UNIT 3 COGNITIVIST SCHOOL OF THOUGHT

Structure

3.1   INTRODUCTION

In the previous Unit, we have discussed the different learning theories related to the behaviourist school of thought. As you have read through the Unit, you must have realized that the theories were developed as a way of trying to explain learning theorists' observations about how animals and human learn. Each theory had its weaknesses and strengths. Each of these theories provided us with different views about learning. In this Unit, we will be discussing different ideas about how human beings learn. These ideas come under a broad spectrum of the Cognitive school of thought.

In this Unit, you will become aware of learning and its process according to Gestalt theory and three major cognitive theories that are broadly classified under information processing theory to which the eminent psychologists like Jean Piaget, Jerome S. Bruner and David P. Ausubel have contributed.

This Unit will also help you to see the ideas presented under cognitive theories in the actual learning context. The applications of cognitive theories in the context of open and distance learning for designing instruction, developing learning tasks etc., are discussed along with the activities and exercises to facilitate your understanding and application abilities, and to interact with the material.

3.2   LEARNING OUTCOMES

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

*   explain the characteristics of the cognitive prospective of learning;
*   describe information processing theory;
*   explain Bruner's theory of instruction;
*   discuss Ausubel's learning theory;
*   explain the humanistic perspectives of learning, and
*   write the implications of cognitive theories for designing instruction.

3.3   WHAT IS COGNITIVISM?

Cognitivism is an internal process of learning, understanding, motivation and retention. The mind is broad and complex into which event-responses are absorbed. The brain and mind are the centre of an organism changing and being changed by the environment in a reciprocal manner. Cognitive theorists stress the importance of unobservable processes or mental events that are involved in learning, such as thinking, memory, perceptions, intentions and emotions. Education psychologist Thomas L. Good and Jene E. Brophey refer to cognitive theory in the following passage.

"Cognitive theorists recognize that much learning involves associations established through contiguity and repetition. They also acknowledge the importance of reinforcement, although they stress its role in providing feedback about the correctness of responses over its role as a motivator. However, even while accepting such behaviouristic concepts, cognitive theorists view learning as involving the acquisition or reorganization of the cognitive structures through which humans process and store information."

The common meaning of cognition is '*knowing*'. In psychological theories, this includes the processes of thinking and learning. Cognitive theories consider how human beings organize, store and use information.

Cognition includes how we perceive and attend to things happening around us, and extending beyond these to the so called higher order processes of remembering, reflective and creative thinking, the use of language and problem solving in various forms.

The major historical roots of modern cognitive theories of learning lie in Gestalt psychology and the field theory of Kurt Lewin. To cognitive theorists, the essence of learning is the perception of new relationships among concepts. Learning is the rearrangement of what one knows and understands. Cognitive structures, goal oriented behaviour, and providing opportunities for intuitive thinking are stressed.

The cognitive psychologists believe that knowledge is organized in our mind into sections or groups. Each section of information is called a schema. Knowledge is stored as linked ideas in our mind. As learning occurs there is a change in the amount of knowledge as well as in the arrangement of information. Thus, as we learn the size and the organization of our schemata changes. The information processing theory, and the work of cognitivists like Piaget, Bruner and Ausubel fall under the category of the cognitivist school of learning. The details are discussed in the following sections.

3.4 INFORMATION PROCESSING THEORY

Information processing theory emphasises on the working of the mind. It attempts to account for the ways in which learners receive, store, integrate, retrieve and use information through the process of perception and memory. Learning is thus viewed as a kind of information input, which is stored until some future time when it is retrieved to be used in a similar or a different situation. This section examines the stages of information processing and explains the ways in which they promote learning.

Information processing theory is not a single theory of learning. It is more a set of related terms and ideas that allow certain kinds of theory to be constructed. Information processing theory compares the human mind to a computer. We can see that the information processing theory emphasizes upon the cognitive mechanisms by which information is processed, that is, the active role of the learner, and the importance of relating the knowledge, which is already stored as new knowledge in the process of knowing. In their conception, the mind is a processing system in which knowledge is represented in the form of symbols, and processing is fundamentally symbol manipulation according to a set of rules. A variety of frameworks are used to characterize cognition and cognitive processing. These are as follows:

* A computer language with a precisely defined syntax and set of procedures.
* Graphic models (flow charts, designs, etc.,) that represent the temporal course of processing information and embody particular assumption or theories as to the organization of knowledge in memory.
* Higher order concepts; such as plans, schemata, scripts and frames that embody larger units of cognitive organization.

The information processing view divides learning into three phases:

1) Attending to new information, and
2) Acquiring and retaining information;
3) Retrieving information from memory and transferring it to a new situation.

Information Processing Model

Information is processed in a step wise manner. The input from the senses first enters a sensory register it is then processed in short term memory, and then it is transferred to long term memory for storage and retrieval.

* ***Sensory Register:*** Input is received from the senses, which lasts from less than a second to four seconds and then disappears through decay or replacement. Much of the information never becomes short-term memory but all information is monitored at some level and acted upon if necessary. For example, when you sit quietly for at least two minutes and be aware of everything; you can hear, feel, smell or taste and you will realize how much is going on, how many different sounds you can hear, and the range of feelings, taste and the smells you experience. Psychologists call these as sensory data.

* ***Short-Term Memory (STM):*** The sensory input that is important or interesting is transferred from the sensory register to the Short-Term Memory. Memory can be retained here for up to 20 seconds or more if reviewed repeatedly. Short term memory can hold up to 7 plus or minus 2 items. The Long-Term Memory capacity can be increased if material is chunked into meaningful parts.

- *Long Term Memory and Storage (LTM):* The Long-Term Memory stores information from STM for long-term use. Long term memory has unlimited capacity. Some materials are 'forced' into the Long-Term Memory by rote memorization and over learning. Deeper levels of processing, such as generating linkages between old and new information are much better for the successful retention of material.

Check Your Progress 1

Note: i)   Write your answers in the space given below.
ii) Check your answers with the answers given at the end of this Unit.

1)   Define cognitivism and explain it in your own words.

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2)   List the three phases of learning according to information processing theory.

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Let us look into the views of other cognitive theorists about how our mind organizes knowledge. Their contributions are discussed in the following section.

3.5   JEAN PIAGET'S VIEW OF COGNITIVE DEVELOPMENT

Jean Piaget (1896-1980) was one of the 20th Century's most influential researchers in the area of developmental psychology. Piaget's theory highlights the need for understanding the learner's level of cognitive development and designing the instruction accordingly. According to him, the learner should be given due importance or a control place while planning the curriculum.

We will consider here only the important points related to designing instruction. The term 'schema' describes the way in which newly acquired knowledge and experience is organised and stored internally. Piaget considered a schema to be a mental category or structure, which contains knowledge and experience that we possess pertaining to an object or occurrence.

As our knowledge and experience increase, the schema changes and becomes more complex to accommodate this. This is how cognitive development takes place.

- **How is knowledge organized in the mind?**

Piaget believed that in our mind, knowledge is organized into sections or groups which are called a schema. He suggested that there are several other processes associated with learning. They are as follows:

Assimilation: New information is added to the existing schema. That is, during assimilation, we interpret the external world in terms of what we already know.

Accommodation: The schema are changed to include new information which does not fit into the existing schema. We must change our beliefs to include this new knowledge. We adjust old schema or create new ones after noticing that our current thinking does not capture or explain our new experiences.

Organization: As we start to think about the information, we also use the other process called organization. We start creating links between the different schemas. The internal rearrangement and linking together of schemas form a strongly interconnected cognitive system. For example, if you think about a subject you know well, you will be able to link lots of different topics. The thought processes that help you to make these links are called organization.

Equilibrium: According to Piaget there has to be a balance between assimilation and accommodation. It is necessary to ensure the developing student's efficient interaction with the environments.

Disequilibrium: This is a state of conflict between one's existing knowledge and new experience. It is a state of imbalance between assimilation and accommodation.

Application of the principles of Piaget's approach to design instruction

Piaget's ideas have had a major impact on education especially at the preschool and early primary school levels. There are four important principles, which underline Piaget's approach that could be used for designing instruction.

- *An emphasis on learning by discovery*

Instead of presenting ready-made knowledge verbally, distance teachers/instructional designers/open and distance learning specialists should provide a rich variety of activities to help students explore and discover relationships for themselves.

- *Sensitivity to learner's readiness to learn*

Piaget believed that appropriate learning experiences build on learner's current level of thinking. Distance teachers/instructional designers/open and distance learning specialists should keep in mind a students' development and introduce new experience, which will challenge the students' current ideas.

- *Acceptance of individual differences*

Teachers/instructional designers need to make an effort to arrange activities for individual students or groups of students rather than just presenting information for the whole group.

- *Creating a learning environment*

Piaget thought that the most effective method of helping students to develop their schema was through the interaction with the peers. These interactions prompted cognitive conflicts so that students were more likely to change their existing schema through the processes of accommodation and assimilation.

3.6 BRUNER'S THEORY OF INSTRUCTION

In the previous section you have studied about Jean Piaget. In this section we will study how Jerome S. Bruner defines learning as the process in which learner receives the instruction and work independently without support of a teacher. According to him instruction should take into account:

i)   the nature of students as knowers,

ii)   the nature of knowledge, and

iii)   the nature of the process of getting knowledge.

3.6.1 Modes of Representation

Jerome Seymour Bruner is an American psychologist who has contributed to cognitive psychology and cognitive learning theory in educational psychology, as well as to history and to the general philosophy of education. Bruner theorized that learners go through three major stages of intellectual development. These are:

i)   **Enactive stage**: In this stage, learners learn about the world around them by acting on objects. In a sense, an object is what you can do with it. A glass is used to drink while a chair is to sit on.

ii)   **Iconic stage**: Learners progress from enactive stage to iconic stage where experiences and objects are represented as concrete images. The learner, no longer need to manipulate objects in order to learn about them, but can learn through models, demonstrations and pictures.

iii)   **Symbolic stage**: Finally learners enter the symbolic stage when they develop the capacity to think abstractly with symbols. In this stage individuals go beyond the present and concrete experiences to create hypotheses.

Bruner realised that the instruction of the learner should also be sequenced. In other words, for learning to occur best, a learner should first experience it, then react to it concretely, and finally symbolize it. Rather than neatly delineated stages, the modes of representation are integrated and only loosely sequential as they translate into each other. Symbolic representation remains the ultimate mode, for it 'is clearly the most mysterious of the three.'

Bruner's theory suggests it is efficacious when faced with new material to follow a progression from enactive to iconic to symbolic representation; this holds true even for adult learners. Bruner's work also suggests that a learner (even of a very young age) is capable of learning any study material so long as the instruction is organized appropriately.

Bruner suggests a system of coding in which people form a hierarchical arrangement of related categories. Each successively higher level of category becomes more specific, echoing understanding of knowledge acquisition. In accordance with this understanding of learning, Bruner proposed the spiral curriculum, in which each subject or skill area is revisited at intervals, at a more sophisticated level each time.

3.6.2 The Process of Learning

To Bruner what is important is not the memorization of facts, but the process of acquiring knowledge. The process of stating a problem, selecting data sources, gathering data, processing data, and making inferences are more important than whether or not students learn a set of facts. Instead of presenting students with conclusions, the distance teacher/ instructional designer/open and distance learning specialist should structure the learning situation, so that the students learn how to work with data to make inferences. That is, they should learn the procedures or methods of inquiry.

According to Bruner, learning is a matter of rearranging or transforming evidence. It is a type of thinking in which the student goes beyond the information given to gain new insights and generalisations.

3.6.3 The Formation of Learning Structures

Bruner lists four advantages of emphasizing structure in designing instruction:

1) Understanding the fundamental structure of a subject makes it more comprehensible. We understand the material better if it is logically organised.

2) A structure permits the student to narrow the gap between elementary and advanced knowledge. If given the appropriate learning experiences, every distance learner can understand some of the basic concepts in a subject area.

3) Unless detail is organised into structured patterns, it is rapidly forgotten. We remember the study material better, can actually remember more study material, and are better able to retrieve study material from our memory when it is logically organized study.

4) An understanding of the fundamental principles and ideas facilitates adequate transfer.

3.6.4 Concept Formation

The inductive processes of learning play a role in the formation of learning structures, which consist of concepts and coding systems. Bruner assumes that a student's interaction with the world always involves categorization or conceptualization. The formation of concepts takes place by identifying similar properties in the objects. Categorization permits the recognition of objects, because it is only through the use of concepts that any object can be identified and communicated. Concepts are then organized into coding systems. Coding systemizes a structure of concepts that ranges from the very specific to the generic. Generic concepts include more specific concepts. The coding system may include concepts at several levels of generality, each becoming more inclusive as they become generic and less defined by specifics. The formation of coding systems for human thought processes is important because of the role they play in retention of information, transfer of learning, and the inquiry process.

3.6.5 Discovery Learning

The emphasis on mastering an inductive process of discovering knowledge, understanding the fundamental cognitive structures of a subject, using intuitive as well as analytical reasoning, and relying upon intrinsic motivation is encapsulated in a teaching method which Bruner calls the discovery learning. Discovery learning is also discussed briefly in Unit 4 of this Block.

Discovery learning takes place when students rearrange or transform evidence in such a way that go beyond the reassembled evidence to additional new insights. Using this method, the teacher/instructional designer/open and distance learning specialist present a set of problems to students who then explore them for solutions and for rules that would allow the solutions of other, similar problems. The teacher/instructional designer/ open and distance learning specialist guides the students through an inductive inquiry process similar to the process used by the scientists who originally discovered the concepts and the theories in the specific subject area. As a result, students group and reorganize the material being studied. They discover the relationships that exist among concepts and organize them into coding systems. We have discussed these applications in Table 3.1.

Table 3.1: Application of Bruner's Discovery Learning approach to Distance Education

For teachers/instructional designers/ODL specialists	For learners
• Redefine teaching role as facilitator rather than transmitter of knowledge. • Stimulate learning and inquiry by setting challenging problems for students to solve. • Provide resource rich learning environment. • Provide opportunities for students to interact with material actively, iconically and symbolically. • Allow for individual differences in ability, interest and prior experience. • Monitor the quality of learning taking place in terms of students' ability, interest and experience. • Revisit material of increasingly higher levels of abstraction.	• Participate actively in learning experiences. • Ask questions while investigating like, how, why, different from and so on. • Observe directly, draw diagrams and pictures. Record the observations and describe your experiences. • Infer and generalize from your experiences. • Revisit the concept, or redesign your investigation based if needed. • Verify that all your inquiries or hypotheses are answered through your discovery.

3.7   DAVID AUSUBEL'S THEORY OF LEARNING

David Ausubel was a cognitive psychologist who is credited with the learning theory of advance organizers. His theory, like Gagne's, suggests how teachers/instructional designers can best arrange the conditions that facilitate learning for students. The overarching idea in Ausubel's theory is that knowledge is hierarchically organized; that new information is meaningful to the extent that it can be related (attached, anchored) to what is already known.

3.7.1   The Processes of Meaningful Learning

Ausubel proposed advanced organizers through which meaningful learning can occur. The three types of subsumptions follow.

A)   **Subsumption theory**

A primary process in learning is subsumption in which new material is related to relevant ideas in the existing cognitive structure on a substantive, non- verbatim basis. Cognitive structures represent the residue of all learning experiences; forgetting occurs because certain details get integrated and lose their individual identity.

- *Derivative subsumption:* This refers to learning that occurs when a child builds upon concepts already mastered. For example, if learners are learning about apples, they will compare characteristics of red and green apples, small and large apples, sour and sweet apples and so on and build an overall concept of what apples are and what one can do with them.

- *Correlative subsumption:* Here the concepts are extended. For example, learners learn about apples, bananas and mangoes. In each case, comparisons are made and concepts extended. For example, learners learn that some

skins of fruits can be eaten while others are thrown away or can be used in the compost heap for obtaining manure later. Subsumptions reinforce an underlying principle of effective learning, which is to start with familiar material and extend it. For this reason general principles are often given, which are then tested through examples.

- *Obliterative subsumption:* This refers to the distinguishing ability of the material to be learnt. If we want the study material to be remembered, it must have some distinguishing characteristics, otherwise it will be forgotten. For example, it would be important to point out why some apples are best used for eating raw and while some can be used for making apple pie by cooking. In other words, similarities and differences should be highlighted to understand a concept better.

B) Meaningful reception learning

In reception learning the material to be learnt is presented to the learners in a relatively complete and organized form. You have learnt in the discovery approach to learning that learners are expected to discover much of the study materials themselves and to organize it in their own way. Ausubel stresses meaningful learning, as opposed to rote learning or memorization; and reception, or received knowledge, rather than discovery learning. Ausubel maintains that learning is through reception, and that discovery learning is inefficient and not necessary in most circumstances. According to him, the focus of attention should be on how to make reception learning most effective.

To help learners learn verbal material, Ausubel recommends what he calls reception learning in which material is organized from the top down, that is, from the most inclusive to the most specific. He also advocates the use of advance organizers. An organizer is a set of ideas or concepts that is given to the learner before the material to be learned. It is meant to provide the stable cognitive structure to which new learning can be anchored. Organizers can also be used to facilitate the recall of facts.

Advance Organizer entails the use of introductory materials with a high level of generality that introduce new material and facilitate learning by providing an anchoring idea to which the new idea can be attached. Cognitive theorists believe that it is essential to relate new knowledge to existing information learnt. Distance teachers/instructional designers, open and distance learning specialists can facilitate learning by organizing information presented so that new concepts are easily relatable to concepts already learnt. Examples of devices that may be used include: pictures, titles of stories, reviews of previously learnt concepts, short video segments, a paradigm, a grammar rule, etc.

C) Progressive differentiation

According to Ausubel, the purpose of progressive differentiation is to increase the stability and clarity of anchoring ideas. The basic idea here is that, if you're presenting three related topics A, B, and C, rather than presenting all of topic A, then going on to B, etc., you would take a spiral approach. That is, when you go through the study material, you would teach the big ideas (i.e., those highest in the hierarchy) in all three topics, and then on successive steps you would begin to elaborate the details. Along the way you would point out principles that the three topics had in common, and things that differentiated them.

3.7.2   Implications for Instructional Design

The instructional events can be arranged based on Ausubel's meaningful Reception Learning;

• Logically organize the study material.

• Link material to what learners already know.

• Relate the study material directly to learners existing concepts.

• Use effective expository teaching methods in particular explanation, narration and demonstration.

• Present advance organizers to the learner before the study material to be learnt is presented.

• Present study material to be learned in a variety of contexts.

• Review the study material presented and learnt and provide effective feedback.

• Apply acquired learning in novel situations to demonstrate transferability.

Check Your Progress 2

Note: i)   Write your answer in the space given below.
        ii)   Check your answer with the answer given at the end of this Unit.

In what way is Ausubel's theory of learning similar to Piaget's and Bruner's learning theories? In what ways are these different? Discuss.

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3.8 HUMANSITIC PERSPECTIVE IN LEARNING

American psychologists Abraham Maslow and Carl Rogers have contributed to the development of humanistic perspective in learning. These theorists focused on the development of a genuine concern for learners and respect for the worth of others. The underlying principles of the humanistic perspectives in learning are:

• It is an optimistic view of humanity in which individuals strive, within their own personal limitations, to achieve the maximum personal growth.

• It focuses on individuality or uniqueness of the person rather than the similarities in people.

• It views people as being self-determining and free to make their own choices.

3.8.1 Maslow's Heirarchy of Needs

Abraham Maslow (1908-1970) has been long recognized as one of the leading proponents of humanistic psychology. His work started with the study of human needs and their gratification, which influenced the understanding of human motivation.

Maslow believed that some human needs, like physiological needs, are basic to other needs and that certain needs must be satisfied before the individual becomes concerned with higher needs. Physiological needs (food, water, sleep, etc.) are most basic and hence demand immediate satisfaction. Once these needs are satisfied, needs at the next level emerge i.e. the need for good health and for safety and security from harm and danger. This is followed by the need for love and belonging. Maslow assumed that if the lower needs are satisfied, the motivation is directed towards highest level i.e. self actualization – the need to develop the self potential, to become who one is capable of becoming. Self-actualization is "not so much a matter of what a person does, as how much he feels about what he is doing".

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

3.8.1.1   Instructional Implications of Maslow's Views

Maslow's hierarchy of human needs has important implications that the instructional designers should take into account while designing instruction. A teacher may have difficulty in understanding why certain students do not complete assignments, are restless in the counselling session or are completely uninterested in activities. The counsellor assumes that the desire to learn is an important need for all students, but Maslow suggested that interest or motivation to learn may not develop until other basic needs have been met. For example, students who attend academic counselling sessions with personal/family problems, anxieties or fears, may not become self- actualized individuals.

3.8.2   Roger's Views on Learning

Carl Rogers (1902-1987), a humanistic psychologist, has influenced educational thought and practice to a great extent. He advocated an educational approach that tries to make learning and teaching more humanistic, and thus more personal and meaningful. He has given certain important humanistic learning principles, which are central to his educational philosophy. These principles are briefly discussed here:

*   **Desire to learn**: One of the foremost beliefs of Rogers is that humans have a natural desire to learn. You must have watched student's curiosity and eagerness to explore their environment, to ask questions, and to seek solutions. This inherent eagerness to learn is a basic assumption in humanistic education.

*   **Learning should be meaningful to students**: The second principle that Rogers emphasized is that significant or meaningful learning occurs when students perceive it as relevant to their own needs and purposes. Students learn best and most rapidly when they perceive learning as personally significant. Think of a student who quickly learns to operate a computer in order to enjoy a favourite game. Learning, according to humanistic psychologists, is purposeful and certainly motivated by the need to know.

*   **Learning without threat**: The third principle propounded by Rogers is that learning is best acquired and retained in an environment free from threat. The process of learning is enhanced when students can test their abilities; try new experiences, or even make mistakes without the sting of criticism or ridicule.

*   **Self-initiated learning**: For Rogers and other humanists, learning is most significant and lasting when it is self-initiated and when it involves both the feelings and the mind of the learner. If the learner is allowed freedom and autonomy, the

learning becomes highly motivating and gives the student an opportunity to how to learn. When students learn on their own, they have an opportunity to make judgements, choices and evaluations. In addition to being self-initiated, learning should involve aspects of the person – cognitive as well as affective.

3.9 COGNITIVE THEORIES AND THEIR IMPLICATIONS

The cognitive theories by different psychologists discussed in this unit have a great influence over distance learning process for designing instruction. Though they have differed in certain aspects, one may see that they have certain commonalities as follows:

- Emphasis on learner and learning process.

- Importance given to the cognitive structures already existing in learner.

- The capability of the mind to process the information and store it.

- The capability of mind of higher cognitive skills.

- Need for a proper learning environment.

- Limitation of memorization in meaningful learning.

- Role of cognition in formation and attainment of concepts.

- Importance of direct experience with objects or surroundings and involvement in activities in learning.

On the whole, it is seen that the main concern of the cognitivists was the learner and the learning process. The cognitive processes that need to be developed through providing different learning tasks were given due importance. In order to design instruction that will support learning, it is essential that we understand the nature of the tasks that learners will be performing. The cognitive task analysis and the learner analysis for designing instruction are described in the following sub-section.

3.9.1 Cognitive Task Analysis

Cognitive task analysis grew out of the cognitive learning theories discussed above to facilitate learning and to develop problem-solving abilities in learners. It has proved to be a useful tool for describing performance in complex problem-solving domains.

The first step in the design of any instruction is a task analysis to determine what should be presented in distance learning materials. Task analysis for instructional design is a process of analyzing and articulating the kind of learning that you expect the learners to know how to perform. Task analysis is necessary to:

- determine the goals and objectives of learning.

- decide the operational components of jobs, skills, learning goals or objectives, that is, to describe what task performers do, how they perform a task or apply a skill and how they think before, during, and after learning.

- identify what type of knowledge states (declarative, structural, and procedural knowledge) characterize a job or task; which tasks, skills, or goals ought to be presented, that is, how to select learning outcomes that are appropriate for instructional development.

- know which tasks are most important that have priority for a commitment of training resources.

- know the sequence in which tasks are performed and should be learned and taught.

- select and design instructional activities, strategies, and techniques that foster learning.
- select appropriate media and learning environments.
- construct performance assessments and evaluation.

Task analysis is the most critical step in instructional planning. Based on the types of knowledge stated above, the task analysis solves three problems for a teacher/instructional designer as follows:

1) It defines the content skills and procedures related to student performance or marginalizes them. This is a crucial step, since most planners will be working with known-yet-not-completely-known contents.

2) Because the reflection process compels a teacher/instructional designer to work at each individual step, skills and procedures that underlie the contents come to light.

3) During this planning, a teacher/instructional designer would be able to visualize contents from the learner's perspective. Using this knowledge one can not only gain subject and students' prior knowledge insight, but also plan for appropriate instructional teaching and assessing strategies.

Techniques of Task analysis

Topic analysis

The steps involved in conducting topic analysis are as follows:

- Identify different content structures (facts, concepts, principles, interpersonal skills, process skills, etc.).
- Group the related content structures from different subjects and their implied competencies.
- Arrange the various components into logical and sequential order.
- Prepare the final outline of the topic to represent your task analysis.

Procedural analysis

The steps involved in conducting procedural analysis are as follows:

a) What does the learner perform?
   - Identify the action in each step that the learner must perform.
   - These actions are either phychomotor or mental.

b) What does the learner need to know to do the above steps?
   - What knowledge (information) is necessary?
   - What does the learner need to know about their sources (referrals)?

c) How does the learner demonstrate using the information in conducting an action?
   - What meta-procedural and meta-cognitive knowledge skills did one use?
   - What physical or mental activities did one undertake?

d) What stimulus material or background information and local knowledge resources were used in the above steps?
   - What material, equipment, hands-on activity did one work on?
   - What local or situational experiences (expertise) had been used?

e) How best can these aspects of planning be represented in the final draft of planning?
   - What representational strategies are possible? (Concept maps, audio-visual schema, table format)

- How best the above representational strategies be organized for inclusion in further assessment planning? (Stating standards, integrated objectives, table of specifications, blueprints, etc.)

3.9.2 Cognitive Approach to Learner Analysis

The key to instructional design is to work around the distance learners rather than the content's learning. It is very important to analyze the learner groups before the instruction is planned. Learner styles are key in developing effective self learning materials.

The teacher/instructional designer must be able to identify the target learners. Prior to this one should have an understanding of learner characteristics in order to analyze the learners before planning learning experiences.

To summarize the above discussion, we can apply principles of learning derived from cognitive theories, which can potentially affect instructional design as follows:

- The first implication is reminding the designer that learners at different stages of cognitive development do not think and process information in the same manner. Learning materials and activities need to be designed appropriately to fit developmental needs.

- The second implication is that unless the presented information is stored in the long-term memory it will be quickly forgotten. Meaningful learning, which occurs when new information can be related to existing knowledge, is much more resistant to forgetting than is rote memorization. Thus, by using examples, analogies, explanations, and advance organizers, designers can increase the chances for meaningful learning to occur.

3.10   LET US SUM UP

In this unit, we have focused on the three cognitive psychologists, Piaget, Bruner and Ausubel, whose work have potential use for distance teachers/instructional designers/ open and distance learning specialists. Piaget stresses the ability to adapt to one's environment through actively building cognitive organization, attempting to assimilate new experiences into one's cognitive structures and accommodating the cognitive structures to one's experiences when they cannot be assimilated. The stages of development suggested by Piaget reflect the course of development from simple to complex, from concrete to abstract, and from the senses and immediate perceptions to the use of abstract symbols and thought. He places importance on the prior knowledge or existing schema as cognitive structures play a role in learning new information. The second theory of cognitive development is Bruner's theory, which hypothesizes that there are three stages of cognitive growth namely understanding the environment through action, imagery and symbol systems (enactive, iconic and symbolic).

Ausubel's work focuses on expository teaching. Advance organizers can be used to activate students' present cognitive structure. Ausubel also emphasizes the necessity for building meaningful cognitive structures, but is more concerned than Bruner about students' readiness to learn content.

The humanistic perspective of learning focuses on educational goals that help students to learn more about themselves and make independent decisions. This theory emphasizes on learning situations that are learner- centered and are oriented towards the discovery method.

3.11 CHECK YOUR PROGRESS: HINTS TO ANSWERS

Check Your Progress 1

1) Please see section 3.3. Please also read section 3.9 to better understand this learning theory.

2) Please see section 3.4.

Check Your Progress-2

1) Compare the sections 3.5, 3.6 and 3.7.