UNIT 2   COGNITIVE CHANGES

Structure

2.0   INTRODUCTION

Adolescence is the developmental stage between childhood and adulthood; it generally refers to period ranging from ages 12 through ages 19. Although its beginning is balanced with the beginning of puberty, adolescence is characterised by psychological and social stages as well as by biological changes.

Adolescence can be prolonged, brief or virtually non existent, depending on the type of culture in which it occurs. In societies that are simple, for example, the transition from childhood to adulthood tends to occur rather rapidly, and is marked by traditionally prescribed passage rites. Psychologists have discussed four areas that especially touch upon adolescent behaviour and development: physiological changes and growth, cognitive or mental development, identity or personality formation and parent- adolescent relations. In this unit, we will discuss on the cognitive development and changes during adolescence.

Cognitive development refers to the development of the ability to think and reason. It refers to how a person perceives, think, and gains understanding of his/her world through the interaction of genetic and learned factors. It takes a fast pace during adolescence. Teenagers accumulate general knowledge and start applying the learned concepts to new tasks.

During early adolescence, they use more complex thinking, they are focused on personal decision making in school and home environments. With some experience in using more complex thinking processes, the focus of middle adolescence often expands to include more philosophical and futuristic concerns. During late adolescence,

complex thinking processes are used to focus on less self-centered concepts as well as personal decision making.

In the theory of cognitive development, Piaget discusses about the four distinct, universal stages, each characterised by increasingly sophisticated and abstract levels of thoughts. These stages always occur in the same order, and each builds on what has been learned in the previous stage.

Adolescents, ages 12 through 19, are and should be at the "formal operations" stage of Piaget's cognitive development theory. It is characterised by an increased independence for thinking through problems and situations. Adolescents should be able to understand pure abstractions, such as philosophy and higher math concepts. During this age, children are able to learn and apply general information needed to adapt to specific situations. They are able to learn specific information and skills necessary for an occupation.

Adolescent egocentrism is also characterised by an imaginary audience with an increased self consciousness. They consider that their people around them especially peers observe their activities and may comment on them.

2.1   OBJECTIVES

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

● define and describe the meaning of cognitive changes that takes place in adolescence;

● describe the cognitive development during adolescent years;

● explain Piaget's theoretical approach on cognitive development;

● describe the information processing perspective in cognitive development; and

● analyse the school performance and cognitive development during adolescence.

2.2   COGNITIVE DEVELOPMENT

The term "cognition" refers to all processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used. It is concerned with these processes even when they operate in the absence of relevant stimulation, as in images and hallucinations. Cognitive psychology is a discipline within psychology that investigates the internal mental processes of thought such as visual processing, memory, thinking, learning, feeling, problem solving, and language.

Cognitive psychology is different from previous psychological approaches in two major ways: (i) It accepts the use of the scientific method, and (ii) It generally rejects introspection as a valid method of investigation. Unlike Freudian approach it does not belive in symbolism. It explicitly acknowledges the existence of internal mental states (such as belief, desire and motivation). It is believed that cognitive development takes place during adolescence at a more rapid pace and the ability to think, contemplate and analyse etc. become all the more sharp.

2.2.1 Cognitive Development in Adolescence

Cognitive development refers to the development of the ability to think and reason. It refers to how a person perceives, think, and gains understanding of his/her world through the interaction of genetic and learned factors. It takes a fast pace during

adolescence. Teenagers accumulate general knowledge and start applying the learned concepts to new tasks. Interest in learning life skills, such as cooking, fixing things, driving and so on, from adults at home and else where is also seen during these years. In terms of school, there is a great transition for the budding adult. As performance improves so does the individual's understanding of complex materials.

Adolescence is the developmental stage between childhood and adulthood. It generally refers to a period ranging from age 11 or 12 through ages 19 or 21. Adolescence marks the beginning development of more complex thinking processes called as formal logical operations. This includes (i) abstract thinking (thinking about possibilities), (ii) the ability to reason from known principles (form own new ideas or questions), (iii) the ability to consider many points of view according to varying criteria (iv) compare or debate ideas or opinions), and (v) development of the ability to think about the process of thinking. In addition to these, a sense of ego and personal uniqueness also develop in the youngster, who starts thinking that no one can really understand her/him.

Some common indicators of the youngsters progression from more simple to more complex cognitive development include the following:

2.2.2 Early Adolescence

During early adolescence, the youngsters are able to use more complex thinking. They are focused on personal decision making in school and home environments.

- They begin to demonstrate use of formal logical operations in school work.

- They begin to question authority and society standards.

- They begin to form and verbalize their own thoughts and views on a variety of topics, usually more related to their own life, such as:

  - which sports are better to play.

  - which groups are better to be included in.

  - what personal appearances are desirable or attractive.

  - what parental rules should be changed.

2.2.3 Middle Adolescence

With some experience in using more complex thinking processes, the focus of middle adolescence often expands to include more philosophical and futuristic concerns, including the following:

- They often question more extensively.

- They often analyse more extensively.

- They think about and begin to form their own code of ethics (i.e., What do I think is right?).

- They think about different possibilities and begin to develop their own identity (i.e., Who am I?).

- They think about and begin to systematically consider possible future goals (i.e., What do I want?).

- They think about and begin to make their own plans.

- They begin to think on long term basis.

- The use of systematic thinking begins to influence relationship with others.

2.2.4 Late Adolescence

During late adolescence, complex thinking processes are used to focus on less self-centered concepts as well as personal decision making, which include the following:

- They start thinking more about global concepts such as justice, history, politics, and patriotism.

- They often develop idealistic views on specific topics or concerns.

- They debate and discuss a great deal and also show intolerance to opposing views.

- They begin to focus their thinking on making career decisions.

- They begin to focus their thinking on emerging role in adult society.

Adolescence can be prolonged, brief, or virtually nonexistent, depending on the type of culture in which it occurs. In societies that are simple, for example, the transition from childhood to adulthood tends to occur rather rapidly.

Adolescents become capable of logical thought. However, they may not necessarily demonstrate such thinking. Adolescents' understanding of how they and others think continues to change and develop. Younger children take what has been described as realistic approach to knowledge. They y believe that knowledge is a property of the real world and that there are definite facts or truths that can be acquired. Older children or preadolescents become aware of the fact that experts often disagree, this leads them to develop a realistic approach, which recognises that different people may interpret the same information in contrasting ways.

Preadolescents go a bit farther, adopting a defended realism approach, which recognises the difference between facts and opinions. Adolescents realise that there is no secure basis for knowledge or for making decisions. They adopt an approach that is described as dogmatism-skepticism, in which, they alternate between blind faith in some authority and doubting everything. Later, some adolescents realise that while there is no absolute truths, there are better or worse reasons for holding certain views, an approach known as post skeptical rationalism.

Cognitive development continues throughout adolescence and results, in more mature modes of thought.

2.3 PIAGET'S THEORETICAL APPROACH ON COGNITIVE DEVELOPMENT

Swiss psychologist Jean Piaget (1896-1980), was the most well known and influential theorist for cognitive development. Piaget was interested in how children reacted to their environments. He proposed a more active role for them as suggested by learning theory. He envisioned a child's knowledge as composed of schemas, basic unit of knowledge used to organise past experiences and serve as a basis for understanding new ones.

Piaget's theory of cognitive development is a comprehensive theory about the nature and development of human intelligence first developed by Jean Piaget. It is primarily known as a developmental stage theory, but in fact, it deals with the nature of knowledge itself and how humans come gradually to acquire it, construct it, and use it. Moreover, Piaget claims the idea that cognitive development is at the centre of human organism and language is contingent on cognitive development.

In the theory of cognitive development, Piaget discusses about the four distinct, universal stages, each characterised by increasingly sophisticated and abstract levels of thoughts. These stages always occur in the same order, and each builds on what has been learned in the previous stage.

The stages are:

- *Sensorimotor Stage (infancy):* In this period, there are six sub-stages, intelligence is demonstrated through motor activity without the use of symbols. Knowledge of the world is limited, but developing, because it is based on physical interactions and experiences. Children acquire object permanence at about seven months of age (memory). Physical development (mobility) allows the child to begin developing new intellectual abilities. Some symbolic (language) abilities are developed at the end of this stage.

- *Pre-operational stage (toddlerhood and early childhood):* In this period, there are two sub stages, intelligence is demonstrated through the use of symbols, language use matures, and memory and imagination are developed, but thinking is done in a non-logical, non-reversible manner. Egocentric thinking predominates.

- *Concrete operational stage (elementary and early adolescence):* This stage is characterised by seven types of conservation (number, length, liquid, mass, weight, area, and volume), intelligence is demonstrated through logical and systematic manipulation of symbols related to concrete objects. Operational thinking develops (mental actions that are reversible). Egocentric thought diminishes.

- *Formal operational stage (adolescence and adulthood):* In this stage, intelligence is demonstrated through the logical use of symbols related to abstract concepts. Early in the period there is a return to egocentric thought. Only 35 percent of high school graduates in industrialised countries obtain formal operations; many people do not think formally during adulthood.

Adolescents, ages 12 through 19, are and should be at the "formal operations" stage of Piaget's cognitive development theory. It is characterised by an increased independence for thinking through problems and situations. Adolescents should be able to understand pure abstractions, such as philosophy and higher math concepts. During this age, children are able to learn and apply general information needed to adapt to specific situations. They are able to learn specific information and skills necessary for an occupation. A major component of the passage through adolescence is a cognitive transition. During this stage adolescents think in ways that are more advanced, more efficient, and generally more complex as compared to children.

This ability can be seen in five ways:

1) During adolescence individuals become better able than children to think about what is possible, instead of limiting their thought to what is real. Whereas children's thinking is oriented to the here and now—that is, to things and events

that they can observe directly—adolescents are able to consider what they observe against a backdrop of what is possible; they can think hypothetically.

2) During the passage into adolescence, individuals become better able to think about abstract ideas. For example, adolescents find it easier than children to comprehend the sorts of higher-order, abstract logic inherent in puns, proverbs, metaphors, and analogies. The adolescent's greater facility with abstract thinking also permits the application of advanced reasoning and logical processes to social and ideological matters. This is clearly seen in the adolescent's increased facility and interest in thinking about interpersonal relationships, politics, philosophy, religion, and morality.

3) Teenagers begin to think more often about the process of thinking itself, or metacognition. As a result, adolescents may display increased introspection and self-consciousness. Although improvements in metacognitive abilities provide important intellectual advantages, one potentially negative byproduct of these advances is the tendency for adolescents to develop a sort of egocentrism, or intense preoccupation with the self.

4) Thinking tends to become multidimensional, rather than limited to a single issue. Whereas children tend to think about things one aspect at a time, adolescents can see things through more complicated lenses. Adolescents describe themselves and others in more differentiated and complicated terms and find it easier to look at problems from multiple perspectives. Being able to understand that people's personalities are not one-sided or that social situations can have different interpretations depending on one's point of view permits the adolescent to have far more sophisticated and complicated relationships with other people.

5) Adolescents are more likely than children to see things as relative, rather than absolute. Children tend to see things in absolute terms—in black and white. Adolescents, in contrast, tend to see things as relative. They are more likely to question others' assertions and less likely to accept facts as absolute truths. This increase in relativism can be particularly exasperating to parents, who may feel that their adolescent children question everything just for the sake of argument. Difficulties often arise, for example, when adolescents begin seeing their parents' values as excessively relative.

Egocentrism in Adolescence

An important aspect of the psychosocial development contributing to the adolescent period is adolescent egocentrism. According to Elkind (1967), adolescent egocentrism includes a belief system carried by adolescents that makes them consider themselves as special and unique. This feeling is accompanied by the acquisition of many new psychological abilities.

Adolescent egocentrism is also characterised by an imaginary audience with an increased self consciousness. They consider that people around them especially peers observe their activities and may comment on them. They are extremely conscious of what others think of them, their appearance and everything related to themselves. This way they perceive themselves as seen by them contributing to the development of self confidence.

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Self Assessment Questions

1) Answer the following in True (T) or False (F):

- Adolescence is the period from age 12-19 years.   (   )

- Early adolescence uses more complex thinking, focus and expands them futuristic and philosophical concern.   (   )

- Adolescence becomes capable of logical thoughts.   (   )

- Adolescence egocentrism is characterised by an increased self consciousness.   (   )

- Egocentric thinking predominates in concrete operational stage.   (   )
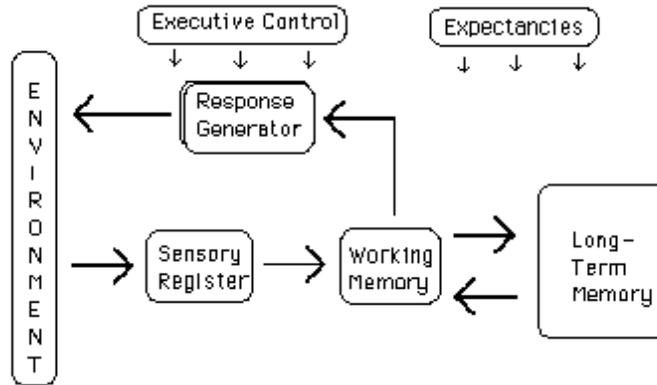
2) Fill in the blanks:

- The development of the ability to think and reason is known as _____.

- Individuals in _____ focus on less self centred concept.

- Piaget discusses _____ distinct stages about cognitive development.

- Early in the period of formal operational stage there is a return to _____.

- Aspects of psychosocial development (i.e, belief systems) contributing to adolescence period is _____.

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2.4 INFORMATION PROCESSING PERSPECTIVE

2.4.1 Information Processing

Information processing is the change (processing) of information in any manner detectable by an observer. As such, it is a process which *describes* everything which happens (changes) in the universe, from the falling of a rock (a change in position) to the printing of a text file from a digital computer system. In the latter case, an information processor is changing the form of presentation of that text file. Latent and manifest information is defined through the terms of equivocation (remaining uncertainty, what value the sender has actually chosen), dissipation (uncertainty of the sender what the receiver has actually received) and transformation (saved effort of questioning, that is equivocation minus dissipation).

When we deal with information, we do so in steps. One way to think of this is to picture the process of acquiring, retaining, and using information as an activity called information processing. Information comes from the outside world into the sensory registers into the human brain. This input consists of things perceived by our senses. We are not consciously aware of most of the things we perceive; we become aware of them only if we consciously direct our attention to them. When we do focus our attention on them, they are placed in our *working memory*.

A Model of Human Information Processing

Another name for our working memory is *short-term memory*. Our working memory has a very limited capacity – we can attend to only about seven items at a time. Therefore, we must take one of the following actions with regard to each piece of information that comes into this short-term storage area: (1) continuously rehearse it, so that it stays there; (2) move it out of this area by shifting it to long-term memory; or (3) move it out of this area by forgetting it.

Long-term memory, as its name implies, stores information for a long time. The advantage of long-term memory is that we do not have to constantly rehearse information to keep it in storage there. In addition, there is no restrictive limit on the amount of information we can store in long-term memory. If we move information to long-term memory, it stays there for a long time - perhaps permanently! To make use of this information in long term memory, we must move it back to our working memory, using a process called *retrieval*.

Information processing can be viewed as parallel to the way in which an executive manages a business. Information comes into the business across the executive's desk - mail, phone calls, personal interactions, problems, etc. (This is like short-term memory.) Some of this information goes into the waste basket (like being forgotten), and some of it is filed (like being stored in long-term memory). In some cases, when new information arrives, the executive gets old information from a file and integrates the new information with the old before refiling it. (This is like retrieving information from long-term memory to integrate it with new information then storing the new information in long-term memory.) On other occasions the executive may dig out the information in several old files and update the files in some fashion or integrate them in some way to attack a complex problem. The business of human learning operates in much the same manner.

2.4.2 Information Processing Theory

The information-processing theory is associated with the development of high-speed computers in the 1950s. Researchers—most notably Herbert Simon and his colleagues—demonstrated that computers could be used to simulate human intelligence. This development led to the realisation that computer-oriented information-processing models could provide new insight into how the human mind receives, stores, retrieves, and uses information. The information-processing theory was one of several developments that ended the decades-long dominance of behaviourism in American psychology. It focused on innate mental capacities, rather than on conditioned,

externally observable behaviour. By enabling experimental psychologists to test theories about complex mental processes through computer simulation, information-processing models helped reestablish internal thought processes as a legitimate area of scientific inquiry.

The information processing theory is an approach to the cognitive development of a human being, which deals with the study and the analysis of the sequence of events that occur in a persons mind while receiving some new piece of information. In short, it is the analysis of the way a human being learns something new. There is a fixed pattern of events that take place in such a situation, and by knowing this pattern we can enable children and people with special abilities to learn new things faster.

The information processing theory laid down by experts in psychology claims that the human mind is very similar to that of computers, as far as information processing and analysis is concerned. They also say that any new piece of information that enters the brain is first analysed and then put through the test of several benchmarks before being stored in some vestibules of the memory. Since these actions occur at a very fast speed, we are unable to notice them in action.

The sensory perceptors of a human being function in the same way as the hardware of a computer does, and the mindset and the rules and strategies adopted by the person while learning is equivalent to the software used by computers. The information processing system of a person can thus be enhanced if these perceptors and rules are altered.

2.4.3 Information Processing Model

There is a fixed structure that the information processing theory follows, and it is divided into the following four parts.

- The store model : This is a breakdown of the model which states that the information that has been received can be stored in any of the processing units, or the channels through which it passes. These channels are the sensory register, short-term memory and long-term memory.

- The sensory register : This is that part of the mental processing unit that receives all information and then stores it temporarily or permanently.

- Short-term memory : That part of the sensory register where the information is stored temporarily. Once the decision has been made regarding the information, the information will either be discarded or transferred to the long-term memory.

- Long-term memory : The part where all the information is permanently stored. It can be retrieved later as and when the need arises.

The four main beliefs of the information-processing approach include the following:

1) When the individual perceives, encodes, represents, and stores information from the environment in his mind or retrieves that information, he is thinking. Thinking also includes responding to any constraints or limitations on memory processes.

2) The proper focus of study is the role of change mechanism in development. Four critical mechanisms work together to bring about change in children's cognitive skills: encoding, strategy construction, automatisation and generalisation. To solve problems effectively, children must encode critical information about a problem and then use this encoded information and relevant prior knowledge to construct a strategy to deal with the problem.

3) Development is driven by self-modification. Like Piaget's theory of cognitive development, the information-processing approach holds that children play an active role in their own development. Through self-modification, the child uses knowledge and strategies she has acquired from earlier problem solution to modify her responses to a new situation or problem. In this way, she builds newer and more sophisticated responses from prior knowledge

4) Investigators must perform careful task analysis of the problem situations they present to children. According to this view, not only the child's own level of development but the nature of the task itself constraints child's performance. Thus a child may possess the basic ability necessary to perform a particular task when it is presented in a simple form, without unnecessary complexities. However, if extra or misleading information is added to the same task, the child may become confused and be unable to perform it.

2.5 SCHOOL PERFORMANCE AND COGNITIVE DEVELOPMENT

During adolescent years, there are many reasons for teens to under perform at school as is given below:

i) A lack of motivation to do well

ii) Problems at home or with peers

iii) Poor work habits or study skills

iv) Emotional and behaviour problems

v) Learning disabilities (such as dyslexia)

vi) Attention deficit hyperactivity disorder

vii) Mental retardation or below average intelligence

viii) Other medical problems, including anxiety and depression.

Adolescent's achievement motivation focuses on adolescents' beliefs, values, and goals. These beliefs, goals, and values changes during early and middle adolescence which lead to decline in their motivation during this period.

Specifically, early adolescents have lower perceptions of their competence for different school subjects than do their younger peers. Adolescent's valuing of different school subjects often declines as they move through school, with the declines especially marked across the transition to middle school. Their intrinsic motivation for learning often decreases as well.

The most important implication of this work for middle school counselors is that motivational problems can become more central during early adolescence. This can be a time period in which adolescence motivation declines in significant ways. Counselors can help identify children most at risk of becoming demotivated at school, and work with teachers to help foster these adolescents' motivation.

The early adolescent period is marked by many changes in biological and psychological characteristics and in relations with peers, teachers, and counselors. The transition to middle school can be difficult for early adolescents, especially those struggling with the changes in other areas of their lives.

Middle school counselors and teachers can ease this transition and help early adolescents negotiate successfully the many changes they experience. This can be accomplished by

a)   cooperation among counselors, teachers, and administrators;

b)   involvement of parents;

c)   programs and curricula to foster students' development in multiple domains (i.e., academic, social, career);

d)   responsive counseling to assist with personal issues;

e)   cultural awareness and sensitivity; and

f)   advocacy for and attention to the diverse needs of all students.

A focus on the particular developmental issues that early adolescents face should be an important part of all middle school counseling programs.

Self Assessment Questions

3) Answer the following in True (T) or False (F):

- Information processing is the change of information in any manner detectable by an observer.   (   )

- Information comes from inside ourselves into the sensory registers in the human brain.   (   )

- Long term memory stores information for long time.   (   )

- Sensory register is the mental processing unit that receives all information and stores it.   (   )

- Information processing theory focused on externally observable behaviour.
                                                                                            (   )

4) Fill in the blanks:

- When the things are present in our conscious mind, and when we do focus on them, they are placed in our _____.

- When we get information from long term memory and focus attention on them, this process is called _____.

- _____ is the analysis of the way human being learns something new.

- Mails, phone calls, etc. are _____ memory.

- Adolescents tend to under perform due to lack of _____.

2.6 LET US SUM UP

Adolescence can be prolonged, brief or virtually non existent, depending on the type of culture in which it occurs. In societies that are simple, for example, the transition from childhood to adulthood tends to occur rather rapidly, and is marked by traditionally prescribed passage rites.

Cognitive development refers to the development of the ability to think and reason. It refers to how a person perceives, think, and gains understanding of his/her world through the interaction of genetic and learned factors. It takes a fast pace during adolescence.

The early adolescent period is one marked by many changes in biological and psychological characteristics and in relations with peers, teachers, and counselors. The transition to middle school can be difficult for early adolescents, especially those struggling with the changes in other areas of their lives. Middle school counselors and teachers can ease this transition and help early adolescents negotiate successfully the many changes they experience. Particular recommendations to accomplish this include (a) cooperation among counselors, teachers, and administrators; (b) involvement of parents; (c) programs and curricula to foster students' development in multiple domains (i.e., academic, social, career); (d) responsive counseling to assist with personal issues; (e) cultural awareness and sensitivity; and (f) advocacy for and attention to the diverse needs of all students. A focus on the particular developmental issues that early adolescents face should be an important part of all middle school counseling programs.

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The information processing theory is an approach to the cognitive development of a human being, which deals with the study and the analysis of the sequence of events that occur in a persons mind while receiving some new piece of information. In short,

it is the analysis of the way a human being learns something new. There is a fixed pattern of events that take place in such a situation, and by knowing this pattern we can enable children and people with special abilities to learn new things faster.

2.7   UNIT END QUESTIONS

1)   Define cognitive development in children

2)   What are the unique features of cognitive development during adolescence?

3)   Describe Piaget's approach to cognitive development during adolescent stage of development.

4)   What is information processing approach to cognitive development during adolescence.

5)   Relate cognitive development and defects thereof to school performance   during adolescence**.**

2.8   SUGGESTED READINGS

Bruner, J. (1966). *Studies in Cognitive Growth : A Collaboration at the Center for Cognitive Studies*. New York: Wiley & Sons.

David Pruitt, M.D (2000). *Your Adolescent: Emotional, Behavioural, and Cognitive Development from Early Adolescence Through the Teen Years*, Imprint: Harper Paperbacks, NY

2.9   ANSWERS TO THE SELF ASSESSMENT QUESTIONS

1)   ● True

● False

● True

● True

● False

2)   ● Cognitive development

● Late adolescence

● Four

● Egocentric thought

● Adolescent egocentrism

3)   ● True

● False

● True

● True

● False

4) ● Working memory

● Retrieval

● Information processing theory

● Short term

● Motivation