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# UNIT 1 THEORIES OF LEARNING

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## 1.0 OBJECTIVES

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After having worked through this unit, you should be able to:

- define learning and its basic conditions,
- explain various theories of learning and their educational implications,
- describe learning outcomes in three domains — cognitive, affective and psychomotor,
- write the required instructional objectives for a unit/lesson.

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## 1.1 INTRODUCTION

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In most open and distance learning systems print material is the chief teaching medium. Teaching a learner through self-learning print materials is different from any other kind of teaching. The process of designing, developing and producing these materials is quite different from that used in the production of text books, lecture notes, journal articles and training manuals. However, it is important to remember that a distance teaching text

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is not the same as a text book, because the material produced in print for independent learning has to carry out all the functions a teacher who would fulfil in a conventional situation such as guiding, motivating, explaining, discussing, asking questions, assessing the learner's progress, giving appropriate remedial measures, and providing advice. Those who are writing distance teaching print materials have to consider the characteristics of the print medium and how print is a convenient medium for the delivery of educational material to remote students, who may not have access to new technologies. Printed texts are comparatively cost-effective and easily designed, developed and delivered. Print material is the most convenient medium to work with, being self-contained, portable and easy to access. In this unit, we will discuss the theories and principles on the basis of which the distance teaching texts are developed.

It may happen sometimes that certain skills are adequately learned and practiced by us without our being aware of the theoretical basis of those skills or the principles behind their successful functioning. But if we know the theories as well, the practice of our skills maybe improved. You may drive a car well without being a car mechanic yourself, but if you also know the mechanism, it may improve your efficiency as a driver. In the field of education, your knowledge of various theories of learning will be very useful when you consciously attempt to practice and improve your teaching/learning skills.

Curriculum, syllabi, *text design*, teaching methods and, modes of evaluation are all based on certain theories of learning. These theories are generally derived from past experience, or formulated to serve the needs of the present and the future. If we want to implement our educational plan or improve the practice of teaching/learning or change the educational system itself, we should acquire the necessary knowledge of various theories of learning before we take any concrete steps in operational terms. Until recently, the design of the majority of distance teaching text materials have been based on various theories of learning from the cognitive, behavioural and information processing families. There is, however, a growing body of literature on the practice of designing materials from a constructive perspective, which have presented as principles that should guide design. In this unit we discuss Behaviourism, Cognitivism and Constructivism as well the possible synthesis of the first two of these. We indicate the general educational implications of these theories and try to link them with distance education. For a more specific discussion on the implications of these theories for distance education, you may turn to Unit 3 of this block.

The purpose of this unit is to acquaint you with the concept of learning, the various theories of learning and the learning outcomes in three domains: cognitive, affective and psychomotor along with their implications in designing print materials.

## 1.2 THE CONCEPT OF LEARNING

Conceptually, 'learning' in the conventional sense is the process of assimilation of knowledge resulting from the interaction between the teacher and the taught. The idea of the traditional teacher-student relationship is, however, impossible to achieve with the growing democratisation of education and the increasing demand for learning or continuing education. In distance education, the scope for personal contact and its role in the teaching and learning process are limited. The concept of learning thus needs to be reinterpreted in terms of distance education. In distance education, learning takes place not through the mediation of a teacher but primarily through the mediation of text materials and electronic gadgets. As you know, in distance education we deal with adult learners, who use their experience to create construct knowledge, a process which is otherwise known as experiential learning. In this section, along with considering the other meanings of 'learning', we will discuss the concept of experiential learning and constructivism. If we look at the process of learning and teaching at a distance from the point of view of pedagogies, it is more or less integrated combination of forms of learning which are developed in classroom teaching (Otto Peters, 1998). These include:

- Learning by reading printed material (textbooks, manuals, lexicons, scientific literature, lecture notes).
- Learning by means of guided self-teaching (counselling at the commencement of studies, counselling by tutors, consulting reading lists).
- Learning by means of independent scientific work (preparation for written examination, the writing of assignments).
- Learning by means of personal communications (use of the consultation hours of university teaching staff, and of course counselling, peer interaction, practical case-work, project work, seminars etc.).
- Learning with the help of multi-media.
- Learning by participating in traditional academic teaching (lectures, seminars, counselling sessions, laboratory work).

What follows below is an elaboration of the theme introduced earlier.

### 1.2.1 Learning and performance

Learning is a relatively permanent change in behaviour, and it is the result of reinforced practice.

Such a concept of learning assumes that certain conditions in the environment bring about fundamental changes in our behaviour and that these changes persist for a long time. Learning is not directly observable but can be inferred from performance. We can infer that a person has learnt something when she/he does something which she/he could not do before. A person may know something, and yet may not have learned it. You may

'know' how a computer works, but may not be able to operate it. Thus, the distinction between learning or the acquisition of knowledge (i.e. capability) and performance (i.e. exhibiting this capability in some form of action) is an important one. We use the term 'behavioural tendency' to maintain the distinction between learning and performance. In this context when we speak of relatively permanent change in behaviour, we refer to a change in performance.

### **1.2.2 Learning and cognitive development**

We may also define learning in terms of cognitive development. Cognitivists say that learning is the changing or reorganisation of cognitive structures, which involves an acquisition of knowledge and the transformation of new knowledge. Looked at this way, we can say that learning is a change in one's knowledge, skills, attitudes and values brought about through experience, and this change may or may not be expressed in overt behaviour.

### **1.2.3 Learning and maturation**

Not all changes in behaviour can be related to learning. Some behavioural changes are due to biological development or maturation. In maturation, the growth tendencies are independent of specific learning conditions, and depend entirely on biological growth. For example, the swimming of tadpoles and the flying of birds simply occur at the moment of anatomical maturation. A child walks once its legs are strong enough to support its weight.

### **1.2.4 Experiential learning and constructivism**

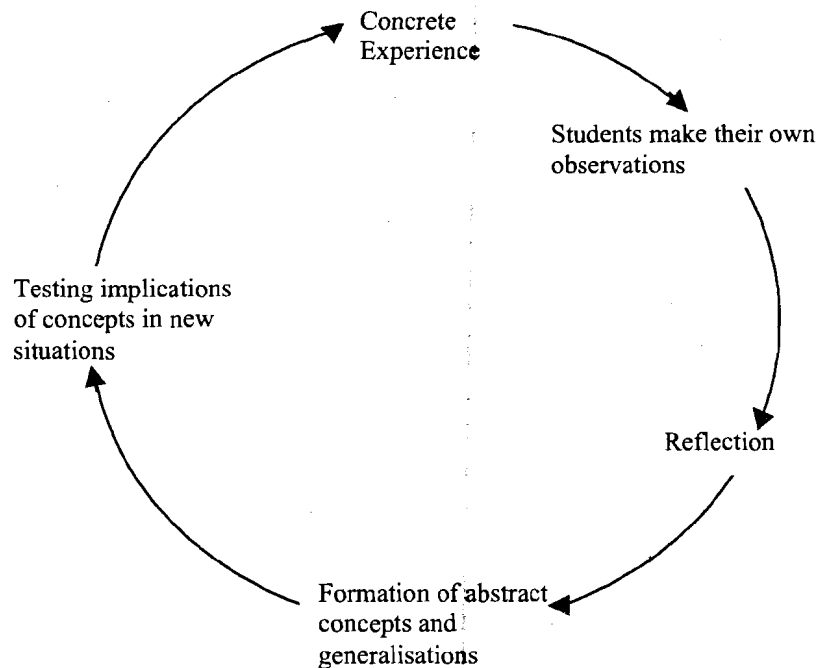
Experiential learning has been a very influential idea in recent years. It is argued by Kolb (1984) that mature adults have much to offer to the educational process from their life experiences. Peter (1997) argues that to some extent experiential learning is constructivism in an adult context. Kolb (1984) describes experiential learning as the process whereby knowledge is created through the transformation of experience while Knowles (1984) and Brookfield (1986) link it to self-directed learning. There is certainly a very strong element of self-direction in learning as in a classic study of the constructivist movement. Knowles (1984) postulates certain assumptions about andragogy (the teaching of adults as opposed to pedagogy, which is the teaching of children) and experiential learning. Most of these assumptions also seem to apply to constructivism. Kolb (1984) listed the essential characteristics of experiential learning which are applicable to constructivist theory.

These characteristics are:

1. Learning is a continuous process grounded in experience.
2. Learning is a holistic process of adaptation to the world.

3. Learning involves transactions between the person and the environment.
4. Learning is the process of creating knowledge.
5. The process of learning requires the resolution of conflicts between diametrically opposed modes of adaptation to the world.

As a result of the seminal contributions of Kolb (1984) and Knowles (1984) there is a style of teaching adults that involves making use of their experiential learning. This is different from pedagogy, in which the teacher instructs the students but does not take experiential learning into account in any way. Andragogy involves the construction of experiential learning into the learning cycle as stated below (fig 1).



**Fig.1: Kolb's Experiential Learning Model**

This cycle explains that the students are encouraged to reflect on their own experiences and to come to conclusions that modify their cognitive structures. They are then ready for the next cycle of experiential learning.

### ***Learning and constructivism***

Constructivism refers to a process where the learner is actively constructing both the knowledge acquired and the strategies used to acquire it. The learner constructs a new version of reality from his or her own unique experiences, and it is this construction s/he then uses to deal with any new experiences in that field.

Constructivist learning is about the elaboration of concepts, as they operate in a real context. Learners elaborate concepts through questioning, critical analysis, application of the concept and by, reflection-on-action.

To learn constructively is to actively process new information, use structured experiential activity and analyse life experiences, solve problems, examine critically one's existing mental framework, explore belief systems and assess one's learning.

The learner's existing mental framework and learning needs are agents in the interpretation and construction of knowledge.

To prepare the materials constructively is to provide opportunities for complex processing of information related to a learner's needs and knowledge of the world, to design relevant and real world (authentic) tasks, provide complex stimuli, challenge the learner's existing knowledge structures and values, acknowledge vague structures in knowledge, help learners revisit material in greater depths, confirm the learning identified by learners, and help learners to arrive at correct solutions.

But one of the limitations of this approach is that it does not fully take into account the way in which social processes, such as peer interaction, collaboration and the use of language, which contribute to learning. The main emphasis of *constructivism* is on individual development through the use of resources and on the accommodation of new experiences to existing understanding.

The role of the tutor/counsellor in a constructivist learning environment is to facilitate learning through the provision of programming tasks, and to support individual development by creating a micro-world. There is no specific place for language, dialogue and communication in developing cognition.

The drill and practice approach of behaviourism makes the role of the teacher redundant, while the constructivist approach reinstates learning by discovery, where the role of the teacher is that of a facilitator, someone who works in a supervisory capacity. You can see this difference from the figure given below.

| Theory             | Behaviourist                                                       | Constructivist                                                 |
|--------------------|--------------------------------------------------------------------|----------------------------------------------------------------|
| Activities         | Drill and Practice<br>Tutorials                                    | Independent learning,<br>experiential learning,<br>programming |
| Learning Processes | Individual<br>instructional and<br>feedback, drill and<br>practice | Generalisable skills<br>based on individual<br>discovery       |

**Fig.2: Difference between Behaviourist and Constructivist approach**

## Implications for the design process of course materials

The curriculum of distance education should provide experiential learning situations for the adult learners and the organisation of the content should encourage the learners to realise the consequences of their experiences. The process of designing distance teaching materials should be consistent with constructivist theory. The course materials should be developed for use in a constructivist learning environment. The course materials should evolve through a process of construction of knowledge, reflection and social interactions. The five conditions for creating constructivist learning environments can be applied to the process of designing self-learning materials. The five conditions are:

1. Embrace the complexity of the *design* process.
2. Provide for *social negotiations* as an integral part of designing.
3. Examine information *relevant* to the design of the instruction at multiple times from *multiple perspectives*.
4. Nurture *flexibility* in the design process.
5. Emphasise *learner-centered design*.

### 1.2.5 Basic conditions of learning

External conditions responsible for learning are very important in various types of learning. A brief description of the basic conditions of learning is given below :

**i) Contiguity :** One of the basic conditions of learning is contiguity – the almost simultaneous occurrence of the stimuli and of the responses to them. In teaching, we are always interested in making the students make connections between a particular stimulus and responses to it.

**ii) Practice:** Practice is the repetition of a response in the presence of the stimulus. We usually need to practice, or repeat S-R (Stimulus-Response) associations to retain them for relatively longer periods of time. For new stimuli and new responses, more practice is required. In all types of learning under S-R situations (e.g. classical conditioning, operant conditioning, skills learning) practice is of crucial importance. But it is of minor importance in learning concepts or principles and in problem solving, if the other conditions of learning, such as reinforcement, are provided appropriately.

**iii) Reinforcement :** Reinforcement is a major condition required for learning to take place. Because of the complexity of the concept of 'reinforcement' and because of its importance, we shall here explain it in detail. We can use reinforcement in different ways to produce different effects, i.e. the effect of different types of learning in the students. In the process of reinforcement, an organism/learner is presented with a particular stimulus (i.e. reinforcer) before and after it elicits desired responses. In a given situation, the organism will tend to repeat the responses for which

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reinforcement is given and to discontinue responses for which it is not. We can distinguish a reinforcer from other stimuli because it has a particular effect on behaviour.

**Feedback** is providing the knowledge that the responses are correct or that they require amendment, also functions as reinforcement in strengthening the responses to be learned. The term 'feedback' refers to any information that permits learners to judge the quality of their performance. There are various ways in which feedback may be provided. They are immediate or delayed or end-of-session feedback. The importance of supplying feedback has led to several technological innovations, including programmed instruction and computer assisted instruction. Learning efficiency often increases when the student receives feedback about the quality of his/her work. The teacher, whether in the classroom or in a distance learning situation, needs to make systematic plans to provide feedback before moving on to new learning materials. Available evidence indicates that active response with direct feedback is superior to passive response with indirect feedback.

A very weak reinforcement may be sufficient for controlling one's behaviour effectively if it is wisely used. We cannot say that a particular activity or event is in fact a reinforcement until we have evidence that it has strengthened the behaviour of the individual concerned.

**iv) Generalisation and discrimination:** Both generalisation and discrimination are perhaps better defined as phenomena rather than as conditions of learning. We call them learning conditions because they are so closely associated with the basic conditions of contiguity, practice and reinforcement which are essential to all learning. A complex learning behaviour can be described in terms of stimulus, generalisation and discrimination.

In many situations, we observe that a child, when confronted with a new stimulus, makes a response previously learnt to respond to a similar type of stimulus. We call this behaviour 'generalisation' (or stimulus generalisation). When a child is taught to call a particular colour 'red', it also learns to call other similar hues 'red'.

Under conditions where discrimination takes place effectively, the individual makes different responses to two or more stimuli. A child, for example, can learn to select the colour red and not pink. The extent to which it learns to pick up red and ignore pink, is the extent to which it has learned to discriminate.

### 1.2.6 Approaches to learning (Deep and Surface)

In sub-section 1.2.1 we have explained the term 'learning' as a relatively permanent change in human behaviour and it is the result of reinforced practice through the process by which stimulus and response bonds are



established. There is a quantitative increase in knowledge, acquiring, memorising and reproducing the facts, making sense of the abstract concepts, interpreting and understanding the reality in a different way due to learning.

In this sub-section we will focus on different approaches to learning and we would explain whether there is an internal relationship between the approaches that students adopt to their learning and the outcome of that learning. A course developer should be aware of the approaches to learning while designing and developing self-learning materials. It helps her/him to identify whether materials require memorisation or understanding or intended to develop skills and then to work with the materials appropriately. These approaches to learning are described as *deep and surface*.

A learner who adopts a *deep approach*

- is interested in the academic task and derives enjoyment from carrying it out;
- searches for the meaning inherent in the task (for example, if a prose passage is read, the intention of the author is sought);
- personalises the task, making it meaningful to his/her experience and to the real world;
- integrates aspects or parts of the task into a whole (for example, relates evidence to a conclusion), sees relationships between this whole and previous knowledge; and
- tries to understand the theories of the task; forms hypotheses. In other words if learners want to grow in understanding they will adopt a deep level strategy.

And a learner who adopts a *surface approach*

- observes the task as a demand to be met, or as a necessary imposition if some other goal is to be reached (a qualification for instance);
- sees the different aspects or parts of the task as unrelated to other tasks;
- considers the time required to complete the task without searching for the meaning inherent in the task;
- relies on memorisation, tries to reproduce the surface aspects of the task. In other words, if a learner wants to display symptoms of having learned something, s/he will adopt a surface level approach.

The specific forms of approaches in the specific learning tasks and content domain are researched by distance education practitioners. A large number of studies have been carried out in which approaches to learning and the outcomes of learning have been described. *Marton and Booth (1996)* observed that the students adopted approaches to the tasks they undertook according to their experience of those specific occasions. The outcomes of those tasks were associated with the approaches adopted there, specific to that situation. Some studies have indicated that individual students do indeed adopt different approaches to particular tasks. Other researchers,

however, have found it reasonable to make the assumption that individuals have a predominant approach when tackling the tasks of learning, and they have tried to determine the extent to which they adopt such an approach to their studies in general. *Ramsden and Entwistle* (1983) developed questionnaires and interview questions to study how students approach learning. Sample items for such measurement are shown below in the box:

### Deep Approach

- "I generally put a lot of effort into trying to understand things which initially seem difficult".
- "I often find myself questioning things I read in books".
- "I usually set out to understand thoroughly the meaning of what I am asked to read".

### Surface Approach

- "I find I have to concentrate on memorizing a good deal of what I have to learn".
- "The best way for me to understand what technical terms mean is to remember the text book definitions".
- "Often I find I have read things without having a chance to really understand them".

A systematic relationship was found between the attributes and approaches adopted, for example, the perception of heavy work loads, poor presentation, lack of choice of content and method, and examinations that demanded reproduction. On the other hand, the perception of good teaching and good presentation and freedom to choose what and how to study, are all related to deep approaches to learning.

The features of learning that are typically associated with deep and surface approaches were used by *Biggs* (1994) in developing questionnaires to identify how students approach their study i.e., learning process questionnaire and study process questionnaire. These were used mainly in Australia and Southeast Asia.

*Kember* (1996) has stated that deep learners begin with an intention to understand and maintain a vigorous interaction with content, whereas the surface learner's main intention is to complete the task requirements, which are regarded as external impositions. The implication is that deep learning is somehow better than surface learning because 'understanding' is achieved.

*Lyall and McNamara* (2000) had conducted a study on a population of 137 enrolled students, who has been studying through distance education at tertiary level for at least one year. These learners stated deep learning as understanding and considered this as the better way of learning, since they would be able to retain the knowledge for longer, thus forming a more

substantial base on which to build further learning. This building-up of knowledge was considered to be a very important learning strategy.

The results of this study emphasise the importance of understanding the approaches to learning while designing materials, because the distance learners have a general desire to adopt 'deep learning' approach, but their circumstances often lead to resort to surface learning approach. These circumstances are usually external, such as work commitments, family responsibilities, limitations of study space and isolation from the institution.

In this section we have discussed in detail the concept of learning. From the analysis of the pedagogical structure of distance education, and principles of andragogy, we can infer that learning is a 'central basic function of human life' and the distance learners are very pragmatic about their studies and tend to use the more flexible 'strategic' approach to learning. Learning in adulthood becomes constructivist in approach when high flexibility of the learning and teaching strategies are aimed at bringing about quick changes in content and media. The nature of these strategies is of paramount importance in the design of learning materials and the development of a suitable distance teaching paradigm, particularly if new technology is to be used for delivery.

### Check Your Progress 1

What is the basic difference between behaviourism and cognitivism? Write in ten lines.

**Note :** a) Write your answer in the space given below.

b) Compare your answer with the one given at the end of this unit.

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## 1.3 THEORIES OF LEARNING: BEHAVIOURISM

Views on learning are based on different philosophical and psychological ideas about human nature and how it learns. Educators work on the basis of various theories of learning. The prominent learning theories we intend to

discuss in sections 1.3 and 1.4 are: behaviourism, cognitivism and the possible synthesis of the two in section 1.5.

### 1.3.1 Behaviourist views

Behaviourism is among the most dominant of modern theories of learning. The behaviourist view is quite comprehensive and includes a variety of thoughts, but all these thoughts suggest a common approach to learning in terms of the development of connections between stimuli received and responses displayed by organisms/learners.

After conducting laboratory experiments with animals, behaviourists concluded that learning is a process by which stimulus and response bonds are established when a successful response immediately and frequently follows a stimulus. They assumed that people are similar to machines, and considered irrelevant any reference to the role of the mind. Most of the basic behavioural research has been conducted on animals. The applications of these research studies, however relate to a wide range of human behaviours. In this context, we can summarize the major principles of the theories to key behaviourists such as Thorndike, Pavlov and Skinner. These theories have most influence upon the development of a theory of design. According to behavioural theories, learning is viewed as the ability to perform new behaviours which are established as goals. There is an effort to create conditions which will enable the learners to demonstrate these behaviours.

The early behaviourist, Edward L. Thorndike has put forward three main laws of learning: The law of effect, the law of readiness and the law of exercise. The law of effect stresses the importance of the effect of a stimulus-response (S-R). Satisfying results reinforce the response while inadequate results weaken it. Reward and punishment are, therefore, important ingredients of learning. The law of readiness indicates the learner's willingness to make (S-R) connection while the law of exercise is related to the strengthening of the connection through practice.

The mechanistic outlook of learning has been developed by a later generation of behaviourists. They suggest that learning something is a process similar to habit formation through conditioning which links desired responses to stimuli. A prominent theorist among them is B.F. Skinner who propagated the concept of *operant conditioning*. His idea will be discussed in sub-section 1.3.3 of this unit.

### 1.3.2 Educational implications

The behaviourist approach to learning has greatly influenced modern educational practices. Behaviourists have conceived of *teaching* as a manipulation of the environment in order to produce desired behavioural changes in learners and thus make education more effective. They suggest

the adoption of the following three principles towards making a teaching-learning transaction yield desirable results.

- knowledge of results and use of positive reinforcement,
- minimum delay in reinforcement, and
- elaboration of complex behaviour by dividing learning into a series of small steps.

One of the major contributions of behaviourists to education is their emphasis on *defining objectives in behavioural terms*. They have stressed the need for stating objectives in the form of *overt behaviour* which can be observed and measured. The role of teachers becomes very crucial in deciding what changes of behaviour the learners should display when they learn, and in teaching in such a way that learners can attain those behavioural changes.

Behaviourist principles have also influenced contemporary approaches to evaluation. For instance, Bloom has suggested a model of 'taxonomy of educational objectives' based on the hierarchy of learning objectives: This will be discussed in section 1.6 of this unit.

Another example of the educational uses to which a behaviourist approach can be put, is individualising instruction such as a personalised system of instruction based on reinforcement theory that has been widely used in education.

### 1.3.3 Skinner's theory of operant conditioning

*Skinner* (1958) propagated a theory related to stimulus-response relationship and reinforcement. In his view, learning is a change in behaviour. As the learner learns, his/her responses in terms of changed behaviour increase. Learning is, therefore, formally defined by him as a change in the likelihood or probability of a response.

**Operant conditioning** is a learning force which effects the desired response more frequently by providing a reinforcing stimulus immediately following the response. The most important principle of this type of learning is that behaviour changes according to its immediate 'consequences'. Pleasurable consequences strengthen behaviour while unpleasant consequences weaken it. For example, in Skinner's famous experiment, a pigeon pecks the red ball and gets food. Because of food (reinforcement), the pigeon is likely to peck the same ball again and again.

In *operant conditioning*, learning activities are divided into many small steps/tasks and reinforced one by one. The operant—the response/behaviour or act — is strengthened so as to increase the probability of its recurrence in the future. Three external conditions — reinforcement, contiguity and practice — must be provided to promote or to effect operant conditioning.

## Reinforcement

The most important aspect of Skinner's theory of learning relates to the role of reinforcement. An organism/learner is presented with a particular stimulus – a reinforcer – after it makes a response. In a given situation, the organism/learner will tend to repeat responses for which it is reinforced.

Skinner made a distinction between positive and negative reinforcements. Positive reinforcement is a stimulus which increases the probability of desired responses. Usually, it is a positive reward. Praise, smiles, or a prize, are examples of positive reinforcement. In negative reinforcement, the desired behaviour is more likely to occur if such stimulus/reinforcement is removed. For example, we can close windows and doors to avoid hearing loud noises or we can avoid wrong answers by giving right answers. Here noise and wrong answers are negative reinforcers. Thus a negative reinforcer is a negative reward – the avoidance of which gives us relief from an unpleasant state of affairs. Skinner did not equate negative reinforcement with punishment.

## Educational implications

The basic implication of *operant conditioning* for instructional activities is their dependence on observable behaviour. For Skinner, reinforcement facilitates learning. Further, he thinks that the most effective control on human learning requires instrumental aids. Broadly, Skinner's theory has made the following contributions to the practice of education:

**a) Teaching Machines:** Teaching machines, in the sense of systematic approaches to teaching with the help of machines, deserve attention as they have strongly influenced distance education both in theory and in practice. In this method, machines present the individual learners with a series of questions to be answered, problems to be solved, or exercises to be done. In addition, they provide automatic feedback to the learners. Teaching through machines and electronic gadgets encourages learners to take an 'active' part in the instructional process. The use of mechanical teaching devices has the following advantages:

- i) Right answers are immediately reinforced. Machines encourage and sometimes even compel the learner to come up with the right answers.
- ii) Mere manipulation of the machines will probably provide enough reinforcement to keep an average student at study for a suitable period each day.
- iii) Any learner who is forced to leave the activity of learning for a certain period can return at any time and continue from where he/she left off.
- iv) Each student can proceed with his/her learning on an individual basis at his/her own pace.

- v) The teacher is forced to arrange and design the content carefully in a hierarchical order.
- vi) There is constant interaction between the teaching material and the learner, thus sustaining the learning process.
- vii) After evaluating the progress of the learner, the teacher can supply necessary supplementary reinforcement. Thus, machines make it compulsory that any given material be thoroughly understood before the student moves on to the next set of materials.

**b) Programmed Instruction:** Programmed instruction is a self-learning system in which the subject matter is broken up into small bits and presented in logical sequences. Each step builds deliberately upon the preceding one. A learner progresses through the sequence of steps at his/her own pace. Each step presents some new information about the theme that is being taught through the programme. At the end of each step there is a question to be answered by the learner. After the question is answered, the learner is expected to check his/her answer with the correct answer supplied in the programme. This correct answer functions as a reinforcing stimulus. Thus, the process of reinforcement is an inbuilt feature of programmed materials.

Let us sum up Skinner's theory of operant conditioning in the following table :

**Table 1 : Summary of Skinner's theory of operant conditioning**

| Sl.No | Basic Element                        | Explanation                                                                                                                                                                                                                                                                                                                                                                        |
|-------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.    | Assumption                           | Behavioural change is a function of external environmental conditions and events                                                                                                                                                                                                                                                                                                   |
| 2.    | Learning                             | Change in behaviour represented by a visible response                                                                                                                                                                                                                                                                                                                              |
| 3.    | Learning outcomes                    | New responses/behaviour                                                                                                                                                                                                                                                                                                                                                            |
| 4.    | Components of learning               | Stimulus (discrimination)-<br>Response-Stimulus<br>(reinforcement)                                                                                                                                                                                                                                                                                                                 |
| 5.    | Applications to educational practice | <ul style="list-style-type: none"> <li>– Analysis of readiness and motivation</li> <li>– Individual learning materials</li> <li>– Teaching machines</li> <li>– Analysis of aversive classroom practices and interactive classroom situations</li> <li>– Scheduling reinforcement</li> <li>– Transfer of response-stimulus relationship to the solution of new problems.</li> </ul> |

### Check Your Progress 2

State how behaviourist principles operate in teaching machines.

**Note :** a) Write your answer in the space given below.  
b) Compare your answer with the one given at the end of this unit.

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## 1.4 THEORIES OF LEARNING: COGNITIVE APPROACH

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The cognitive approach deals mainly with the psychological aspects of human behaviour. We have discussed this approach in detail along with its application to educational practices in the following sub-sections.

### 1.4.1 Cognitive approach

‘Cognitive approach’ has taken an important place in the psychology of learning over the last few decades, and has posed a challenge to behaviourism. It has put back on the agenda the nature of the complex mental process of a learner. While conducting experimental investigation, cognitivism takes into consideration activities such as perception, concept formation, language use, thinking, understanding, problem solving, attention and memory.

Thus, the cognitive approach is concerned with the individual’s inner psychological functioning, and it strongly contends the behaviourist’s emphasis on overt behaviour.

Cognitive theorists have made investigations to show that people learn by perceiving, comprehending and conceptualising problems. The comprehension of concepts and rules is transferable to the solution of new problems or from one situation to another. The cognitivists in arguing that people grasp things as a whole, are, therefore opposing the behaviourist approach to teaching which employs drills to memorise the information.

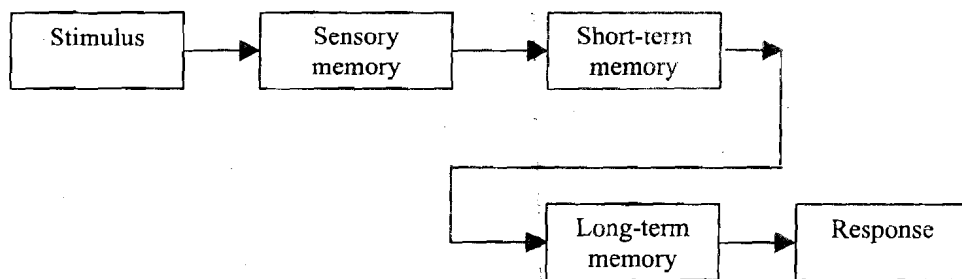
Cognitivists believe that learning is a question both of insight formation and of successful problem solving, and not a mechanical sequence of stimuli and



responses. And so, teaching, according to them, should encourage understanding based on problem solving and insight formation.

### Information processing

The contemporary cognitivists equate human mental activities with the process that goes on in a 'computer' in operation. They conceptualise human beings as information processing systems. The following discussion explains the process of information system and the three different types of memories, each of which serves a different function in the total process. The three different types of memories are : (i) the sensory memory, (ii) short-term memory and (iii) the long-term memory. The sensory memory receives information into the system either visually or in an auditory form. This type of memory refers to the active mental process by which knowledge is coded or represented. The short-term memory refers to the process by which knowledge is organised, stored and accessed. The long-term memory refers to the mental process by which the information is integrated with previously stored information in short-term memory. When an average person speaks of something being learned, the implication is that the knowledge has been put into long-term memory. One of the most important aspects of long-term memory is that it can be consciously controlled. Information processing is a psychological activity consisting of information being received by the senses and information items being selected and passed on to short-memory where encoding processes transfer them to the long-term memory. Long-term memory provides a store from where information can be retrieved in order to make a response. This process maybe represented diagrammatically as follows :



**Fig. 3: An Information Processing Model**

There are a number of elements which are central to a cognitive theory of learning. To begin with, the individual is seen as having an active relationship with the environment. S/he has intentions and goals, and thinks of alternative strategies to achieve these goals. Thinking is essentially a purposive activity. Learning is, therefore, an intelligent and active process. Within this process, issues of perception are very important because perceptual activity is the first relationship between a person and his/her environment or situation. The individual interacts with the situation and this interaction leads to relativity in perception as he/she organises the stimulus into meaningful patterns. Thus an individual acquires knowledge through

his/her interaction with the environment and stores this knowledge for use in new situations.

### **Learning as a cognitive process**

For cognitivists, learning is a cognitive process. In the process of learning, certain changes take place in the cognitive structure of the learner, and these changes help him/her develop an understanding of the concept that is being learnt or taught. Thus, learning goals are not achieved simply by performing activities but by grasping the meaning of things in a way that can be transferred to the solution of new problems.

### **Feedback**

One of the important elements of cognitive approach is the notion of 'feedback'. The learning situation is seen as one in which an individual confronts a problem, develops a hypothesis based on the knowledge already present in his/her memory and then tries it out. The consequences of his/her action then provide him/her with the required feedback so that the correct solutions are confirmed and the incorrect ones rejected.

## **1.4.2 Educational implications**

What is the contribution of this school of thought to educational practices? Cognitive psychologists have investigated complex mental behaviours in a scientific way. And their views are becoming increasingly important in their application to education and instruction. The major emphasis of this approach is on how to design educational activities in order to promote cognitive learning. We describe below the major educational implications of this approach.

- i) The most important aspect of the cognitive approach to education relates to promoting retention of knowledge acquired through learning. The ability to retain knowledge depends on how well it is understood. 'Understanding' can help us conceptually locate the information we store in our memory and create new cognitive structures to efficiently use our long-term memory in new situations as well.
- ii) Teaching materials should be planned on the basis of the theory of discovery. Instructional methods should, therefore, emphasize the learners' competence for spontaneous discovery, which implies that active learning methods should be adopted to motivate the learner to rediscover the facts or to find solutions to the problems.
- iii) This approach emphasises appropriate decisions regarding the instructional objectives, the analysis of prerequisite behaviour, and the teaching methods.

- iv) Such an approach also stresses problem-oriented learning. By raising problems and then solving them, it tells us how to teach in a reflective way.
- v) Lastly, it emphasises the study of learner characteristics which can be used by the teacher to expand the quality and quantity of the student's insights.

### Check Your Progress 3

- Identify three important educational implications of the cognitive approach to learning.
- Point out at least two similarities between cognitivism and behaviourism regarding the conditions of learning.

**Note :** a) Write your answer in the space given below.

b) Compare your answer with the one given at the end of this unit.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins or other markings visible.

### 1.4.3 Bruner's discovery learning

**Jerome S. Bruner (1966)** is a proponent of cognitive learning and a developmental psychologist who is primarily interested in the development of mental abilities. His approach to psychology is eclectic (i.e. he selects the best or the most useful features from the various conflicting theories available). He looks at human beings as information processors, thinkers and creators, and treats the learner as a reactive organism who actively selects, structures, retains and transforms learning/information to achieve certain goals.

## Factors in the Design of Print Materials

Bruner suggests that people have primary needs, other than animal drives. One of these might be called 'curiosity' which keeps an organism active even in the absence of organic states of tension. So our cognitive activity is not always dominated only by the need for such things as food or sex. Accordingly, Bruner thinks of learning as a goal directed activity which satisfies this drive, and answers the curiosity of the learner.

## Learning as a cognitive process

Bruner describes the learner as a problem solver, i.e. one who interacts with his/her environment to test hypotheses and to develop generalisations. The goal of education, according to Bruner, should be cognitive development, and the content of learning should foster the development of problem solving skills through the processes of inquiry and discovery.

In Bruner's view, the *cognitive process* encloses three almost simultaneous processes:

- Acquisition of new knowledge/information
- Transformation of acquired knowledge
- Checking the adequacy of the new knowledge.

The *modes* of cognitive development are described by Bruner in terms of three hierarchical levels/modes.

The first mode is called '*enactive*'. It is the representation of knowledge through actions. For example, a child who enactively knows how to ride a bicycle may not be able to describe the procedure. The second mode is '*iconic*'. It is based upon internal imagery. Knowledge is represented by a set of images/graphics/drawings that stand for a concept but do not fully define it. For example, drawing can represent the 'triangle' diagrammatically, without explaining the concept of 'triangularity'. The third and the most advanced mode is that of '*symbolic* representation'. It is the use of words and other symbols to describe a concept or an experience. Symbolic representation is based upon an abstract, arbitrary and more flexible system of thought. At this stage, language becomes more important as a medium of both of the reception and the expression of ideas. For example, at this stage the child can explain the concept of 'triangularity' or the concept behind the operation of a bicycle.

## Autonomous learning

Bruner advocates autonomy in learning. He suggests that when the learner is allowed to approach learning as an act of discovery, s/he will increasingly engage him/herself in learning, with the autonomy of self-reward. In other words, the learner provides for his/her own stimulation and in this way arouses his or her own curiosity.

The studies of Bruner and his associates indicate that learners can be taught to generate their own instructional method and strategy for learning. A

learner learns to study independently and acquires skills to establish his/her own standard in the same way that any scientist/author/researcher does. In this way, the feedback needed from the teacher is at a minimum. Bruner argues that the teacher's role here must be to create an environment in which learners can learn on their own without the help of any pre-packaged information. He suggests that learners should also learn through their active involvement with content. His work was thus influential in the open school movement and other humanistic approaches to learning. The most important goal of education, Bruner feels, is to teach learners how to value learning for its own sake, enabling them to acquire on their own the knowledge they need.

According to Bruner, learning should be flexible and exploratory. Institutions should arouse learners' curiosity, minimise the risk of failure and make the activities relevant to them.

### **Bruner's theory of instruction**

Bruner defines learning as a process in which a learner achieves instructional objectives with little or no help from the teacher. He emphasises 'the training of students in the use of mind' with confidence, energy and honesty. Thus, a theory of instruction should take into account:

- a) the ways of structuring knowledge,
- b) the presentation sequence,
- c) the motivating experience, and
- d) the nature of pacing of rewards and punishment.

In his theory of instruction, Bruner puts forth his original ideas concerning the most effective way of achieving knowledge and skills. For him, a theory of instruction should cover the following major aspects:

- i) The emphasis should be placed upon the learners' skills in handling things, and in perceiving and grasping the subject. The learner's approach to learning should be such that s/he should be able to use the acquired knowledge in solving problems.
- ii) The subject matter should be presented enactively, iconically and symbolically so that learners can acquire optimal comprehension and a generalised set of basic ideas or principles.
- iii) Bruner recognises the role of extrinsic and intrinsic rewards in promoting learning, but he thinks that intrinsic rewards are more important. He sees intrinsic rewards in the form of the satisfaction gained from solving problems quickly, the interest and involvement in learning, the pleasure received from the intellectual mastery of it, etc.
- iv) Discovery learning increases motivation and strengthens the learner's tendency to carry out his/her learning activities with the autonomy that goes along with self-reward. Discovery learning teaches the learner the techniques of problem solving and results in a

## Factors in the Design of Print Materials

better retention of what is learned because the learner acquires the knowledge through his/her own efforts.

- v) Intellectual honesty, i.e. willingness to check and correct one's ideas and notions, or one's adopted solutions to problems, should be cultivated.

In section 1.3 and 1.4, we have discussed in detail the behaviourist and cognitivist approaches to learning and their educational implications.

Let us compare behaviourism and cognitivism through a schematic representation of both approaches to learning.

**Table 2 : Behaviourist and cognitive approaches to learning : A Comparison**

| Elements            | Behaviourist Approach                                                                                                                                                                                                            | Cognitive Approach                                                                                                                 |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Basic Premise       | Learning is a function of environmental conditions, stimuli and responses, stimulus substitution, i.e. an existing response becomes associated with new stimuli. Concentrates on observed response and ignores mental processes. | Learning involves a perceptual reorganisation. Learning is related to insights. Emphasises information processing and human memory |
| Learning Formula    | Stimulus-Response-Reinforcement                                                                                                                                                                                                  | Stimulus-Cognitive Processes                                                                                                       |
| Process of Learning | Relationship between stimulus and response.                                                                                                                                                                                      | Learning as insight                                                                                                                |
| Entry Behaviour     | Entry behaviour determines the starting point from which complex behaviour can be conditioned.                                                                                                                                   | Previous knowledge is used as a base from which a learner can develop his/her own new cognitive structure.                         |
| Motivation          | Organic drives such as hunger, fear, anger, love, etc.                                                                                                                                                                           | Goal, curiosity and expectation                                                                                                    |
| Major Contribution  | Analysis of readiness and motivation. Transfer of stimulus control scheduling. Reinforcement analysis of aversive classroom practice. Individualised learning materials.                                                         | Linking new learning to cognitive structure. Providing aids in comprehension. Problem solving and long term memory                 |

**Check Your Progress 4**

Give at least three components pertaining to theory of instruction proposed by Bruner.

**Note :** a) Write your answer in the space given below.

b) Compare your answer with the one given at the end of this unit.

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## **1.5 SYNTHESIS OF THE BEHAVIOURIST AND THE COGNITIVE APPROACHES**

The behaviourist concentrates on the external stimulus and conditions provided by the environment for learning or bringing about changes in behaviour. Cognitive theories, on the other hand, stress the internal conditions of learning, viz. perceptual reorganisation, insight, information processing and memory. But in reality, learning depends on both external and internal conditions. To make this point clear we present below the views of Robert M. Gagné whose approach is said to be a synthesis of cognitivism and behaviourism.

### **1.5.1 Gagné's views on learning**

Robert M. Gagné is a prominent educational psychologist whose ideas on the 'conditions of learning' are generally employed in every teaching-learning process. He identifies the factors which account for the complex nature of human learning and his point of view is often used to underpin the mechanistic instructional technology that is associated with behaviour modification and 'performance or competency based education'.

Gagné (1984) has described learning as a change in the behaviour of an individual that is retained and that makes possible a corresponding change in his or her behaviour in a particular situation. According to him, learning is a process that takes place inside an individual's brain (comparable to organic processes such as digestion and respiration). The most important

aspects of a learner are 'his senses, his central nervous system, and his muscles'.

Gagné combined a basic behaviourist position with elements of cognitive thought and built an hierarchical model of the different types of learning. He thus shows the way in which a unifying theory may be able to explain how different kinds of learning relate to each other. He synthesized the existing theories of learning and tried to provide a consistent explanation for all types of learning with the help of a set of psychological principles of learning. For example, learners learn best when information is presented in logical sequences consisting of short units with a clear framework.

### Conditions of learning

Gagné identifies *eight conditions* of learning, or learning types or varieties of learning, beginning with the simple ones and ending with the complex ones. Although Gagne refers to these conditions as learning types, he is primarily interested in the observable behaviour and performance which are the products of these conditions. In these conditions of learning he combined the basic behaviourist view with cognitive theory to present a hierarchical model of different types of learning. Here, we shall give a brief description of the types of learning Gagné talks about.

| Type                          | Brief Description                                                                                                                                                              |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1) Signal learning            | The individual acquires a conditioned response to a given signal, the learning is involuntary.                                                                                 |
| 2) Stimulus-response learning | The individual makes responses to specific stimuli; the correct response is rewarded.                                                                                          |
| 3) Chaining                   | Two or more previously learned stimulus-response connections are linked together.                                                                                              |
| 4) Verbal association         | Chains that are verbal, e.g. a child identifies an object and calls it by its proper name (e.g. 'the red ball'), or it finds a Hindi or French equivalent for an English word. |
| 5) Multiple discrimination    | The learner learns to distinguish between motor and verbal chains which s/he has already acquired.                                                                             |
| 6) Concept learning           | A common response to a class of stimuli; in learning a concept the learner responds to stimuli by identifying its abstract characteristics like shape, colour, etc.            |
| 7) Rule learning              | In learning a rule we relate two or more concepts. For example: 'at                                                                                                            |



## 8) Problem solving

100°C water will boil'. Here temperature and boiling-point are two concepts related by a rule. The learner uses the rules learned to achieve some goals; problem solving is the combined product of two or more lower-order rules; it thus requires an internal event i.e., thinking to take place for solving a problem. For example, a learner is posed with a problem to prove that air has pressure. For solving this problem s/he has to learn a few lower-order rules such as (i) air can support a column of water (experiment with the help of a tumbler, a piece of card board and water), (ii) the weight of air is approximately 15pound per square inch on every surface in every direction, (iii) air pushes upwards as well as downwards.

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**Phases of learning**

Gagné has identified *nine* stages of cognitive processing that are essential to learning and which need to be executed in a sequential order. These stages are: 1) gaining attention; 2) informing the learner of the objectives; 3) stimulating recall of prerequisite learning; 4) presenting the stimulus material; 5) providing learning guidance; 6) eliciting the performance; 7) providing feedback about performance correctness; 8) assessing the performance; 9) enhancing retention and transfer. By sequencing instruction in this way, one creates external conditions which complement the internal condition. These phases of learning are the typical series of external and internal events that constitute a single learning act. The internal conditions of learning include two factors— the learner's psychological state and the cognitive processes required for learning. The internal processes may be influenced by external events in the form of environmental stimulation.

The importance of these phases is that they are present in every act of learning and are performed in different ways for different varieties of learning. They are:

- i) preparation for learning,
- ii) acquisition and performance, and
- iii) transfer of learning.

Preparation for learning initiates the individual into the learning task, while acquisition and performance refer to the assimilation of the new knowledge

or of the capability. Depending on the complexity of the skill to be learned, these phases may require anything from one to several sessions. Finally, transfer of learning may take place sometime after the acquisition of the new skill. A brief account of the categories is given below:

| <b>Category</b>            | <b>Phases and their Functions</b>                                                                                                                                                                                                                                                                            |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Preparation for learning   | Drawing learners' attention to the stimulus. Informing the learners of learning goals/objectives. Providing recall of prerequisite behaviour/learning.                                                                                                                                                       |
| Acquisition of performance | Presenting stimulus materials: Permitting temporary storage of stimulus features in working memory. Transferring stimulus features and related information to long-term memory. Retrieving stored information. Activating response. Providing information and feedback about the correctness of performance. |
| Transfer of learning       | Providing additional cues for later recall of capability and assessment of performance (cueing retrieval or serve as a signal for getting back the information). Enhancing retention and transfer of learning to new situations/contexts (Generalisation).                                                   |

### **The Gagné's model of instruction**

The foundation of Gagné's model relates to his conception of the organization of knowledge in terms of outcomes of learning. This structure concentrates on general classification of learning tasks, thus relating to all content areas. This model includes five types/varieties of learning. Gagné identifies five types or varieties of learning. They are: verbal information skill, intellectual skill, motor skill, cognitive strategies, and attitudes. Each type of learning is acquired in different ways, i.e. each requires a different set of prerequisite skills and a different set of cognitive-processes (i.e. internal conditions of learning). Gagné accepts that environmental stimuli (i.e. external conditions of learning) are required to support the learner's cognitive processes during learning. Thus, human learning is the result of interaction between the learner's internal variables (states and cognitive processes) and the external (events of instruction/ stimulus) ones. In other words, Gagné attempts to synthesise the basic principles of cognitivism and behaviourism. The varieties of learning identified by Gagné are summarised below:

Verbal information skill provides the ability to state or to recall information (facts, definitions, labels, etc). This has to be developed to meet the needs of any particular subject matter.

### **Intellectual skill**

Intellectual skills are the most important ones, involving mental operations. They include conceptualisation of the environment, differentiating things from each other, understanding concepts, seeing relationships between things. Reading, writing, and handling of numbers are the other abilities which come under this variety of skill. These abilities range from the simple to the complex.

### **Motor skill**

Motor skills are physical skills. These include the ability to perform a sequence of physical movements.

### **Cognitive strategies**

Cognitive strategies refer to the learner's thinking, remembering and learning—the procedures we use for ordering and processing information internally. They are learned over long periods of time.

### **Attitudes**

Attitudes are deep-rooted in us and we find it difficult to change them. They determine our predisposition towards positive or negative responses to an object. Our attitudes strongly affect our motivation for learning.

## **1.5.2 Educational implications of Gagné's theory of learning**

We present here three broad educational implications of Gagné's theory of learning.

**i) Prerequisite behaviour:** Gagné advocated that processes of learning move from the simple to the complex. The learner has to develop prerequisite capabilities before s/he acquires new terminal behaviour. Thus the use of an hierarchy of learning and task analysis are integral parts of instructional transactions.

**ii) Learners' characteristics:** Learners' individual differences, readiness and motivation to learn are the important issues to be considered before designing instructional activities.

**iii) Cognitive process and instruction:** The transfer of learning, the self-management skills of the learner, and teaching learners the skills of problem solving are integral parts of the internal conditions of learning, applicable to

instruction. The skill of learning 'how to learn' should be developed in the learner and the emphasis should be on the learner's individuality.

**Check Your Progress 5**

Point out at least four cognitivist and two behaviourist elements in Gagné's synthesis of the two approaches to learning.

**Note:** a) Write your answer in the space given below.

b) Compare your answer with the one given at the end of the unit.

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## 1.6 THE TAXONOMY OF LEARNING OUTCOMES

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The desirable outcome of learning experiences — the way individuals are to act, think or feel as a result of participating in some instructional activities — can be classified into three domains, viz. *Cognitive*, *Affective* and *Psychomotor*. Bloom and his associates classified educational behaviour from the simple to the complex, based on the level of learning and

developed a taxonomy of learning outcomes. We shall describe briefly all the three domains which include different types of learning outcomes. Each domain consists of a list of general objectives stated for a programme or a course. Each general objective has a pool of specific *learning outcomes/objective*. These specific learning objectives are stated in a unit in behavioural terms. These objectives clearly convey what a distance learner will be able to do after going through a unit. They are also known as instructional objectives or learning outcomes. Each objective begins with an *action verb* that indicates definite observable and measurable response (e.g., identifies, defines, recalls etc.). In the following discussion, you may note that with each general objective (viz., knowledge), we have provided a few instructional objectives (viz., names, defines, states etc.). For example, in a course of Diet and Nutrition, the general objective is to *know* the basic components of Diet, but the specific instructional objective should be *name* at least five principle components of a balanced diet or *define* the term balanced diet.

### 1.6.1 Cognitive domain

This domain includes learning objectives which deal with the 'recall' or 'recognition' of knowledge and the development of intellectual abilities and skills. This is known as the knowledge component of educational objectives (distance teaching is particularly effective in developing the cognitive domain of learners).

Given below are the six stages of cognitive learning:

**i) Knowledge:** Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range of learning material, from specific facts to complete theories. Knowledge represents the lowest level of learning outcomes in the cognitive domain. It is indicated by the repetition of responses that have been practiced through learning experiences. The specific learning outcomes are: names, defines, labels, states and selects.

**ii) Understanding:** It is defined as the ability to grasp the meaning of material. It is the behaviour which represents new responses in relation to and in addition to those previously practiced and learned. The specific learning outcomes are: interpretations, translations, summaries, analyses, detection of similarities and differences and comparisons etc.

**iii) Application:** It refers to the ability to use learned material in new and concrete situations. It is an act of putting theories, rules, methods, concepts, principles or laws to practical uses or new situations. The specific learning outcomes are: discovers, produces, relates, solves, uses and predicts.

**iv) Analysis:** It refers to the ability to break down material into its component parts so that its organisational structure may be understood. This may include the identification of the parts, finding out relationships

between parts, and explaining the organizational principles involved. The specific learning outcomes are: identifies, illustrates, sub-divides and differentiates.

**v) Synthesis:** Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication, a plan of operations (research proposal) etc. The specific learning outcomes are: categorises, combines, designs, rearranges, summarises, writes, and reconstructs.

**vi) Evaluation:** It is concerned with the value judgement of any statement, achievement of the learner and material. The judgements are to be based on definite criteria. Learning outcome in this area are the highest in the cognitive hierarchy because they contain elements of all of the other categories, plus value judgements based on clearly defined criteria. The specific learning outcomes are: appraises, compares, justifies, summarises and supports.

### 1.6.2 Affective domain

This is related to the attitudinal domain of educational objectives. Learning in the affective domain pertains to changes in interest, attitudes, values, and to the development of appreciation and adequate adjustment needed for effective learning. This is a higher level of learning, and it has a close relationship with cognitive and behavioural changes. This relationship is operative at the instructional as well as the evaluative level. Each form/instance of affective behaviour has a corresponding one of cognitive behaviour. In certain cases, promoting attitudinal changes may demand an element of face-to-face teaching in distance education. Therefore, in certain cases audio-visual media and face-to-face contact sessions are resorted to.

#### Stages of affective learning

**i) Reception:** It refers to the learner's willingness to attend to particular phenomena or stimuli (textbook, activities, etc). At this stage, the learner becomes sensitive to the existence of certain phenomena and stimuli. For example, he or she becomes willing to receive instruction in English. Such willingness is the first requisite for the successful learning of a foreign language. The specific learning outcomes are: chooses, describes, identifies, selects, replies and uses.

**ii) Responding:** It refers to the active participation on the part of the distance learner. The learner is sufficiently motivated to actively respond to the stimuli, for example, he or she becomes eager to participate in the cultural activities organised by other countries. Learning outcomes in this area may emphasise acquiescence in responding (a distance learner completes assignments, participates in teleconference and shows interest in the subject). The specific learning outcomes are discusses, performs, answers, presents and writes.

**iii) Valuing:** The behaviour of a learner shows that a situation/an object/ phenomenon, has value or worth for him/her. For example, a belief in the importance of civic responsibility in society. However, you may not fulfil such responsibilities in each and every situation when it comes to actual social practices but you internalise the set of specified values, and express simple acceptance or a commitment. The specific learning outcomes are: reports, completes, explains, justifies and studies.

**iv) Organisation:** This is essentially an advancement/ extension of state (iii), i.e. valuing stage. In this context we can infer that organisation is concerned with bringing together different values, resolving conflicts between them, and building an internally consistent value system. For example, preparing a vocational plan that satisfies the human need for both economic security and social service. The specific learning outcomes are: arranges, combines, modifies and prepares etc.

**v) Characterisation by a value or value complex:** At this level, the values which have a place in the individual's value hierarchy, are organised into some kind of internally consistent system. This system controls the behaviour of an individual. Thus, a set of values or the pattern of behaviour as a result of learning or repeated experience in society becomes a way of life or the character of an individual. Having reached this stage, the individual unlike the one we suggested in item (iii) above will fulfil the social responsibilities at all costs. The specific learning outcomes are: displays, listens, revises, solves, uses and verifies.

### 1.6.3 Psychomotor domain

This domain pertains to the manipulative or psychomotor skills of educational competency. Face-to-face teaching within the overall framework of distance teaching can ensure learning of this kind. For example, driving can be learnt more effectively under the direct supervision of an instructor, after the learner has attended to a television lesson on 'how to drive a car'.

Psychomotor learning has three characteristics:

**i) Response chains:** Learning of skills involves a chain of motor responses, i.e. the muscular movements in swimming or driving or writing.

**ii) Movement coordination:** Coordination of perception and motor skills is necessary here. For example, a child starts riding a bicycle by acquiring this coordination.

**iii) Response patterns:** Organisation of stimulus-response chains into large response patterns. For example, a child can ride a bicycle or motorcycle without making an error after he/she masters the skill in question.

## **Factors in the Design of Print Materials**

There are seven stages of psychomotor-learning. They are: perception, set, guided response, mechanism, complex overt response, adaptation and origination.

**1. Perception** is the process of becoming aware of objects, qualities or relations by way of sense organs. This level is concerned with the use of the sense organs to obtain cues that guide motor activity. The specific learning outcomes are: chooses, identifies, selects and relates etc.

**2. Set** is a preparatory adjustment of readiness for a particular kind of action. It refers to readiness to take a particular type of action. The specific learning outcomes are: begins, moves, reacts and volunteers etc.

**3. Guided response** is an early step in the development of skills. It is the overt behavioural act of a learner under the guidance of a counsellor or tutor. Readiness is a prerequisite for this kind of response. It includes imitation, and trial and error. The specific learning outcomes are: assembles, builds, sketches, manipulates and constructs etc.

**4. Mechanism** means that the learned response has become habitual. At this level, the learner has achieved a certain level of confidence and proficiency. The specific learning outcomes are: displays, measures, organises and builds etc.

**5. Complex overt response** is the skillful performance of motor activities that involve complex movement patterns. Proficiency is indicated by a quick and accurate performance requiring a minimum energy. The specific learning outcomes are: assembles, constructs, fixes, organises and manipulates etc.

**6. Adaptation** is concerned with skills that are so well developed that the learner can modify movement patterns to fit special requirements or to meet a problem situation. The specific learning outcomes are: adapts, rearranges, reorganises and revises etc.

**7. Origination** refers to the creating of new movement patterns to fit a particular situation or specific problem. The specific learning outcomes are: arranges, combines, designs and originates.



**Check Your Progress 6**

Imagine at least three different learning situations where the needs of the three domains of learning we have talked about should be met for successful learning.

- Note:** a) Write your answer in the space given below.  
 b) Compare your answer with the one given at the end of this unit.

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**1.7 LET US SUM UP**

We have discussed in brief some of the most influential approaches to learning, and touched upon their educational implications. We have presented the views of the behaviourist school, and the cognitivist school as well as the views of those who have attempted to synthesise or combine them. And we have also indicated the usefulness of an eclectic stand in this regard. Although there are many important theories in each school, we have not discussed all of them. Under the behaviourist school we have selected only B.F. Skinner for a specific illustration. Similarly, under the cognitive school we have chosen just one theorist, Bruner, as an example. Our own stand, as you must have noted, is eclectic. Behaviourism and cognitivism present two different approaches to learning, but we need not prefer one to the other. Gagné's synthesis of these two approaches shows that we may use those aspects of any approach to learning which can serve our purpose.

This eclectic position is particularly useful in the system of distance education system which tries to be most pragmatic in its approach to learning. The contributions of different approaches of learning belonging to different schools of thoughts and of individual educationists with different theoretical affiliations do meet the varied demands of the distance education system. This has been the primary consideration for discussing behaviourism, cognitivism, constructivism, the views of Gagne, Bruner and

Bloom's model for levels of learning, but we have not in this unit related them to distance learning as such. However, you will find a better and more specific understanding of the implications of these theories for distance education in unit 3 of this block.

### Check Your Progress: Possible Answers

- 1) Behaviourism views learning as the automatic response of an organism to stimuli or environment. Cognitivism, on the contrary, considers learning a mental activity—the functioning of the human brain which receives, processes and retrieves information. In other words, behaviourism treats human learning at par with biological or impulsive reactions of animals to their environment, whereas cognitivism emphasises the conscious elements of the human mind which selects the information it needs and decides whether or not to respond to a particular stimulus and in what way.
- 2) A teaching machine provides immediate feedback to the learner, ensures right responses and reinforces them. The programmes of a teaching machine are preplanned. An exercise is repeated till the learner learns what the programme expects him/her to do. Behaviourist principles such as stimulus-response relationship, reward for the right response and the repetition or reinforcement of the right response operate in the teaching/learning method used in teaching machines.
- 3)
  - a) The following may be considered very important educational implications of cognitivism:
    - i) Retention of information (or memory) which leads to new cognitive structures.
    - ii) Discovery learning which motivates the learner and encourages active learning.
    - iii) Emphasis on problem solving and reflective learning.
  - b) Behaviourism and cognitivism are similar in emphasising the importance of :
    - i) Feedback, and
    - ii) Practice/reinforcement.
4. Bruner is a cognitivist for the following reasons:
  - i) By putting forth the three modes (i.e. enactive, iconic and symbolic) of the representation of knowledge, Bruner recognises the role of the human mind in comprehending reality.
  - ii) He views 'learning' as 'goal oriented', and not as a mere biological or impulsive response to external stimuli.

- iii) His theory of instruction emphasises the principal cognitive elements of autonomy and the problem solving capabilities of the learner.
5. In Gagné's synthesis of the cognitivist and the behaviourist approaches to learning, we may notice the following elements:
- a) Cognitivist elements:
    - i) information processing,
    - ii) intellectual skills—from the simple to the complex,
    - iii) recognition of individual and attitudinal differences in learners, and
    - iv) transfer of knowledge and skills.
  - b) Behaviourist elements:
    - i) Gagné's emphasis on the observable behaviour and the performance of the learner, and
    - ii) His dependence on the Stimulus-Response factor derived from the theories of Thorndike and Skinner.
- 6) A sample answer: Think of a situation where you want to become an astronaut or a cosmonaut. Here, perfect coordination between the three domains of learning is necessary. The teaching/learning situation, in this case, should meet your needs at the cognitive, the psychomotor and the affective domains because it requires you to know and to understand (many things connected with space research), perform (the psychomotor functions) and keep your emotional stability while on the job.

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## UNIT 2 THEORIES OF COMMUNICATION

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### *Structure*

- 2.0 Objectives
- 2.1 Introduction
- 2.2 Communication
  - 2.2.1 Types of communication
  - 2.2.2 Purposes of communication
  - 2.2.3 Processes of communication
  - 2.2.4 Technologies of communication
  - 2.2.5 Educational communication
- 2.3 Communication Theories
  - 2.3.1 Mathematical theory
  - 2.3.2 Information theory
  - 2.3.3 Free press and social responsibility theories
- 2.4 Let Us Sum Up

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### 2.0 OBJECTIVES

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The purpose of this unit is to give you an overall view of communication, of various communication processes including those used in education, and of a few theories of communication.

After having worked through this unit, you should be able to :

- define communication,
- list the purposes and types of communication,
- describe how the process of human communication takes place,
- describe the process of educational communication,
- identify different theories of communication, and
- describe their educational implications.

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### 2.1 INTRODUCTION

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Within the framework of a social set-up, human beings interact with each other through communication. So 'communication' has been termed as the fundamental social process. Any discipline or field of study that deals with human society and human behaviour is necessarily concerned with this process.

The sub-system of education functions within a broader system — that of society. To understand human behaviour for effective teaching and learning, it is necessary to understand the processes of human communication.

Education is also a process of communication between the individual and

society, communicating desirable social standards and human knowledge from the latter to the former over a period of time.

In distance education too (though it takes place outside the classroom) teaching-learning takes place between the distance teacher and the distance learner through the process of mediated interaction and other means employed by the system. So, to understand and improve upon this two-way communication for effective learning, it is important to study the processes of communication and a few theories that have direct or indirect bearing on the disciplines of education and distance education.

Having discussed the theories of learning in the previous unit, we now turn to theories of communication in order to form a relationship between the two and to subsequently see how they influence the design and development of self-learning materials.

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## 2.2 COMMUNICATION

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The earlier meaning of communication (derived from the Latin word 'communicare'—means 'to make common') has undergone many changes, which have made its meaning broader and more complicated. For example, Theodorson and Theodorson (1969) stated that communication as a process of transformation of information ideas, attitudes or emotions from one person or group to another or others primarily through *symbols*. Schramm, (1971) conceived of communication as a process of transferring feelings, motivations, ideas and knowledge from one mind to another, in a way in which the receiver was seen as a passive agent.

But the latter concept of the audience as passive listeners appears to be baseless, since as some of them may well refuse to accept what is forced on them. And it is actually only the *message* and not the idea or thought that passes from the sender to the receiver. At times the message may result in change of behaviour in the receiver which was not intended by the sender.

However, the meaning that we want to derive from this definition is that communication is a process of conveying and imparting ideas and knowledge whereby there is a transfer of messages as well as ideas from one mind to the other(s) with the help of signs (through sight) and sounds (through hearing).

Another set of definitions stresses the *influence* of a system and/or mind on the destination and/or another mind. This influence is carried out by manipulating the alternative signals that are transmitted through the channel. The sender is free to use any signal which s/he thinks would influence the receiver. These signals not only cover speech - written and oral - but also pictures, music, theatre, and almost all human behaviour. For example, in a theatre show, the characters/artists manipulate various signals (e.g. speech, postures, gestures, etc.) to both entertain and influence the minds of the audience. In a broader sense, communication is the procedure by means of

which one mechanism affects another mechanism. The stress here is on *influence* rather than a *transfer*. The human relationship approach views communication as the mechanism through which human relations exist and develop.

Schramm (1971), a noted communication theorist, views it differently saying "it is the sharing of an orientation towards a set of informational signs". Information refers not only to facts/news or whatever is taught in the classroom, but also any content that reduces uncertainty or the number of alternative possibilities in a situation". It includes facts, opinions, guidance, persuasion and even emotion communicated through 'silent language'. This communication is based on a *relationship* between at least two bodies - humans, animals or even machines - that are 'in tune' with each other. This relationship may not be a face-to-face one. For example, in the case of *mass media* there is no direct contact between the two agents of communication.

But the quality of communication in direct contact differs from that in indirect or mediated contact. Communication makes connections between persons through various forms or media. We shall touch upon these connections in sub-section 2.2.4. You will find that communication is an activity which is not limited to any static condition. We 'learn' how to communicate, and for this learning we use communication itself. This is the process that goes on in schools and colleges everywhere.

### 2.2.1 Types of communication

The experience of communicating can be divided into four categories based on the number of people involved in this act, viz., intra-personal, inter-personal, group, and mass communication.

#### **Intra-personal communication**

This refers to a process when one communicates with one's own self. Such communication is *within the self* and *to the self*, e.g., thinking, working out a problem, writing diaries, etc. (Holmberg, 1981).

#### **Inter-personal communication**

This is the communication that takes place when at least two people interact, whether face-to-face, e.g., an interview, talking to friends in a café, or otherwise, as with a telephone conversation etc. In this case, emphasis is laid on speech as well as on non-verbal forms of communication.

#### **Group communication**

By group communication we mean communication within and between groups of people. The groups may be small, such as a family, or large, as in the case of a committee meeting.

## Mass communication

In this case the communication is received by or used by large numbers of people, e.g., an open-air concert for a thousand people, radio and postal systems, etc.

Whatever the type of communication, its purposes are more or less similar. Given below is a brief account of the various purposes of human communication.

### 2.2.2 Purposes of communication

Every type of communication has a purpose behind it. Such purposes are related to certain needs, and they may be conscious or unconscious. In face-to-face communication, for example, the verbal forms of communication reveal conscious purposes, and the non-verbal forms express unconscious purposes.

Communication may be *intentional* or *unintentional*. It is unintentional when, for example, Mr. A's words hurt Mr. B though the former did not intend to hurt the latter.

Some of the purposes of communication are to

- give, get or exchange information,
- use communication to form or to maintain relationships,
- persuade others to think in the way that one does, or to act in the way one wants,
- gain, maintain or exert power over others,
- make decisions about what we think and do,
- express our ideas and ourselves to others, and
- make sense of the world and our experience of it.

#### Check Your Progress 1

- i) Define the broader meaning of communication. Your answer should be 7 or 8 lines long.
- ii) Distinguish between inter-personal and intra-personal communication with the help of at least two examples.

**Note :** a) Space is given below for you to write your answers.  
b) Compare your answers with those given at the end of this unit.

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### 2.2.3 Processes of communication

It is worth noting that the process of communication depends on the different functions it serves, and variations in the process of communication are due to the varied functions/purposes for which it is used. Schramm (1971) writes, “Essentially the communication process consists of information-processing organised around a shared orientation to certain signs”. When information is not communicated properly, it does not bring the desired results. So, it is important to study the process of communication and the various models used to understand and/or to explain it. We shall here discuss three models that explain the processes of communication, ranging from simple to complex activities.

The process of communication requires two or more participants, one sends information and the other receives it. This is the simplest model of communication called the ‘Linear Model of Communication’ (Dimbleby and Burton, 1985), in which the sender sends messages to the receiver through one or the other channels. Look at Figure 1 given below :

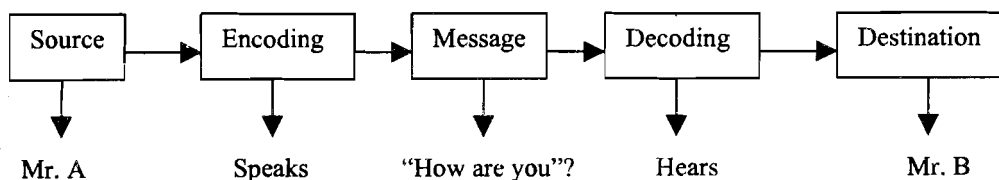
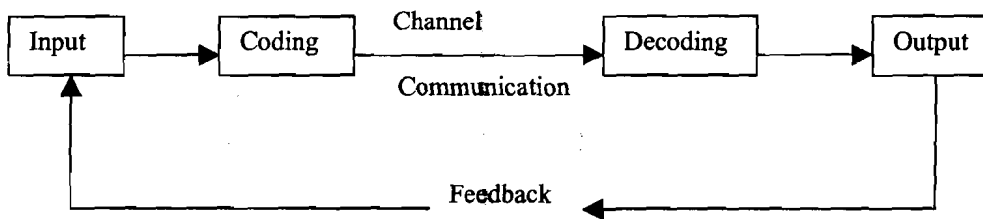


Fig.1: Linear model of communication



The message is carried out with the help of some *codes* (like verbal or non-verbal signs) which are *decoded* by the receiver. In this simple process of communication, any complex human behaviour is not overtly expressed.

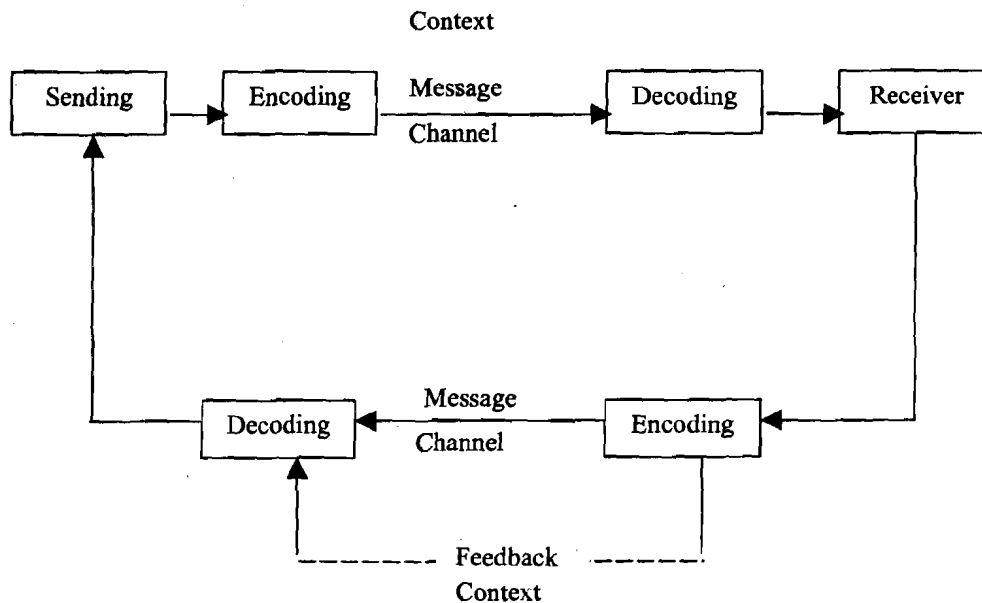
But communication is not always a one-way process, rather it is usually a two-way process where two persons interact with each other, and either one or both of them encode and decode. Let us examine the communication model of Shannon and Weaver (1949) that was originally applied to develop electrical systems and is now applied to human communication. (see Figure 2 below).



**Fig 2: Engineering model of communication**

We shall illustrate this model with the help of an example. The input is the event that provides a stimulus, for example, through the sensory organs. Suppose A receives such a stimulus, the resulting nervous impulses reach the brain causing reactions and preverbal feelings. According to the accustomed verbal patterns s/he translates them into words. S/he then selects some words and speaks to B and conveys his/her reactions by means of sound and light waves; the reaction in terms of nervous impulses travels to B's brain, then to his/her muscles and glands that produce reactions and preverbal feelings. He/she translates those feelings into words according to the verbal patterns which he/she is accustomed to. After selecting or abstracting some of those words, he/she arranges them in some fashion and speaks either to A or to somebody else and thereby offers a stimulus to him/her. The process of communication goes on in this way. This is called the Exchange Model of Communication (Osgood, 1954) or the Engineering Model of Communication (Shannon and Weaver, 1949) in which both the sender and the receiver are active agents during the process of communication.

The contextualised model or linear model of communication with a context and feedback (see Figure 3) is an extension of the exchange model when the dimensions of the situation or surroundings are added to the above process. The process between the sender and the receiver also has another dimension — that of feedback.



**Fig 3 : Contextualised model of communication**

All the processes of communication may not necessarily achieve the pre-determined purpose (of the sender of the message). Communication becomes *dysfunctional* when it fails to achieve its purpose. It may fail because of one or more of the following possibilities:

- Mutual attention is not paid adequately
- The receiver fails to understand the meaning of a communication in the way the sender intended
- The two parties do not have clear-cut common communication goals, and
- Emotional disturbance affects either party.

But in *effective* communication:

- The sender *rightly uses the symbols/signs* to properly and effectively communicate what he/she wants to communicate,
- The receiver *gets the meaning* correctly from the symbols/signs of the sender,
- The receiver *responds correctly/appropriately*, and
- The process of communication is flawless.

After learning about the processes of communication, we need to know something about the important technologies involved in the process of communication.

**Check Your Progress 2**

State, in about five lines, in what way the engineering model of communication is an extension or an improvement over the linear model of communication.

**Note :** a) Space is given below for you to write your answer.  
b) Compare your answer with the one given at the end of this unit.

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**2.2.4 Technologies of communication**

To accomplish pre-determined ends in the process of human communication, a wide-ranging series of *techniques* and *technologies* are used. Human beings have invented and used technologies to communicate amongst themselves and with animals, 'human language' being one of these technologies. These technologies are peculiarly interdependent. We discuss here some of the important technologies of communication.

**Imitation**

Human beings imitate the behaviour of others. This process is purposeful, since it allows for the exchange of experiences. Human beings decide upon the purposes of their imitation and use specific techniques for communication like gestures, inchoate language, etc.

**Symbols**

Symbols constitute a significant means of communication. Some of the most important of these are the use of metaphors, similes, icons, etc. Through symbols, one is able to communicate one's thoughts and perceptions adequately to others.

**Language**

Written and spoken languages transmit meaning through their use of words, sentences, and grammars. The technique of language use has itself become an important field of study. Various disciplines like linguistics, philology, semantics, phonetics, etc. have emerged to deal with the skills of mastering verbal and written languages, the commonest means of communication.

### Print

The invention of the technology of writing in languages using phonetic, ideographic and pictographic symbols greatly contributed to facilitate human communication. Subsequently, print enabled one person/group to communicate with another person or a group of persons on a large scale. Print in the form of books has great potential to communicate the ideas of the writer/author to relatively larger number of readers, and it is more effective for purposes of persuasion than many other techniques are.

### Motion pictures

Motion pictures constitute a strong communication technology as they help communicate more effectively by creating impressions that become permanent in the minds of the viewers.

### Broadcasting

The technological revolution of the nineteenth century gave birth to the technique of broadcasting. Radio broadcasting was followed by television broadcasting. Broadcasting through both radio and television is one of the most developed mass communication technologies of today, serving even larger audience than the group communication techniques can address.

## 2.2.5 Educational communication

Education has long been considered a communication process which links individuals and the society in which they live. In this process, the knowledge, values, skills and standards of the society are communicated from generation to generation. Now let us examine how educational communication takes place (please turn to Figure 2).

In educational communication, the *input* is knowledge, skills, standards and values of a society provided in a particular subject matter, and this input is supplied and managed by the teacher. When s/he puts forth facts, ideas, attitudes, statements, etc. coding takes place, as messages are encoded into sound, visual images, printed words and non-verbal messages. So coding is the process of making the desired input visible and/or audible to the learners. The *channels of communication* are the sound signals or the visual signals produced by the teacher, chalk and board or even the audio-visual signals that accurately and clearly convey the message to the learners.

*Noise* is something that disturbs or interrupts the communication. The main source of noise in the classroom, for example, is the teaching environment, consisting of the furniture, chalk and board, and even the colour of the wall and the voice quality of the teacher. A higher teacher-learner ratio also creates an obstacle to learning as does the teacher when s/he is not clear about her/his purpose. The learners *decode* the message, and the *output* depends upon the learners' previous knowledge of the subject being taught,

skills of note-taking, ability to use books and to extract information, etc.

The learner is central to educational communication. *Feedback* from the learner to the teacher plays an important role in regulating the channels of communication, and in enabling the teacher to reduce obstacles or disturbances and to vary the input to suit learner needs.

## 2.3 COMMUNICATION THEORIES

After having studied the meaning, the process, and the techniques of communication, it is reasonable to examine various theories of communication which are directly or indirectly related to education and particularly to distance education. As mentioned earlier (in section 2.2 of this unit) education is a process of communication and to understand this process for its further development it is necessary to study the relevant theories of communication. We do not intend to propagate those theories nor shall we explain them from the viewpoint of the discipline of communication. Rather we shall touch upon such aspects of these theories as have relevance to educational practices.

What follows is a brief description of four theories — two of which are directly related to education (viz. mathematical theory, and information theory), and two of which have only an indirect bearing on education (viz. free press theory and social responsibility theory). Besides, we shall discuss their educational implications. Before going through these theories, let us go through the activity which is given below.

### Check Your Progress 3

Imagine that you are a teacher teaching in a classroom. Describe, with the help of an example, how communication takes place between you (the teacher) and the learner(s).

- Note :** a) Space is given below for you to write your answer.  
 b) Your answer should not be more than ten lines.  
 c) Compare your answer with the one given at the end of this unit.

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### 2.3.1 Mathematical theory

The early theoretical bases of communication owe much to the views held by Shannon and Weaver (1949). Known as the *mathematical theory of communication*, their views are based on developments in electrical systems and electronics. For them, the main channels of communication were telephone cables and radio waves. The communication process is divided into components like the source, the transmitter, the signal and the receiver. Now, look at Figure 2 again on page 49. A message is converted into a signal suitable for the channel to be used. The *channel* is the medium that sends information from the sender to the destination by means of signals. For example, in a conversation the sender's brain is the *source*; the voice mechanism produces signals through spoken words and transmits it through air (the *channel*) and the receiver decodes the message from the signals.

Though originally applied to the fields of engineering and mathematics, this theory has been widely applied to the broader field of human communication. This mathematical theory of communication has greatly influenced present day educational thought and practice. We may examine a few of its educational implications as follows.

#### Educational implications

In the processes of teaching and learning, information is passed on from the teacher to the learners. Usually one teacher may communicate with 50-60 learners at a time. In larger classes s/he may communicate with 100 learners. Thus the number of people involved in a particular situation of educational communication could not be more than say 101 persons. The mathematical theory of communication helped in enlarging this number, as it helped in improving the electronic media through which information could be distributed to large populations and so the monopoly of a few in relation to educational transactions was successfully overcome. With the help of developed communication technologies, information became more widely used and effective. Besides print material, other mass communication technologies like radio and television broadcasting came to be used for quick transmission to the audience/learners. Moreover, video and computer technologies have questioned the role of the teacher as the sole authority in the teaching-learning process. Now, satellite technology has considerably overhauled and improved the process of instructional technology.

### 2.3.2 Information theory

The mathematical theory gave birth to the *information theory of communication* which views communication as the procedure through which one mind affects another mind or, to put it differently, the procedure for conveying a message meaningfully to the person for whom it is meant. It is a theory of transmitting signals, viz., written language, spoken words, body movements, etc. At the source one *message* is selected out of the many available ones in any of the available *forms* to be transmitted to the

receiver. Provision is also made for feedback in many forms that flows from the destination back to the source, helping the communicator correct the subsequent output.

The term '*message*' or '*information*' is not confined to news or facts, or to whatever is taught in the classroom, but also covers any content that reduces the uncertainty and disorganisation of a situation. As we mentioned earlier in section 2.2 of this unit, it may even include opinion, emotion, motivation or persuasion. It even goes beyond *words* to include silent *gestures* which are called 'forms'.

This theory emphasises *communication networks* in which data are organised, ordered and related and such similarities and connections are shown as had previously not been perceived. Physical tests can be applied to verify predictions. This theory is heuristic, for it has led to new and previously unknown facts and methods.

Chute (1987) adapted the Shannon-Weaver model by adding examples of message transmission media. While retaining the basic form of the communication, Chute suggested that various media could potentially serve as the 'source' in a communication process. Chute's model is perceived as the initiator of interactive communication. Wagner (1994) stated that the models developed by Schramm and Chute can be used to help distance educators to conceptualise the mechanics of interactive telecommunication.

### **Educational implications**

The information theory of communication has greatly contributed to the process of teaching-learning in terms of the effect of the teacher (or even of print materials) on the minds of the learners, and the process of feedback being provided by the learners to the teachers to improve teaching, and also by the teachers to learners for effective learning. Feedback in the classroom can take many forms including negative ones such as puzzled looks or signs of boredom-like yawning which inform the teacher that the point at issue needs further clarification or that it is time to move on to another topic, or perhaps to stop teaching for the moment. Similarly, feedback in the case of distance education should be used to improve upon all the subsystems — administrative, academic and industrial.

### **2.3.3 Free press and social responsibility theories**

These theories indirectly influence the system of education in terms of the sociology of education. The *free press theory* originated from the *libertarian theory* of Siebert and others, which emphasised the freedom of printing press and its liberation from official control in the seventeenth century, and this is considered the main legitimising principle for print media in liberal democracies. Simply, this theory says that an individual should be completely free to express himself, and should not be forced to suppress his/her feelings and emotions. S/he is free to give information to

the press and to publish whatever s/he likes. This is one of the fundamental human rights.

People are free to express themselves as long as that expression does not harm others, and the press is a means of arriving at the truth. Control of the press leads to the hiding of facts. On the other hand, the press is to be made free to the extent that it does not go against the nation. It should be free from unreasonable censorship but must be answerable to law.

Educational systems are indirectly influenced by this theory, in the sense that it helps the system of education through free press to bring the reality close to the learners in a *learning society* (see ES-311), and to make them aware of their rights as well as responsibilities. The aim of education is to bring about the socio-economic and political development of the nation, and a free press accelerates this process.

The *social responsibility theory* originated from the 'Commission of Freedom of the Press' in the United States. This theory demanded that the media - print and broadcasting - have a social responsibility and must be answerable to society through various kinds of democratic procedures. It reconciles three divergent principles, viz., (i) individual freedom and choice, (ii) media freedom, and (iii) media obligation to society. Media is to be self-regulating within the legal framework of a nation along with its obligation to society, and it should avoid anything that might lead to violence or communal disturbances.

The contribution of this theory to education can be summed up thus: education tries to develop moral ideas and values among individuals, to provide more and correct information to them and to ensure progressive social development; and in this task the social responsibility theory of communication helps much in terms of media responsibility in transmitting correct information to all citizens who are learners and in the process of developing their moral values.

#### Check Your Progress 4

'Free Press theory of communication can indirectly contribute a lot to the spread of education in any nation'. Do you agree with this statement? Give reasons.

**Note :** a) Space is given below for you to write your answer.  
b) Try and match your answer with your day-to-day social experiences.

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## 2.4 LET US SUM UP

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In this unit, you have studied about the various meanings of communication. Broadly, communication means imparting, conveying or exchanging ideas, knowledge, etc. In other words, it implies the transfer of information from a source to a receiver. It also includes all the procedures by which one mind affects another through oral speech, written word and almost all human behaviour.

We have seen that education itself is a process of communication. Two important theories, viz. *mathematical theory* and *information theory* of communication have a direct bearing on the practice of education. You have also studied two other theories, viz. *free press theory* and *social responsibility theory* which have an indirect bearing on education in the sense that they point to the significance and need for democratising education, and contribute to the concept of ensuring equality of educational opportunity.

### Check Your Progress : Possible Answers

- 1)
  - i) Communication simply means conveying or transferring ideas and feelings from the sender to the destination. In a broader sense, it is the willing interaction between the source and the receiver by means of symbols and signs - verbal or non-verbal, face-to-face or mediated. All along, a relationship is maintained between the two parties through feedback.
  - ii) There is intra-personal communication when, for example, learners without interference from anyone else work out or solve a problem in mathematics on their own. But it is extended to inter-personal communication when the learner has a friend helping him/her solve the same problem at every stage.
- 2) In the engineering model of communication both the sender and the receiver 'act' and the former is kept in touch through feedback given by the latter. Feedback is absent in the linear model of communication.
- 3) A teacher, while teaching in the class, may put a question to Miss. B. This 'coding' takes place with the help of the 'channel' of verbal sounds/words. Miss B 'decodes' it and replies that she could not understand the content of the question. This works as a 'feedback' to the teacher, as a result of which he again puts the question to her in simple and clear language. This time Miss B understands the question and gives the correct answer. This is one form of communication that takes place in the classroom.
- 4) It is an open ended question. However, we shall be answering this in unit 3 (Section 3.3) of this block.

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## UNIT 3 IMPLICATIONS OF THEORIES FOR COURSE DESIGN

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### *Structure*

- 3.0 Objectives
- 3.1 Introduction
- 3.2 Learning Theories and Distance Education
  - 3.2.1 Behaviourism
  - 3.2.2 The cognitive approach
  - 3.2.3 Gagné's synthesis
  - 3.2.4 Bloom's model
- 3.3 Communication Theories and Distance Education
  - 3.3.1 Mathematical theory
  - 3.3.2 Information theory
  - 3.3.3 Free press and social responsibility theories
- 3.4 Theories of Learning and Communication: Implications for Course Design
  - 3.4.1 Presenting the materials
  - 3.4.2 Identifying the objectives
  - 3.4.3 Motivating the learner
  - 3.4.4 Exploiting learners' experiences
  - 3.4.5 Providing learning activities
  - 3.4.6 Facilitating retention
  - 3.4.7 Promoting transfer of learning
  - 3.4.8 Providing feedback
  - 3.4.9 Providing guidance
  - 3.4.10 Conclusion
- 3.5 Principles of Media Selection
- 3.6 Let Us Sum Up

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### 3.0 OBJECTIVES

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In this unit, our main purpose is to discuss the implications of a few learning and communication theories for distance education. Besides, we have examined how a distance educator can benefit from these theories in designing self-learning materials, and in selecting various media for distance teaching.

After having worked through this unit, you should be able to:

- relate the theories of learning and communication to the instructional practices used in distance education,
- relate and describe how the theories of learning and communication are helpful in designing self-learning materials,
- list a few principles of media selection for distance education, and
- design a study unit in an effective self-learning format.

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## **3.1 INTRODUCTION**

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In units 1 and 2 of this block, we discussed a few theories of learning and communication and their implications for education. Now, in this unit we will look into how the practice of distance education benefits from the learning and communication theories. As distance educators, you will also be engaged, in the future, in developing self-learning materials for distance learners. So it is important for you to learn how the features of these learning and communication theories can be applied to the instructional practices used in distance education, especially in the design of self-learning materials.

The concepts of learning and communication are interrelated. With effective communication the rate/quality of learning at a distance improves and with advances in communication technology the individual distance learner overcomes the barriers of distance and time. The four theories of learning (Behaviourism, Cognitivism, Gagné's synthesis and Bloom's model) and theories of communication (Mathematical, Information, Free press and Social responsibilities) guide the course writers/distance educators to develop and design self-learning materials in any branch of education/knowledge.

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## **3.2 LEARNING THEORIES AND DISTANCE EDUCATION**

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In unit 1 of this block, you have already been acquainted with four major schools of thought dealing with human learning along with their educational implications. As distance educators, we are interested not only in knowing about but also in applying the different principles of human learning in the process of distance education. We are also concerned with how distance learners learn, and in what way we may facilitate their learning.

Before we examine the applications of the theories of learning in the process of teaching/learning in distance education, let us outline the distinct nature of the autonomous learner (the distance learner).

Individualisation and autonomy of various degrees characterise a distance learner who learns through mediated communication. All learning in distance education is essentially a personal activity. Every distance learner works on his/her own for which there is a need for individual tutoring. From this point of view, the theories of learning become more important in distance education than in formal classroom learning. Given below is a brief description of the applications of the four theories of learning in distance education in the same order used in unit 1.

### 3.2.1 Behaviourism

The behaviourists emphasise the connection between stimulus and response as a cause of learning, which for them is a change in human behaviour. Skinner, a prominent behaviourist, propagated the concept of *operant conditioning*, and viewed that behaviour (in the process of learning) changes according to its immediate consequences—pleasurable or unpleasant. Learning objectives are divided into a large number of small steps. Each of these steps is led by a stimulus and the set of response(s) and each step of learning is strengthened so that they recur in future and cause more learning. To promote the recurrence of such responses to cause more learning, both positive and negative reinforcements are given.

#### Implications for distance education

The two major practical contributions of behaviourism to education are *programmed instruction and teaching machines*. The technology of programmed instruction has direct bearing on the process of teaching/learning in distance education. Both the principles of programmed instruction and electronic devices like audio and video cassettes, computers filmstrips, etc. are used successfully in distance teaching/learning. Two principles—that learners play an active role in learning, and that they proceed at their own pace—greatly help a distance teacher to design self-learning materials and other devices for effective learning through the process of two-way communication.

Moreover, every exercise in learning (in distance education too) is to produce pre-determined or desired behaviour in the learner. These principles help in identifying the aims and objectives of a course unit in terms of the learner's terminal behaviour. Accordingly, the subject matter is divided into small steps and presented in a logical sequence. At each step the learner is provided with positive reinforcement in the form of questions and exercises, followed by relevant answers.

Besides, machines or electronic devices are used to reinforce learning and to support individual pace of the distance learner. Machines make it possible for a learner, who has for some reason given up learning activities for a long period of time, to come back to undertake them from where he left off. This has obvious implications for distance education which is specially meant for those who may have left the classroom years ago (for whatever reason) and now want to continue their education. This principle is important for distance education as it tries to facilitate *continuing education* and to establish a *learning society*.

Assignments form an integral part of the packages of learning materials in distance education. They are designed to serve three important purposes: to keep pace with student's progress in learning, to grade their performance, and to give them necessary feedback about their progress. So assignments function as tools to provide reinforcement to the distance learners.

### 3.2.2 The cognitive approach

The cognitive approach to learning emphasises the psychological functioning of an individual. Stress is laid on how a learner remembers and retrieves information from the memory. Instead of developing by means of a mechanical sequence of stimuli and responses, learning takes place through insight-formation and successful problem-solving. Information processing, learning as a cognitive process, and feedback from the consequences of one's own actions are the three basic components of the cognitive approach to learning. Bruner, a cognitive psychologist, describes learning as a cognitive process which involves the acquisition of new knowledge, the transformation of acquired knowledge, and the evaluation of the adequacy of acquired knowledge.

You have already studied about these facts with regard to cognitive learning in unit 1 of this block. Now you should go through sub-sections 1.4.1 (p. 24) and 1.4.3 (p. 27) once again before looking into the implications of this approach for distance education.

#### Implications for distance education

Various principles of learning emphasised by the cognitive theorists have influenced the practice of distance education. As the primary emphasis in distance education is on self-learning, the cognitive approach appears to be well suited to it.

Secondly, the distance learner is to be made to approach learning as an act of discovery (to rediscover the facts) so that s/he may exercise autonomy in learning through self-reward. The self-learning material should ensure the active involvement of the distance learner with these contents of such material so that s/he may learn without any significant external reinforcement. Besides, the learner when presented with problems and made to solve them, develops the habit of self-learning through the process of problem solving.

The four major requirements of instruction referred to by Bruner (Holmberg, 1981) are, viz.,

- i) developing in the learner a predisposition towards learning by specifying experiences,
  - ii) simplifying information for the learner to generate new propositions and to manipulate a body of knowledge,
  - iii) specifying the most effective sequence in which to present the material, and
  - iv) specifying the nature and pacing of extrinsic and intrinsic reinforcement.
- All of these are applicable to distance learning situations—instruction provided to a learner may proceed step-wise from direct experience to representation of experience, and then to symbolic representation.

### Check Your Progress 1

- i) Describe in about 8 lines on what grounds both behaviourist and cognitive approaches to learning make complementary contributions to distance education.
- ii) List the differences between the implications for distance education of behaviourist and cognitive approaches to learning in terms of 'learning' and 'feedback'.

**Note :** a) Space is given below for you to write your answers.  
b) Compare your answers with those given at the end of this unit.

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### 3.2.3 Gagné's synthesis

Gagné synthesised the approaches of the behaviourist and the cognitive theorists to learning. For him, learning is a change in human disposition or

## Factors in the Design of Print Materials

capability that takes place inside an individual's mind. He put forward hierarchical conditions of learning and identified nine phases of learning that include both internal and external events. These phases range from generating the learner's attention through stimulus to generalisation or transfer of learning for solving new problems. Besides, he suggests eight types of learning, beginning with a simple form of learning (signal learning) and ending with the most complex one (problem solving).

## Implications for distance education

Gagné's model of *information processing* and the *hierarchical model of eight types of learning* (see pages 29-33) moving from simple to complex forms, have significant implications for distance education. Instruction should be designed in such a way that the second step is taken only after the first one is thoroughly accomplished. The various *events of instruction* suggested by him are immensely helpful to the course designers. These sequenced events guide successfully not only conventional classroom teachers but also distance teachers, television script writers, and instructional designers.

Stimulus in the form of diagrams, charts, etc. in the learning materials presented through video tapes or television appeals to the interests and curiosity of all types of learner. Every distance learner is to be informed of the objectives and of *how s/he would know when s/he has learned what is expected of him/her*. The course materials are to be written in such a way that each unit stimulates the learner to recapitulate what has been learnt in the previous unit. You may notice this approach being followed in the units of the block which you are now going through. In distance learning the learner goes through the stimulus (materials or course materials) only when s/he is *ready* to learn. S/he is also provided with guidance (whenever called for) through correspondence, and personal contact programmes at study centres. Feedback is provided through *comments* on the assignments, and there is *continuous assessment* of his/her performance through more and more assignments. The self-learning materials are written in such a way as to make the learner perform varied tasks relevant to his/her studies.

Gagné has also been specific about the choice of media. In distance education, one can make a tentative choice of medium for each instructional event and then review the list of tentative media before making the final choices. It is the instructional events within lessons rather than the level of the lesson that determine media selection. (We shall elaborate on this point later in this unit).



### Check Your Progress 2

Relate Gagné's synthesis of the two learning theories (viz. Behaviourist and Cognitivist) to the designing of self-learning materials for distance education.

- Note:** a) Space is given below for you to write your answer.  
 b) Your answer should not be more than 8 lines long.  
 c) Check your answer with the one given at the end of this unit.

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### 3.2.4 Bloom's model

Bloom classified learning outcomes into three domains—cognitive, affective and psychomotor—with greatest emphasis being laid on the cognitive domain. The cognitive outcomes of learning are classified under six headings, viz., knowledge, comprehension, application, analysis, synthesis and evaluation. Through the process of 'task analysis' educational behaviours can be classified and graded from simple to complex based on the level of learning.

At this stage, you can take a look at the few pages on Bloom's model in section 1.6 of this block.

#### Educational implications

The basic application of Bloom's model of distance education is that the separate stages of learning in the cognitive domain can help the course designer to decide the objectives of the course, and help him/her choose the best from the various media available for the purpose. In the selection of medium/media, learning objectives must be one of the major deciding factors. For example, if the objective is 'affective' in nature, face-to-face contact, television or radio with some complementary activities may be more suitable than any other medium. But if the objective is 'cognitive' in nature (e.g., analysis of a philosophical concept), the printed text will probably be more effective. For psychomotor learning (e.g. learning a skill), TV viewing with supporting home kits are called for, or learning with the help of a live instructor in face-to-face situations may be necessary in certain cases.

Besides, if the objectives of learning are expressed in behavioural terms,

evaluation of learning outcomes can be based on observable behaviour which the learner is expected to display.

**Check Your Progress 3**

State, in about 8 lines, how Bloom's contribution may be made use of in distance learning.

**Note :** a) Space is given below for you to write your answer.

b) Compare your answer with the one given at the end of this unit.

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### **3.3 COMMUNICATION THEORIES AND DISTANCE EDUCATION**

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Communication is the process of interaction between the sender(s) and the receiver(s) and in this process, information is transmitted from the former to the latter with immediate or delayed feedback. In distance education the learners are at a distance from the teacher, and the teaching-learning activities are carried out through the process of two-way communication. Obviously, it matters a lot as to how information is transmitted from the source to the destination, and feedback from the latter to the former. Unlike the traditional classroom where there is inter-personal communication, in distance education interaction goes on through mediated communication in which various media, including 'print', play important roles. So an understanding of communication theories is central to a distance educator, since it offers an additional conceptual framework for examining the use of media for course preparation. In what follows is a brief account of the implications of the four theories of communication (which we introduced in unit 2) for distance education.

#### **3.3.1 Mathematical theory**

To a casual reader, a discussion of the mathematical theory, here or elsewhere in this course may appear to be an irrelevant exercise. But, there is a strong reason for our having brought it into our discussion. We consider this theory a representative line of thought which emphasises the maximal and effective use of electronic means in transmitting and receiving

information from the source to the receiver and vice versa. This emphasis has resulted in a gradual rise in the quality and quantity of information passed on through the various media of communication—more than one message going along the same line, possibilities of teleconferencing, emergence of audio and video cassette technology, uses of on-line computers, etc. In short, we suggest that the mathematical theory of communication symbolises the urge of man to harness nature and evolve technologies to make non-face-to-face communication easy and effective. Advances in technology have materialised this communication to a great extent, and, as a consequence, educators may choose one of the available media as their primary medium of instruction, but they have a host of others available to be used for different purposes of enhanced educational communication. And so the distance learner may use the medium that suits him/her the most.

### 3.3.2 Information theory

Central to the information theory of communication is the process of successful communication. The success of communication, it is suggested, depends on

- i) The messages selected for transmission—they must be relevant to the needs of, and must meet the expectations of, the receiver (the distance learner in our case).
- ii) The signals chosen for encoding the message—the receiver must be able to decode them easily for his/her benefit, and
- iii) The feedback from the receiver—it should function as a stimulus to further communication and improve the process of interaction thus established.

The obvious implications of this theory for distance education are in the area of course preparation, a process which comprises course planning, course development and course production. As these subordinate processes have been dealt with adequately in subsequent blocks of this course, suffice it to say here that the systems of distance education have amply drawn on the insights provided by information theory, be it for purposes of selection, presentation or modification of teaching materials.

### 3.3.3 Free press and social responsibility theories

Once again, a casual reader may question the relevance of these theories to the theme under consideration, as they obviously pertain to socio-political aspects of communication, and not to education. At this stage we draw your attention to Blocks 1, 2 and 3 of Course ES-311 in which we have made it clear that distance and open systems of education have been adopted the world over as a result of a new kind of socio-political awakening. This awakening emphasises the democratisation and universalisation of education. Thus, as the situation obtains today, the strongest plank for distance and open education is essentially socio-political in character—hence a consideration of these theories is quite in place here.

The free press theory upholds freedom of expression, which has direct implications for freedom of learning, that of teaching and any type of educational communication. The learner should be able to get what s/he is looking for, and the institution should be able to provide the education for which it is approached. Education has to be a free enterprise. The social responsibility theory emphasised that in a democracy the media, though independent, have to function within a framework of social responsibility. This principle too has direct implications for education, which cannot be socially irresponsible.

It should be noted that the press (print) and the other media are the means of mass communication, and that distance and open education too effect mass communication using the same means, i.e. the print and the other media. In the ultimate analysis the function of distance and open education is not very different from that of the press and the media, namely, educating the masses, democratising and universalising education.

We remarked above that education has to be a free enterprise. It has to be so both in terms of its content and its operational aspects. Unlike conventional classroom education, open education is open also because it is not based on closed (indoor) communication. It is open in more senses than one, since it is open to public criticism at each stage of its operation, and its content too is open to all. This openness itself is a means of making such education socially responsible. Viewed in this way, open education is a socially responsible, free educational enterprise.

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### **3.4 THEORIES OF LEARNING AND COMMUNICATION : IMPLICATIONS FOR COURSE DESIGN**

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In the foregoing sections we discussed the broad implications of the theories of learning and communication for distance and open education. Having projected the relationship between these theories and distance education at the cognitive level we now turn to the practical aspects of these implications.

Some time in the future, a distance educator may be asked to perform activities and achieve objectives which cannot be thought of today, but at present, society in general and academics in particular expect such an educator to do at least, as much as a teacher does in a classroom situation. How will the distance educator achieve the objectives which a classroom teacher does in the classroom? A straightforward way of answering this questions is:

- i) To see what the trained classroom teacher does, and then
- ii) To see how the distance educator too might achieve the same objectives or results.

### Activity 1

- Note:** a) Use the space given below for your answer.  
b) Please do not proceed before you complete this activity.

List about 10 words and/or phrases to indicate what, from your point of view, a trained and/or successful classroom teacher does (in a classroom) in order to make his teaching effective. For example, *motivates the learners*.

|   |                        |    |
|---|------------------------|----|
| 1 | Motivates the learners | 6  |
| 2 |                        | 7  |
| 3 |                        | 8  |
| 4 |                        | 9  |
| 5 |                        | 10 |

What does a trained conventional classroom teacher do in a classroom? S/he performs a number of activities which are aimed at facilitating learning by learners. These activities are :

- i) Presenting the materials:** Most of the time allowed to a classroom teacher is spent in presenting the prescribed materials, available in a text or some other form. The teacher is supposed to breathe life into that text and help the learner communicate with it.
- ii) Identifying the objectives:** The syllabus and very often the prescribed text itself make it clear as to what educational objectives are to be achieved through a particular course and/or text. But, practically, it is the teacher who identifies them for the learner. It is the teacher who points to what is significant and what trivial, what needs to be paid what degree of attention, and for what purpose.
- iii) Motivating the learner:** To reduce distraction, the teacher provides motivation. S/he brings learners to a state of readiness, in which condition learning takes place more easily. All of us know of teachers whose very name or presence provides enough motivation for a successful academic exercise. And then, there are teachers who demotivate learners in more than one way.
- iv) Exploiting learners' experiences:** *Good teachers build their teaching on learners' experiences.* The same concept may be brought home to rural learners with the help of their experiences, and to those of urban background with theirs.
- v) Providing learning activities:** Once a new concept is taught, or a new piece of information is given, the teacher promotes learning through

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learning activities. For example, after having taught a formula, the teacher asks learners to apply their learning to work out solutions to a few questions.

**vi) Facilitating retention:** Just knowing about a concept does not amount to having learnt it. The learner should be able to retain (what s/he may have learnt) in his/her memory—both short-term and long-term. Good teachers use different means to help their students to facilitate and improve their retention of concepts.

**vii) Promoting transfer of learning:** Having learnt a concept or obtained any new learning, the learner should be able to transfer his/her learning to various issues within his/her discipline as also across various other disciplines. For example, if we have learnt about the notion of relativity in physics, we should be able to think of a different kind of relativity in sociology. Besides, the transfer of learning has yet another meaning—facilitating further learning.

Used in either sense, transfer is promoted by the teacher in the classroom through various means.

**viii) Providing occasions for feedback:** For successful teaching we need two way feedback—from the learner to the teacher, and vice versa. The teacher provides occasions for this exchange, for example, s/he puts a few questions to see whether or not the learners have learnt what s/he taught, and then teaches again if s/he needs to.

**ix) Providing guidance in various ways:** Teachers use various techniques to keep the learners on the right track. In general we may say that all the items above constitute guidance but in particular we may extend the meaning of guidance to cover various other considerations such as emotional, domestic ones etc.

### Activity 2

- a) List the pedagogic functions of a unit. Prepare an outline (just the key words) suggesting how the listed functions may be fulfilled in Distance Education in the absence of the teacher.
- b) We shall answer this question separately. So please do not proceed till you prepare an outline.

Try and list how each of the above pedagogic functions of a teacher may be fulfilled through self-learning materials.

**Note:** Kindly use a separate sheet for this activity.

### 3.4.1 Presenting the materials

The presentation of the materials depends on the type of course. If the course is independent of any prescribed texts, presentation will succeed if it has the following features:

**i) Intellectual clarity:** Materials to be presented should be analysed logically before they are put into any format. This logical analysis will suggest the best order in which the various sub-themes of a particular theme may be presented. Such an order will maintain both the continuity and the consistency of what is presented. It should be taken for granted that if the author is not clear about what s/he wants to present, his/her presentation will not promote self-learning among learners.

**ii) Linguistic simplicity:** Complex language and expression does not promote self-learning. The materials should be presented in simple everyday language. Simplicity of expression is achieved by using common words, short and simple sentences, expressing ideas and concepts clearly, adopting a personalised style, and bringing in a touch of humour wherever possible.

**iii) Concretisation:** It is easier to understand the concrete than the abstract. So, it is advisable to present illustrations, diagrams or devices like lexivision (in which pictures, etc. and words are put together to explain a difficult concept) to concretise what we may be presenting to our learners.

**iv) Appropriate media:** Research and experience have shown that in general terms learners learn equally successfully from any medium, be it print, audio or video. However, depending on what material is to be presented and to whom, one medium does show a relative advantage over the other. Besides, the choice of the medium should be governed by the considerations of cost efficiency also (for a detailed discussion on this issue, please turn to section 3.5).

### 3.4.2 Identifying the objectives

In self-learning materials, this role of the teacher may be achieved by listing clearly what the objectives of a particular course unit are. Still better, these objectives can be listed separately if they pertain to different domains.

- i) In the *cognitive domain*, however, one emphasises the aspects of cognition in learning, which are to have correct and relevant information, conceptualise reasonably well, recall easily and correctly, generalise, etc. Objectives pertaining to this domain may be put in cognitive terms.
- ii) In the *psychomotor domain*, the objectives should indicate clearly which skill is to be displayed by the learner after s/he has worked through a particular study unit.

- iii) There are subjects, like Commerce and Technology, which may have an equal share of cognitive and behavioural objectives. In such cases, the objectives need to be put in *mixed terms*, indicating, as far as possible, which are behavioural and are cognitive in nature.
- iv) In subjects like mathematics and languages, (in which a learner cannot work properly at the second level if he/she hasn't achieved reasonable proficiency at the first), the objectives need to be stated in *behavioural terms*, i.e., the course unit should indicate clearly what the learner should be able to do after s/he studies/works through the unit. For example, the objectives could be listed as follows:
  - a) The learner should be able to solve simple quadratic equations.
  - b) The learner should be able to answer at least eight comprehension questions (out of ten) on an unseen passage of a given standard.

In addition to the domain specification of objectives, we must be clear about the various levels of stating the objectives for a particular purpose.

For example, for potential students and the public we may list the objectives of a course/study unit differently, depending on who the students or the public are; for an authority from the Ministry of Education we will talk about the objectives in very broad terms; for course writers we would be more specific about the objectives, for they have to shape the course according to the specifications we give them; and finally for the learner we have to be even more specific for s/he has to achieve the specific objectives.

As far as the presentation of objectives is concerned, course writers may present them in various ways:

- In a rectangular panel,
- In the form of a list, or
- With the help of a checklist, etc.

### 3.4.3 Motivating the learner

Self-learning materials, in the same way as live teachers, may be highly motivating, moderately motivating or demotivating. The degree of motivation which such materials promote among the learners depends on the nature of the (i) external characteristics and (ii) internal characteristics of the materials.

i) **External characteristics:** All learners, young and old alike, would be motivated to go through the materials if their external characteristics are pleasing. Learners prefer looking into books which present diagrams in pleasing colours. The cover, the paper size, the *typography*, the *format*, the *layout* and even packaging can contribute to motivating the learners to work through the materials. It can be argued that course writers may not have been asked to take decisions regarding the externals of the materials as



suggested in this paragraph. True, but a better informed course writer can make useful suggestions in this regard which may be appreciated by the decision-makers.

**ii) Internal features:** Ultimately, it is the quality of the materials presented which motivates the learners. In this connection it has been observed that the materials would be highly motivating, if they:

- fulfil the needs of the learners,
- exploit the experiences of learners,
- use a personalised style in presenting information, etc.
- set interesting and enjoyable exercises,
- provide ample feedback,
- present assignments in order of their difficulty levels, and
- present study units of moderate length.

### 3.4.4 Exploiting learners' experiences

As indicated under item (ii) above, one of the ways of motivating learners is to draw upon their own experiences while presenting the materials. Besides motivating the learners, such an approach helps the course writers to take the learner from what he/she knows or has experienced to what he/she does not know or hasn't experienced. How may this idea be put into practice in designing a course unit? There are at least two ways available to the course designer and one may think of many more:

**i) Structure of the unit:** While designing the course unit, the course writer may make a gentle start by using material and/or information which is already known to the learner. As the course advances, the content and its complexity may be increased gradually. For purposes of reinforcement, revisions may be more frequent in the initial stages.

While speaking of this idea of structure, we may also emphasise the use of personalised language. Such language, as against strongly formal language, is within the experience of most learners. Using informal/personalised language brings the course unit closer to the learner's experience (of language).

Besides, if the course writer provides a study guide wherever needed—or as a rule at the beginning of a unit—the learner will certainly link the material presented in the new unit with what is already known to him/her. A study guide may consist of notes or hints of the following type:

- Before you start working on unit M, please study once again sub-section 4.3.1 of unit N, Course 2.
- To study unit P you need to have a dictionary by your side. Besides, you are advised to make your own notes as you work through the unit.
- Having studied unit D, you must conduct experiment No. 6 before you proceed to unit E, etc.

**ii) Sources for the choice of experiences:** Depending on the subject/discipline the course writers may choose from:

- natural phenomena for subjects/disciplines like the life-sciences, geography, etc.
- adult experiences for sociology, economics etc.
- everyday affairs for commerce, medicine etc.
- folktales and sayings for fine arts, history, literature, etc.
- mass media such as popular T.V. serials/programmes for child care, sports etc.

What has been presented above is only a suggestion. It is not as though natural phenomena do not provide experiences in the area of economics; we have only tried to show that experiences are available all around us, and we need to choose among them purposefully.

### **3.4.5 Providing learning activities**

It is said that one learns best by 'doing'. Self-learning materials provide learning activities in various ways. Some of the more significant ones are touched upon below:

**i) Exercises:** We may ask the distance learners to work on various types of exercise which are incorporated at appropriate intervals in the teaching materials. Having worked on the exercise the learner can check the degree of his/her success with the help of possible answers provided in the unit. If it is not possible to provide a possible answer, the course writers may present a probable solution or just a few hints pointing to the possible answers.

Depending on the resourcefulness and interest of the course writers, a wide variety of exercises may be presented.

The distance learner may be asked to:

- Draw conclusions from the discussion(s), details or information present in a unit,
- Express in the form of a diagram what has been detailed in the unit,
- Play a game which involves not only the reinforcement of what has been learnt but also leads to new learning, etc.

**ii) Work on useful materials:** The course writers may

- Direct the distance learners to additional materials such as books, papers, folklore, etc.,
- Advise them to go on a study visit to collect information/materials,
- Conduct an experiment.

**iii) Assignments:** Working on assignments is an important activity for the distance learner. Here we need to indicate how an assignment differs from an exercise.

At the Indira Gandhi National Open University for example, assignments are used for continuous assessment (some prefer to call it internal assessment). Assignments demand relatively longer answers and are usually placed at the end of a block or supplied separately. The purpose of assignments is two-fold. They are used partly to assess the performance and the progress of the learners, and partly to provide a means for building purposeful interaction (two-way didactic communication) between the teacher and the learner.

Assignments may consist of different types of question:

- **Open ended questions** which permit a learner to present arguments for and/or against a certain proposition,
- **Multiple choice questions** which may be marked with the help of a computer, and
- **Project type questions** which ask for data to be collected, analysed and conclusions to be drawn from the analysis.

One may add to this list of question types depending on the *objectives* and the *nature* of the course concerned.

**iv) Other activities:** It should be noted that the activities listed above are illustrations only. The variety of activities depends on the resourcefulness of course writers.

Performing an experiment, expressing and enlisting constructive suggestions and criticism, redesigning a given unit, having a pause to refresh oneself and the like are activities that have pedagogic significance. And all these can be incorporated with the help of suitable instructions built into the study units.

### 3.4.6 Facilitating retention

A well-known technique of helping learners to improve their 'retention' is to provide *frequent repetitions* at appropriate intervals. Such repetitions and revisions can be provided in self-learning materials with the help of intext questions, sub-sectional summaries, assignments, etc.

Secondly, one of the most effective ways of helping learners' 'retention' is to make them understand what is taught. Understanding helps in abstracting what is learnt. To help learners understand what is presented in self-learning materials, course writers should present an adequate number of illustrations, appropriate explanations, etc.

Thirdly, a 'problem solving' approach to learning also helps 'retention'. The study units should provide opportunities for applying what has been

taught and learnt. Application type exercises ask the learners to apply their learning to real life situations, present a new point of view, identify the weaknesses in an argument or a concept, etc. The very process of applying a principle to a situation and/or a problem helps the learner to retain that principle in his/her long term memory.

### 3.4.7 Promoting transfer of learning

To have learnt a new concept, a new skill, or adopted a new attitude through the process of teaching and learning is not enough. A learner may be said to have achieved learning satisfactorily only if s/he can transfer his/her learning to new situations within a particular discipline and also across disciplines, if necessary. Obviously, one of the ways of promoting such a higher level of learning is to put the learner through more complex application and problem-solving types of exercise. This objective may be achieved in self-learning materials with the help of the activities listed below:

#### i) Identification of similarities/parallels:

- Exercise in pointing out parallels in a given group of situations, items, issues, etc.
- Exercises in providing examples and/or illustrations of parallels in situations, phenomena, consequences, etc.
- Exercise in looking for parallels/similarities by identifying forward and backward references to the same phenomena, etc. within a text.

#### ii) Identification of dissimilarities: The exercise types suggested under (i) above can also be used for identifying dissimilarities.

#### iii) Application of learning/knowledge:

- Exercises in applying one's knowledge in different fields, for example, the notion of dynamics, may have been learnt primarily from mathematics, but this notion can be used/applied in understanding or explaining some social phenomena in terms of social dynamics.
- Exercises in identifying overlaps (this type of exercise is more advanced than the types suggested under items (i) and (ii) above) and thus moving on to new discoveries.
- Application exercises of various types and of differing levels which help the learner to proceed towards advanced learning with greater ease and confidence.

### 3.4.8 Providing feedback

Two-way feedback between the teacher and the learner is a means of providing the necessary correctives, revisions, modifications and repetitions needed in the process of teaching and learning.

Self-learning materials provide such two-way feedback with the help of the following devices:

**i) Structure:** The study units are structured in the form of small steps. Each step provides something to learn, and is followed by exercises of various kinds — in-text questions, self-check exercises, etc. The learner is expected to work on these exercises and reinforce his/her learning by checking his/her answers with the ones provided by the course writers. In certain cases the course writers may provide the actual answers, in others just a model answer, and in still others they may only suggest a possible answer. Whatever the type of answer provided, it serves as feedback to the learners.

**ii) Let us sum-up sections:** The course writers provide sum up sections from place to place within a block and/or a unit. One may sum-up details, etc. using the following devices:

- Summaries
- Schematic diagrams to present the whole information visually
- Schematic questions, answers to which, when worked out by the learners, form a summary of the materials presented.

You may think of other ways of summing up details.

**iii) Assignments:** As we have already written about assignments in sub-section 3.4.5, we shall not touch upon this theme here. However, we need to emphasise that the comments (by tutors or by the computer) on the assignment-responses provide valuable feedback to distance learners.

### 3.4.9 Providing guidance

‘Guidance’ is a cover term that subsumes all that has been listed in the above sub-sections — from 3.4.1 to 3.4.8. However, here we may list certain other aspects of self-learning materials which we could not accommodate in the above sub-sections.

- i) Anticipating questions which the learners may raise, is one of the characteristics of all good teachers. Similarly, good course writers anticipate questions and provide their answers in the study units by way of simplifying a difficult concept, exemplifying it in different ways, focusing on essentials, leaving out non-essentials, etc.
- ii) Typography too can be used as a guide. Different type faces and sizes, multi-coloured print, division headings and different shades, can all provide guidance to learners as they become increasingly familiar with the logic behind the typography used.
- iii) Instructions of various types, for example *prescriptive and suggestive*, have a definite role to play in guiding the learner through the course units.

- iv) Introductions may be made to perform some important pedagogic functions such as to build links with what has gone into the course earlier, indicate what is to follow and in what order, what preparation is required to get the best out of a unit, etc.

### 3.4.10 Conclusion

In the above nine sub-sections we have tried to show how learning materials can perform the functions of a teacher, and thereby how a distance learner may have those very learning experiences which a learner may have in a classroom situation. Of course, the success of such materials depends on their quality.

One may feel that the suggestions given above are too many to keep track of, and that it may not be possible for course writers to accommodate all of them while preparing a course unit. To this we say that what has been suggested above is an elaboration on the issues involved, an attempt to link theory with practice. In practice, we may reduce the entire discussion to two notions:

- Access devices, and
- Learner-active materials

Access devices are those means which help the learner to grasp what is presented in a study unit. Introductions, glossaries, sections' headings, explanations, diagrams, etc. are all access devices.

Learner-active materials are those which have to be worked through. These materials do not lend themselves to such reading strategies as are employed in reading novels but require a different kind of reading.

A self-learning study unit must be learner-active, providing an adequate number of learner-activities to achieve its objectives.

This brings us to the notion of unit design. How should a study unit look like?

#### Activity 3

Present a schematic diagram of a unit.

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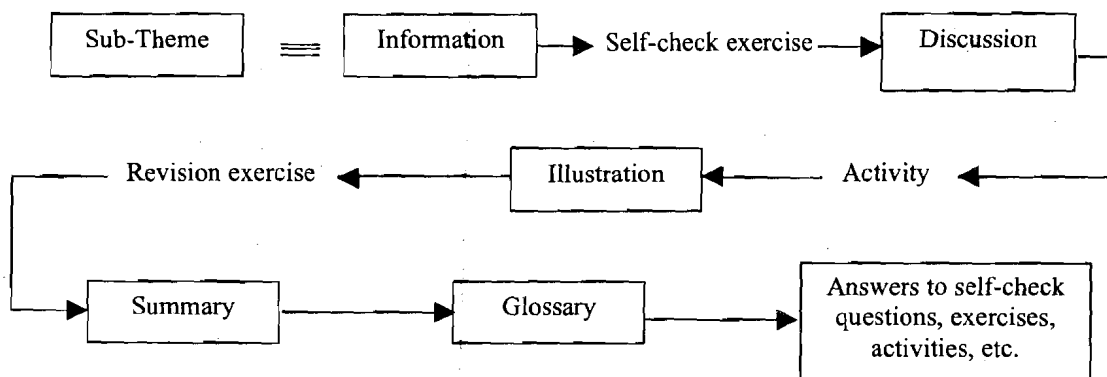
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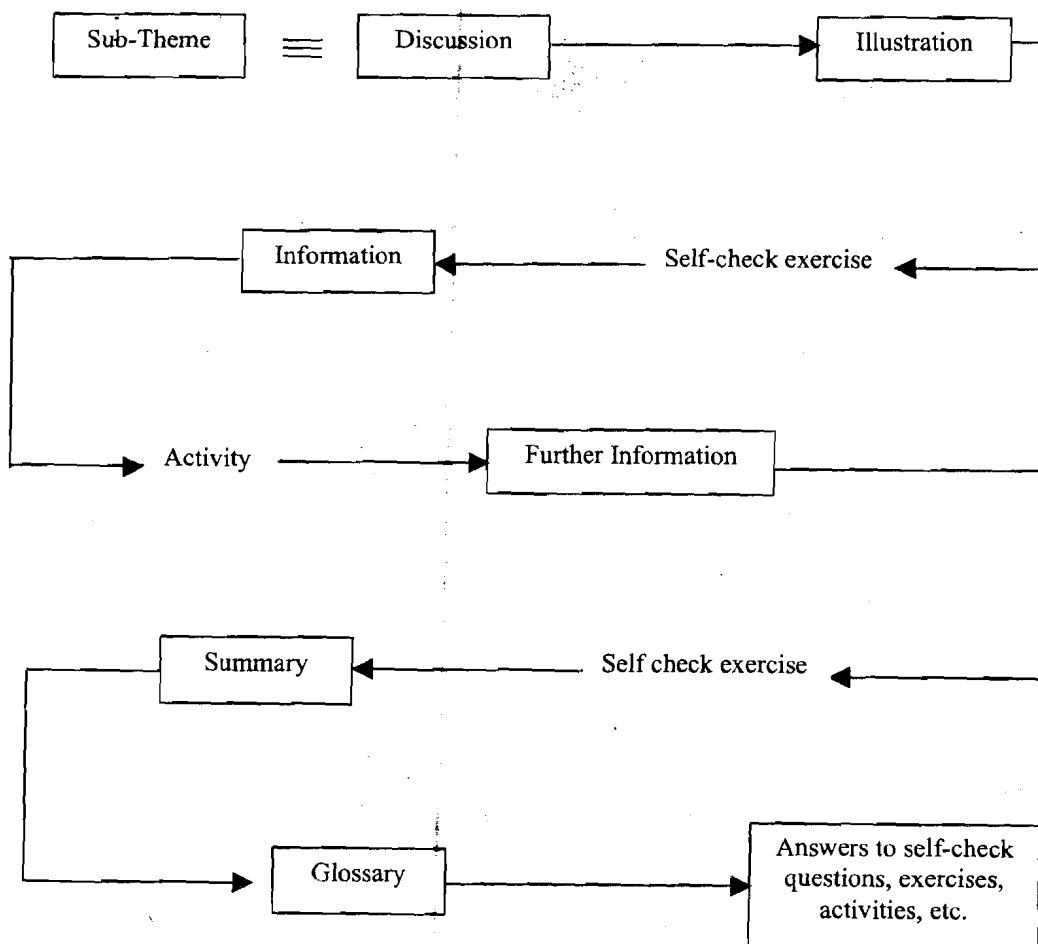
**Note:** For comparison, our suggested answer is available elsewhere in this block (See the block introduction of this booklet).

Having decided on the appropriate unit design the course writer has to decide the best possible sequence/arrangement of the components of the main theme of the unit. A particular theme may consist of a few sub-themes, and a sub-theme may be presented as follows:



**Scheme 1: Structure of a section of a study unit**

Please note that scheme 1 is a mere illustration. There can be many variations of this scheme. For example, another possible scheme may be as follows:



**Scheme 2: Structure of a section of a study unit**

#### Activity 4

Select a unit of this block and study its presentational design. Present its structural design schematically in the space provided below:

Does it perform the various pedagogic functions adequately?  
(Use the following space for your answer).

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### 3.5 PRINCIPLES OF MEDIA SELECTION

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The choice of media is an important factor in making distance education a success. The concept of media equivalence, and the research conducted in this area confirm that any medium is good enough to carry information. Given a reasonably favourable situation, a distance learner will learn from any medium—television, radio, programmed instruction, computer assisted



learning through print, films, filmstrips software, etc. However, we cannot make an arbitrary choice of medium because our aim is to achieve our educational objectives by using the most suitable medium.

Certain factors which influence the learning process both in face-to-face teaching and media instruction are common. Relevance of the content, intellectual clarity and logical sequence of presentation, linguistic simplicity, the need to repeat the main points, the teacher's sympathy towards learners, learners' motivation, their involvement in the subject and their respect for the teacher/instructor affect the amount and the quality of learning equally in both situations. Nevertheless, media technology is different from the teacher in that it has to be used and controlled by the learners as well as the instructor who justifies the choice of the media.

Schramm (1977) suggests that questions pertaining to the instructional strength of the material, the cultural and situational context, the learners' access to the various media and the resources available to the programme are more important than the question of which medium is the best for delivering information. Yet, we cannot rule out the need to select the right media. Local needs, situations, resources, the nature of the subject matter, the anticipated target group, suitability of the mode of delivering information, political considerations, prestige issues, newness of available technology, etc. make it necessary to choose the most appropriate media. In doing so, we have to consider the pedagogic, the technological and the economic aspects of the issue. Schramm (1977) calls these aspects the three vectors: Task vector, Media vector and Cost vector. Task vector analyses the educational needs, the objectives to be achieved through educational tasks and the learner's abilities to control and use the media technology. The Media vector explores the availability of the media, while the Cost vector examines the economics of the media—i.e., the resources and costs in terms of money, manpower, and technology. In practice, however, all the three vectors are interconnected, and they interact with each other. The teacher or the planner who chooses the media should keep in mind the pedagogic relevance, the availability of the technology and the cost effectiveness of the media selected.

Some of the factors to be considered while selecting the media are:

- i) Accessibility (i.e., whether the media selected are accessible to learners),
- ii) Convenience or usability (i.e., whether learners can use the media as and when they want to),
- iii) Control over the media technology by the learner as well as the teacher,
- iv) Production and delivery costs, and
- v) Organisation (i.e., meeting the current requirements of technology, maintenance of the equipment, etc).

The emphasis, however, should be on achieving the educational objectives through the use of appropriate media rather than on the cost and technology of media although the latter do influence the eventual choice. If media is

integral to the curriculum, then there is an obligation to ensure that all learners studying that particular course/programme already have access to the instructional media-materials. Whether the media are integrated or not, their suitability should be given priority. Sparks (1982) identifies some of the factors that determine the suitability of the media. They are:

- i) The place of media in educational feedback loop (i.e., whether they can be used for remedial tuition, identification of individual problems, etc.),
- ii) Their suitability for different educational aims, different subjects, different kinds of teachers and students, and
- iii) Their cost

The above mentioned principles may give us, at best, some general guidelines in selecting the media. The distance educators and the course designers should exercise their discretion and keep the specific needs of their institution in mind when they make media choices. Course ES-318 discusses media related issues in more detail.

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### 3.6 LET US SUM UP

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In this unit, we have:

- i) described the implications, of the theories of learning and communication for distance learning, which we touched upon in units 1 and 2;
- ii) pointed out the functions of a conventional classroom teacher, and how the self-learning materials may perform those functions;
- iii) described the tasks of a distance teacher at various stages of developing self-learning materials for distance learning; and
- iv) touched upon a few principles of selecting various media to be used for distance learning.

The ultimate outcome of our having dealt with items (i), (ii), (iii) and (iv) above has been arrived at a reasonably workable unit-design.

### Check Your Progress: Possible Answers

- 1)i) Behaviourists advocated programmed instruction and self-pacing in learning. Various electronic devices were/are used to make self-pacing possible. The cognitivists introduced the concept of autonomy in learning. Both the concepts of self-pacing and autonomy are complementary to each other in their application to distance education.
- ii) From the behaviourist point of view, distance learning can take place through the process of stimulus-response, and 'feedback' comes from the distance teacher in terms of tutor comments. Whereas cognitive theorists view that the distance learner can learn through discovery,

in which case feedback comes from the distance learner him/herself in terms of the successful completion of the learning activity.

- 2) Gagné synthesised behaviourist and cognitive approaches to learning and provided a hierarchy of eight types/conditions of learning, ranging from simple to complex learning activities. Guided by these views the distance educator, while developing self-learning materials, presents the subject-matter as a sequence of its components ranging from simple to complex items in which every learning item is related to the previous one thematically and logically.
- 3) Bloom thought of three domains of learning, viz., cognitive, affective and psychomotor. These domains guide a course designer in distance education to formulate learning objectives in behavioural terms. Further the learning objectives help in deciding upon the type of media to be used in distance learning/teaching.

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