behaviourism and cognitivism about the nature of knowledge are not acceptable to constructivists. Its assumption about knowledge is the most distinguishing characteristics of constructivism. As a theory of knowledge, constructivism rejects a static, passive or fixed view of knowledge and refuses to accord it an objective value. You can say that constructivism rejects absolutist epistemology, which is the basis of both behaviorist and cognitivist theories of learning.

This does not mean that constructivism can be conceptualized solely in terms of its theory of knowledge. On the contrary constructivism is quite difficult to describe, as it does not refer to any one theory, model, concept or approach, but is akin to a broad label. It accommodates a range of positions and has several versions, some of which

we shall study later in this unit. Not only does it not stand for any one /single approach, theory or position but denotes a broad intellectual tradition that privileges multiplicity. There is thus no standardized definition, meaning or description that can be given to it. One can go as far as to say that one's understanding of constructivism is dependent on the theorist, educator or researcher one is reading about.

Do you now understand why constructivism has been introduced in this unit by comparing it with behaviorism and cognitivism, rather than by an attempt to define or conceptualize it independently? It is a theory of knowledge and has far reaching implications for learning, pedagogy, assessment and educational practice. We will, thus, be concerned in this unit not only with understanding constructivism but also its educational implications. It is not in the traditional sense of the term a 'learning theory', as it does not propose a theory of learning, even though one comes across the term constructivist learning theory in the literature on constructivism.

We conclude this introductory discussion regarding what constructivism is not and the numerous interpretations that it has, by moving on finally to the question what constructivism is.

19.2 OBJECTIVES

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

- describe constructivism as a concept;
- compare different definitions of constructivism;
- enunciate different principles of constructivism in educational theory and practice;
- distinguish between different types of constructivism;
- differentiate between objectivism and constructivism;
- identify the constructivist features of concepts in cognitive psychology;
- draw implications of constructivism for education;
- identify the constructivist conditions of learning in schools; and
- visualize how to become a constructivist teacher.

19.3 THE IDEA OF CONSTRUCTIVISM

Constructivism has emerged as an influential doctrine in education in the last two decades. As an area of study it has roots in multiple disciplines, like philosophy, psychology, sociology, education, cognitive science and cybernetics. Its earliest votary was an Italian philosopher Giambattista Vico, (1668-1744), who proposed a constructivist theory of knowledge in which he regarded knowledge purely as a byproduct of human construction. This is evident in his words that "The known is the made." Since then many theorists and researchers have formulated different ideas about constructivism. Today constructivism, as an epistemological orientation, is embraced by researchers and practitioners in diverse fields ranging from science education, educational psychology, sociology of knowledge, mathematics education to instructional technology. You need not be surprised to discover that it is not only students of education like you who are studying this topic, but even those who study subjects like psychology, sociology, philosophy, anthropology and information technology, are also exploring the field. As already stated, constructivism is not a unitary construct. There is considerable debate indeed among educators, philosophers, psychologists and researchers about what it entails. With this background let us now try to understand what it means.

Constructivism is centered on the idea that human knowledge and learning is actively constructed by the learner, not passively received from the environment. Knowledge is always someone's knowledge. It is created or constructed by the experiencing individual. It is not impersonal or absolute. How do learners actively build or 'construct' this new knowledge? They do this on the bedrock of their prior knowledge. Learners in a classroom have their individual experiences and a cognitive structure, which are built on those prior experiences.

As an illustration of the above let us consider a school going child who resides in a rural habitation adjoining a river. The child has never left the village, nor ever crossed the river, nor does she think that it is possible to do so. The teacher in the school teaches him/her that there is a vast body of water (ocean) that surrounds the earth. However what he/she learns and comes to believe is that the river is the ocean and there is no earth beyond the river. Whenever a reference is made about the earth and universe, or even if the globe is shown to him/her, the child draws upon his/her own personal construct of the earth. So knowledge construction has taken place on the basis of his/her earlier experience of the world and is, in fact, a misconception. As such the misconception cannot be accepted as 'valid knowledge' as it is in contradiction to it. Valid knowledge is defined by the concerned community of practice, which in this case is the community of geographers. For the learner, his/her knowledge construct is a viable one, as it suffices the purpose of organizing his/her experiences of the world. For the teacher, this knowledge construct is unacceptable as it falls way short of what can be regarded as 'valid knowledge.' Not only does it fall short but is as a matter of fact, in opposition to it, as the village alone is not the earth but only a part of it. Mental Model of the earth is formed by the child by fitting the new information into his/her existing mental model. These mental models are quite stable and resistant to change. Can you recall now some of your own childhood experiences and memories?

Children tend to develop interesting and unique concepts not only about physical phenomenon such as the one explained above, but even about the social world. Children who have seen only men in short hair and trousers, which is often the case in rural Indian societies, on seeing women in the same attire, refer to them as 'uncle.' They have constructed a concept of uncle (men) on the basis of certain characteristics. Even though they may be told that this is not uncle but auntie, and even if they seemingly accept what they are told, they may not necessarily believe in it. They may use the word auntie but continue to hold on to their earlier constructs. Our daily life experiences are replete with such instances. How about exploring some such interesting ideas among children around you?

It is not difficult to understand the idea of non-congruence between knowledge and reality, as the main function of the knowledge constructs is to organize the ongoing experiences of the learner and not mirror reality. The learner tends to reformulate his/her existing structures/ constructs by connecting them to the new experiences of the world. This is what we mean when we say that in a constructivist setting, knowledge is not objective. Susan Hanley of Maryland Collaborative for Teacher Preparation, University of Maryland, gave an example of such view of knowledge. She noted that "Mathematics and science are viewed as systems with models that describe how the world might be rather than how it is. These models derive their validity not from their accuracy in describing the real world, but from the accuracy of any predictions which might be based on them."

Knowledge involves mental constructs that are constructed from past experience. Whether these constructs / structures are valid, truthful or incomplete is not important. The truth content of this knowledge is insignificant. If the known is the made, there is no singular, universal absolute knowledge; if reality is pluralistic, then it is meaningless to search for or debate about what the truth is. The truthfulness of a statement has to be judged vis-a-vis the point of reference on which it is based. If a child conceptualizes a bus as a big car or a goat as a dog, he/she is doing so on the basis of some criteria.

If we adopt their criteria or view their constructions in line with their viewpoints or referents, then we may not find any flaw in the above-mentioned statements. Discrepancy arises only when we use our criteria to evaluate their constructions. This is not to say that children do not learn 'approved' knowledge. They do so when they adopt culturally accepted criterion. As far as the personal constructions are concerned, reality is pluralistic and there can be no single truth. When society or culture presents to the child their standpoint, reality becomes consensual, yet it may vary from culture to culture, community to community. Thus individual constructs about the same phenomenon although logically consistent, may differ from one another. Such differences may be reduced through social persuasion or growing experiences, resulting in shared understanding among the members of a community. Further, when communities come together and arrive at a larger consensus, knowledge becomes increasingly consensual (universal as far as this world is concerned).

19.3.1 Constructivism: Some Definitions

In the words of Vico (1710) "We can know nothing that we have not made."

According to Van Glasersfeld (1989) constructivism is based on the belief that "knowledge is not passively received but actively built up by the cognizing subject and the function of cognition is adaptive....and serves the organization of the experiential world, not the discovery of ontological reality."

In the words of Martin Dougiamas (1998), a student of science education at Curtin University of Technology on Internet Technologies, Australia, observed:

"Constructivism is building on knowledge known by the student. Education is student-centered; students have to construct knowledge themselves. Explanations can use metacognition to explain via metaphor. Semiotics, or meanings of words, are important to keep in mind. Constructivism is a theory, a tool, a lens for examining educational practices."

Bruner defines constructivism as a learning theory in which learning is seen as an active process in which learners construct new ideas or concepts based upon their current and past knowledge (Kearsley, 1999).

As evident from these definitions, there is difference in how these four scholars belonging to constructivist tradition conceptualize constructivism, since originally they belonged to different disciplinary domains. Vico and Glasersfeld are philosophers, Dougiamas is an Information Technologist and Bruner is an educator. This sampling of constructivist theorists is not meant to be exhaustive but should illustrate to you the diversity of the field of constructivism. We hope that you have not failed to notice that there is no fundamental incompatibility between their ideas.

One can thus surmise that notwithstanding the various versions and interpretations, some common ideas, concepts and principles surface across constructivist theories. Let us examine them in greater detail, in the next section.

19.3.2 Principles of Constructivism

Two main ideas that can be termed as the principles of constructivism are as follows:

- The learner is not a passive entity but an active cognizing subject. He/she plays an important role in learning and development of knowledge. Knowledge is not passively received or absorbed by the learner but actively built by him/her. What more this implies is that knowledge cannot be transmitted from one learner to another. Learners have to construct this knowledge themselves.
- The function of cognition is not the discovery/representation of the world but adaptation. That is to say that cognition performs the function of organizing the learner's experiences of the world. Reality and truth are not the important notions

related to knowledge. What is of significance is that the learner constructs a viable explanation of his/her experiences. It is not important whether these explanations are factually correct or mirror the reality, but rather that they are self-constructed by the individuals. The goal of cognition is thus not the representation of an objective independent reality but our own attempt to understand and organize it. In order to do so we create a version of it by our own selves. This is the process of construction of knowledge.

Check Your Progress 1

Note: Write your answers in the space given below.

- 1) How does constructivism differ from behaviorism and cognitivism in terms of its assumptions about the nature of knowledge?

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- 2) Rewrite any one definition of constructivism proposed by any theorist in your own words.

.....

.....

.....

- 3) Explain in your own words what you understand from the notion of constructivism.

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- 4) As a student of education, are you attracted to the doctrine of constructivism? If yes, why?

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19.4 CONSTRUCTIVISM IN EDUCATIONAL THEORY AND PRACTICE

Over the last two decades, constructivism has become increasingly acceptable as a perspective in education. Not only is it becoming acceptable but is also gaining popularity. More and more scholars, researchers, educators and educational administrators are following the constructivist approach. Mainstream literature in educational psychology is according larger space to it. In most texts, introductory or advanced, you will find a full chapter or even a unit devoted to it. There is also an upsurge of interest in its implications for education. Teachers and school administrators increasingly embrace constructivist practices inside and out of the classroom. We shall study some of the implications of constructivism for education in a separate section later.

Some of the reasons that have fuelled the popularity of constructivism are the following:

- Educators are increasingly rejecting the philosophical basis of behaviourism. The assumption of the passive learner is especially unacceptable. Almost all the contemporary writers on education regard children as active and inherently educable. The dominant modern view of child nature is completely opposite of behaviourism. With increasing disenchantment with behaviorism, constructivism offers a refreshingly contrasting alternative.
- Children's knowledge often involves systematic errors and misconceptions. Constructivism alone accounts for their formation. The formation of personal constructs, misconceptions and errors will become obvious to you, as you will study about Radical Constructivism in the forthcoming section.
- It explains variability in meaning, perception and understanding that learners attach to objects and events.
- In philosophy of science, doubts have developed about the accessibility of objective reality in the area of modern physics. If objective reality is not knowable even in an area as objective as physics, then the constructivist skepticism of objective knowledge is well founded.
- Constructivist theory is compatible with the interactional and cultural emphasis of theorists like Vygotsky and Bruner.

19.5 TYPES OF CONSTRUCTIVISM

The parameters on the basis of which various versions of constructivism can be distinguished from each other are many. This is understandable in view of the loose and broad nature of the doctrine of constructivism. It can be therefore labeled in a variety of ways giving rise to many types of constructivism some of which we are now going to study.

By far the most popular classification of constructivism is done by using a continuum ranging from weak to strong. The weak form is titled as **trivial constructivism**, and the strong form at the other end of the line is termed as **radical constructivism**. To understand these two types of constructivism we will return to the two principles of constructivism that we studied in the last section. Briefly stated again, the first principle assumes that the learner is an active rather than a passive being, while the second considers the function of cognition as adaptation rather than representation.

19.5.1 Trivial Constructivism

Von Glasersfeld first coined this term in 1990 calling it the simplest type of constructivism. One can say that **trivial constructivism** is contained in all other types of constructivism, which will become obvious to you as you proceed in this section. It also parallels the argument of **personal constructivism** that we will discuss later in this section.

Trivial constructivism agrees only with the first of the two main principles of constructivism, that is, the learner is an active player in the process of construction of knowledge. Its central idea is that learners themselves construct mental structures on the basis of what they already know. Learning is not just passive absorption of information but active construction by the learner. New knowledge is actively constructed on the foundation of prior knowledge by the action of an active learner upon the world. Knowledge is thus never impersonal, as it is always someone's knowledge. Of course that someone is the learner. That is what we mean when we say that knowledge is not independent of the learner. It is also learner dependent in the sense that new knowledge is built on the basis of what the learner already knows.

It does not dismiss the objective reality of the environment but believes that this reality is knowable by the learner through the process of personal construction. The purpose of learning and cognition is construction of mental structures that mirror this reality. As a result of cognitive development the learner made constructions become better and better representations of this reality of the environment.

The Information Processing theory can be regarded as one of the weakest forms of constructivism. It is constructivist as it views learning as an active process in which the learner's thought processes are engaged. Not only the learner's thought processes are involved but even emphasized, as the learner is endowed with the capacity for thinking, problem solving and going beyond the information given. Glasersfeld even regards the theory of Jean Piaget, as a case of trivial constructivism.

Our formal system of education can also be regarded as an instance of trivial constructivism. The knowledge that it seeks to disseminate or the information that it transmits is fixed - given. This given (curriculum) is a piece of a larger body of knowledge that corresponds to an objective, singular, knowable part of reality and therefore every learner is expected to learn the 'same knowledge'. It is further believed that certain cognitive processes such as comparison, analysis, synthesis etc will help in constructing knowledge, which will ultimately approximate the accepted form or validated knowledge. The trivial constructivists do not deny that different individuals make different constructions using different cognitive processes, but they largely attribute these differences to variety of experiences. Thus the differences in constructions can be reconciled by providing learners with appropriate experiences with a view to enable them to construct 'valid knowledge'.

19.5.2 Radical Constructivism

This complex and difficult to describe notion is well summarized in the words of its most ardent advocate Glasersfeld (1990), who wrote, "Coming to know is a process of dynamic adaptation towards viable interpretations of experience. The learner does not necessarily construct knowledge of a 'real' world."

Radical constructivism does not deny the objective reality, but considers it unimportant. According to Glasersfeld we do not even have a way of knowing this objective reality. It is colored by the lenses of the learner's eyes by way of his/her experiences. It does not even matter if this perceived reality is a representation of objective reality, as the function of learning and cognition is not to correctly represent the objective world. The function of learning and cognition is adaptation, that is, the construction of viable explanations of the experiences of the learner. These constructions help to impose an order on the learner's flow of continuing experiences in the world.

By now it may be evident to you from this discussion that radical constructivism follows both the principles of constructivism, the first of the active learner and the second that regards adaptation as in function of learning and cognition, by virtue of which the place of truth in knowledge is given to viability. You may also realize how necessary it was to recall the two principles of constructivism at the beginning of this section, as these served as a criterion for conceptualizing these two major types of constructivism. Conversely, the classification of constructivism as trivial and radical helps us better understand the two main features of constructivism. Let us conclude by stating that the critical difference between trivial and radical constructivism is with regards to the general function of cognition, which both conceptualize differently, while both emphasize the active role of individual learner as the constructor.

19.5.3 Personal and Social Constructivism

This is another significant dimension along which constructivism can be classified depending on whether knowledge is regarded as an individual or a social construct even though the process in both cases is subjective. Personal and social constructivism

are accordingly conceptualized as two types of constructivism. The former regards knowledge construction as an individual process, while the latter puts emphasis on the social environment or the context in which the learner is situated and constructs knowledge.

Personal Constructivism

Theorists and researchers located in this position can often be identified by the fact that they call themselves as constructivist and not social constructivist. So what are the identifying features of this version of constructivism? As evident from the title it regards the individual learner as the constructor of knowledge and prioritizes the individual aspects of learning. Learning and cognitive development involve individual sense making in an experiential world.

A celebrated example of this is the great psychologist Piaget's theory that is generally called genetic epistemology, which you have studied earlier. It explains learning and cognitive development in terms of structures like individual schema and mental processes like organization and adaptation (assimilation and accommodation). The learner with the help of these structures and processes constructs knowledge himself/herself. So the learner though active is alone in this process of knowledge construction. You will now agree that such a theory about learning and cognitive development, one that accords primary place to individual structures, processes and constructs, is a type of personal constructivism. In the words of Piaget (1980) himself "Education, for most people, means trying to lead the child to resemble the typical adult of his society (whereas) for me, education means making creators, even if there aren't many of them, even if one's creations are limited by comparison with those of others."

Social Constructivism

Social constructivism is founded on the thesis that social processes are central to learning and cognitive development. It regards knowledge as a social construct and prioritizes the social aspects of learning and cognitive development. Some of these social aspects are language, culture, everyday practices, material objects, interpersonal interaction, peer interaction, tools and symbols. Though the concept originated in sociology and philosophy, it has become increasingly popular in education in the last two decades. Though there is no consensus as to what it stands for; in educational theory and studies the social constructivist tradition is dominated by the legacy of L.Vygotsky. The ideas of American educator J. Bruner have also contributed to its heritage in recent years.

Social Constructivism centers around the idea that the culture is a constituent of mind and therefore provides for structures which determine the construction of reality. In this sense, no knowledge constructions are asocial or acultural. The learner appropriates and constructs meanings in response to his or her experiences in the social contexts. Cognition is socially situated and knowledge construction is a social activity rather than an individual enterprise, an outcome of the dialectical relationship between the individual and the social context. The primary origin of knowledge is not in the learner's interaction or action upon the objective world as is believed in personal constructivism. Knowledge and knowing are not acultural entities unaffected by sociological contingencies. Knowledge originates in the social and material history of the culture to which the learner belongs. Mental processes including higher cognitive skills have social origins. Learning, cognition and cognitive development cannot be understood without going outside the individual, to the social and cultural processes from which they originate. Learning and cognition do not begin within the individual, but occur between individuals; that is to say that they take place on an intermental rather than intramental plane. It is from this intermental plane that mental processes are internalised by individuals. Learning and development occur as a result of this internalization from outside, in a process, which is intersubjective. In order to understand how children construct knowledge we need to examine the tools of culture. The cultural tools are

both, physical and psychological. The implements used for farming, the vehicles used for transport, machines used for various purposes, computers etc. are part of physical tools. Culture invents these tools in order to deal with the situations and overcome the limits imposed upon us by our biology.

Telescopes, microscopes hearing- aids, spectacles etc. are all examples of physical tools. On the other hand, language, sign systems, sign language, religious systems, legal systems, social institutions, different art forms or modes of creative expressions, folklore constitute the psychological tools. There are set (shared) ways of thinking, learning and teaching in a given culture. These are all part of psychological tools. The social constructivists firmly believe that humans interact with the physical world only through cultural tools. Thus all knowledge is mediated and constructed essentially through these tools. The social constructivists do not separate mind from culture. To them learning is a social process involving the learner, the culture and the members of the society. The manner in which children of a culture are initiated into it, especially into its knowledge system also needs to be considered. Sociocultural theorist Lave (1988) conceptualized cognition as “ complex social phenomenon.....distributed-stretched over, not divided among - mind, body, activity, and culturally organized settings (which include other actors).”

To conclude we can say that social constructivism believes that the locus of knowledge is not in the individual but in society; learning and cognition are inherently social; and that cultural activities, tools and symbol systems play critical role in learning and cognitive development.

19.5.4 Objectivism and Constructivism

Constructivism is often contrasted with objectivism as if the two were the opposite ends of a line. Objectivism is based on the belief that knowledge should correspond to reality. The objectivist seeks to define knowledge as a representation of the reality of the world. The real world in turn is regarded as absolute, static, objective and independent of the learner. Knowledge is to be regarded as knowledge, only if it is a truthful mirror of the world. It is thus based on the objective reality of the world and is not dependent on the learner. Knowledge is thus conceptualized as objective and independent of the learner.

Constructivism holds extremely opposite views about knowledge. To the constructivist knowledge is not absolute, static, objective or learner independent. As discussed earlier in this section, constructivism regards knowledge as part and parcel of the learner and his/her experiences with the environment. It dismisses the notion of objectivity in knowledge, as knowledge is not supposed to match or discover reality. There is no need for it to correspond to a knowable, external reality; or to be a truthful representation of it. Truth has little role, if any, to play in the conceptualization of knowledge. The notion of truth is replaced by viability in the conceptualization of knowledge. What viability implies is that the constructed knowledge should enable adaptation, that is, allows the learner to organize the experiential world.

Check Your Progress 2

Note: Write your answers in the space given below.

- 1) Employing the two principles of constructivism, distinguish between trivial and radical constructivism.

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- 2) Cite a significant commonality between Personal and Social Constructivism.
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- 3) Write an example that illustrates how social construction of knowledge takes place.
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- 4) Can the terms behaviorism and objectivism be used synonymously? If not, why? Will you agree with the statement that behaviorism has emerged from the objectivist tradition?
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19.6 CONSTRUCTIVIST FEATURES OF CONCEPTS IN COGNITIVE PSYCHOLOGY

Two areas of study in mainstream cognitive psychology that appear to be quite 'learner independent' are perception and memory. In the following paragraphs we explain how even perception and memory can be conceptualized in a constructivist approach.

- The General Theory of Perception proposes that the learner's perception of the world involves not a passive reception / taking in of stimulation, but an active process of sense making and interpretation. The learner's prior knowledge, expectations and learning play an important role in this process of making perceptual sense of the world.
- F.C.Bartlett views memory as a process of reconstruction from the stored traces of previous experiences. This process of reconstruction is not different than a construction, as it involves drawing meaning from stimuli in the environment, on the basis of which this reconstruction takes place. So even memory can be regarded as a construction.

19.7 IMPLICATIONS OF CONSTRUCTIVISM FOR EDUCATION

Constructivism has important and far-reaching implications for educational theory and practice. In the previous sections we have examined some of the theoretical dimensions of constructivism. In the present section we will consider the main practice related implications of constructivist principles for learning and pedagogy. We will also outline the constructivist conditions of learning and the roles that constructivism accords to the teacher and the learner.

The main features of a constructivist approach to learning and pedagogy are the following:

- i) The constructivist epistemology rejects a transmission model of knowledge. Consequently education is not based on the view that there is a fixed world of knowledge, transmitting of which to the learners, is the goal of education. Teaching and learning are not like the pipelines of the water supply distribution system of a city wherein the main supply reservoir is akin to the given body of knowledge, and the pipelines that carry water to the households, as if they were sending this water of knowledge to the learner. The traditional role of teachers as instructors and of learners as recipients of this instruction is out of tune with the constructivist approach. Teaching involves facilitating opportunities for construction of knowledge and learning involves making these constructions.
- ii) The constructivist epistemology is based on the belief that new knowledge is constructed on the basis of prior knowledge. The prior knowledge that learners bring with them to the teaching-learning situation in the classroom should be brought to the forefront. This prior knowledge needs to be incorporated in the learning experiences that constitute teaching learning. On a visit to a primary school in district Bundi in Rajasthan, a teacher showed a yellow colored object to the children of class II and asked, "What color is this?". A little girl jumped with excitement and said 'Khatti'! Her response was incomprehensible till the teacher told me that khatti means 'kadhi' (a preparation of buttermilk and gramflour garnished with turmeric). Since kadhi is yellow in color, her concept of yellow color is that of the color of 'kadhi'. The teacher then presented many more examples of yellow color and said that this is 'peela rang' (yellow color). Though it is difficult to say whether that child acquired the concept of 'yellow' or not, it nevertheless does tell us how children's new learning or constructions are based on their own previous constructions. Whether the teacher or the other children had 'kadhi' in their minds, this child's notion of reality was definitely based on it.

The prior knowledge varies from learner to learner depending upon the personal and social experiences that they have had in the past. It also varies from culture to culture. Therefore all learners cannot be expected to build on the same foundation. The learners can neither understand the same things nor understand them in the same way. If learning is a constructive process then teaching needs to provide the opportunities for it by supplying the teaching learning experiences taking in account the prior learning and facilitating the building of new knowledge on this basis. For radical constructivists especially, the basis of teaching learning process should not be a predetermined body of knowledge that may be regarded as essential or worthwhile knowledge by the teacher or the educational system; but what the learner already knows and is concerned about. The knowledge that is connected to the learner is more important than that which may be given in any discipline or area of study. Since the vantage point of knowledge construction is this preexisting knowledge of the learner, teachers need to probe and explore in detail what is the knowledge that learners bring with them. However, the social constructivists point out that individual constructions are essentially influenced by cultural constructs (accepted body of knowledge) as knowledge is a body of shared, 'lived in' experiences. For example, the meanings that fine arts such as sketches, painting, sculpture; evoke in the viewers are based on common understanding shared by a community. The social constructivists consider knowledge as consensual and therefore emphasize the importance of discussion, collaborative learning, social negotiation, persuasion, and even demonstration like projecting models and sometimes direct instruction. Thus a teacher with a social constructivist orientation would acknowledge learners' personal constructions but would lead them, through the aforesaid processes, to a shared understanding of the phenomenon. Thus when the child said khatti to denote yellow the teacher may explain, "Yes khatti is yellow color but so is lemon or mustard flowers.

Thus they all belong to the color category called 'yellow'.

The trivial constructivists, however, believe that knowledge is absolute, fixed and knowable. They thus stress on enabling the learner to construct and reconstruct, organize and reorganize, to structure and restructure; then understand so that it matches or at least approximates the external reality.

- iii) The constructivist perspective assumes that an active learner has the capacity to construct knowledge himself/herself. The learner is not somebody who needs to be forced to learn by the teacher. She has an inherent capability for it. In fact, that is how knowledge develops. However, the active construction of knowledge is not an instant process, but takes time. It requires self-reflection on the part of the learner. Piaget in fact conceptualized the notion of 'horizontal elaboration', which implied that when children first acquire a new concept, they like to mentally just play around with it for a while, that is to say that they want to elaborate it horizontally. Teaching learning situations thus need to allow time and opportunities for this sort of horizontal elaboration, and overall active construction of knowledge.

Driver (1988) listed the following six features of the constructivist perspective as it relates to schooling:

- Learners are purposive, active and responsible for their own learning. They bring their prior experiences and knowledge to all learning situations.
- The process of learning is regarded as active in the sense that it entails activity on the part of the learner.
- Knowledge is not a thing that exists out there but is personally and socially constructed.
- It is not only the learners who bring their prior experiences to learning situations, teachers also bring in their prior conceptions to the teaching learning situations. These prior conceptions are consanguine not only to the scholastic subjects they teach but also to their assumptions and viewpoint about teaching and learning.
- Teaching does not involve mere transmission of knowledge. It involves the organization of the learning situation and of tasks and opportunities, which facilitate the construction of knowledge.
- Curriculum is not a given that is to be learned; but a schedule of learning tasks, materials and resources by virtue of which learners construct their knowledge.

19.7.1 Constructivist Conditions of Learning

Constructivist conditions of learning are those conditions that are helpful in accomplishing the constructivist goals of education, namely; the active construction of knowledge. There is no gain saying that they emphasize the process of learning rather than its product.

Jonassen (1994) mentioned eight attributes of the learning climate that can be regarded as the constructivist environment:

- It is characterized by multiple representations of reality.
- The complexity of the real world is evident in these representations.
- Knowledge construction rather than knowledge reproduction is emphasized.
- Authentic tasks are regarded as important learning situations.
- Opportunities are arranged for real world settings or case based learning.

- Learners are encouraged to reflect on experience.
- Knowledge construction is not separated from content or context.
- Social negotiation and collaboration among learners are encouraged.

Viewing learning and cognition as a constructivist phenomenon implies constructivist conditions of teaching and learning. The first condition is that the teaching learning situation should involve a complex learning environment. The complexity of the learning environment reflects the complexity of the real world, and allows greater real world settings and experiences. It provides opportunity for interaction with and exploration of many aspects of the environment, due to which the nature and characteristics of the world can be discovered first hand. It also highlights the relationship among facts, principles, ideas and concepts in the immediate environment. It offers to the learner direct opportunities for experimentation because of which he/she develops capacities, procedures and skills for learning to learn. It allows for organization of a rich variety of activities and discovery learning. The verbal presentation of readymade knowledge is avoided, while personal discovery and active construction are nourished. The second condition of constructivist teaching learning environment is multiple juxtaposition of instructional content. A single approach to a complex topic/concept sidesteps its significant aspects, which can become prominent from another vantage point. The varied dimensions of concepts and ideas may become obliterated or emphasized depending upon the perspective with which they are approached and considered. This can and in fact does lead to partial understanding, misconceptions, oversimplification, overgeneralization, learning failures and even patterns of learning failure. All this can be avoided if the same material / concept / topic can be examined from multiple perspectives. In the words of Spiro (1991) " revisiting the same material, at different times, in rearranged contexts, for different purposes, and from different conceptual perspectives is essential for attaining the goals of advanced knowledge acquisition." Multiple juxtaposition of instructional content implies that the same teaching learning material should be examined from multiple perspectives and positions.

The third condition the constructivism implies for teaching and learning is that there should be **focus on authentic activities and social processes**. Authentic tasks and activities are very important learning situations, as they do not separate knowledge construction from its context. Authenticity implies that these activities and tasks have to be similar to those, which the learner comes across in the real life. It should bridge the hiatus between the classroom world and the real world, while also highlighting the usefulness of school knowledge for everyday life. A complex learning environment allows for the incorporation of this authenticity. The knowledge so constructed is authentic knowledge belonging to the learner in the context of one's own world. Almost all academic areas offer the possibilities of designing such contextual activities. Resnick (1987) lamented that in everyday life commonsense knowledge and school knowledge are becoming more and more mutually exclusive. Most learners make little connection, if any, between what they learn in the classroom and what they need to do in real life outside the school. Organization of authentic activities and tasks helps to construct context related knowledge and thereby bridges the gap between school and everyday life knowledge.

Social constructivism, as you know advocates that learning and cognitive development cannot be understood without reference to the social context in which they exist. Social processes are not only social processes but important factors of cognitive growth. Social interaction is critical for learning and cognitive development. Conversation, cooperation, peer tutoring and group work are some of its significant processes. Learners make better sense of the world when they come together to construct meaning from the observed phenomenon and experienced events. It also facilitates the use of multiple perspectives to understand complex topics.

19.7.2 Becoming a Constructivist Teacher

Do you agree with the adage that teachers tend to teach as they have been taught? If you do, then becoming a constructivist teacher is a daunting challenge, as most of us have been taught in the traditional, objectivist model.

Constructivism is the dominant contemporary idea in education, and has far reaching implications for how teachers teach and learn to teach. Becoming a constructivist teacher requires professional preparation in which the constructivist characteristics are cultivated and nurtured. Constructivist teachers do not consider themselves as the containers of knowledge who pour it into the learners (who do not contain it). They ardently believe that the learner is capable of constructing knowledge himself / herself. They are master organizers of learning environments, situations and experiences which are organized in a way, that they bring learners' prior understanding to the forefront while putting forth problems that are not only important to learners but also emerge out of these prior understandings.

When in the classroom, for example, the constructivist teacher first and foremost probes and thereafter draws upon the preexisting knowledge of learners. This knowledge is then challenged by putting forth some information, problem or task which though related to the former; cannot be understood, solved or accomplished solely by this prior knowledge. This challenge is a manifold one, situated as much as possible in the real world and the teacher is only one of the sources at the hands of the learner to resolve it. Learners may work individually or in groups, depending upon their own preference. Peer interaction and peer learning are, however, encouraged. Even though assessment can employ the standard paper pencil tools, it needs to incorporate self-evaluation and group evaluation.

19.8 LET US SUM UP

Constructivism as a theory of knowledge rejects a static, passive or fixed view of knowledge and does not accord an objective value. Constructivism is centered on the idea that human knowledge and learning are actively constructed by the learner and not passively received from the environment. Knowledge involves mental structures that are constructed from past experience. Validity, truthfulness, or completeness of the structures is not important; because if knowledge is made, there is no singular, universal absolute knowledge; if reality is pluralistic, then it is meaningless to debate about what the truth is. There are two main ideas that can be termed as the principles of constructivism: (i) the learner is not a passive entity but an active cognizing subject; (ii) the function of cognition is not the discovery or representation of the world but adaptation. Constructivism is classified into trivial, radical, personal and social constructivism. Trivial constructivism does not discuss the objective reality of the environment but believes that this reality is knowable by the learner through the process of personal construction. Radical constructivism does not deny the objective reality, but considers it unimportant. Personal constructivism regards the individual learner as the constructor of knowledge and prioritizes the individual aspects of learning. Social constructivism is centered around the idea that the culture is a constituent of mind and therefore provides for structures which determine construction of reality. In this sense, no knowledge constructions are asocial or acultural. Constructivists hold extremely opposite views about knowledge to that of the objectivists. Objectivism is based on the belief that knowledge should correspond to reality. Constructivism has implications for educational theory and practice. The main features of a constructivist approach to learning and pedagogy are that constructivist epistemology, rejects a transmission model of knowledge, is based on the beliefs that new knowledge is constructed on the basis of prior knowledge, and it assumes that an active learner has the capacity to construct knowledge himself/herself. For accomplishing constructivist goals of education the learning climate has to be created accordingly.

19.9 UNIT END EXERCISES

- 1) At the end of your study of constructivism do you believe that education should be based on a fixed body of knowledge or it should rather be based on the child's own constructions of knowledge? Do you favor the pedagogy of transmission or that of construction? Why?
- 2) Describe the teaching-learning activities you would organize to create a constructivist learning environment for introducing a topic to your class.

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