

Cognitive Science: Fundamental Foundation Of Mental Process

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Abstract

The sole aim of education is to bring an all-round development in the personality of a child, therefore it is quite essential to understand Cognitive Science as it is science of mind/brain. Cognitive Science is the interdisciplinary scientific study of mind and its processes. It examines what cognition is, what it does and how it works. We can study cognition by application of scientific method to understanding psychology. So cognitive science can be defined as scientific study of understanding. The knowledge of the trend of cognitive science is of great use for the teacher. Therefore this paper tries to focus on the history, working areas and interdisciplinary approach of cognitive science. It also focuses on cognitive science as information processing system and its use in teaching-learning process.

KEYWORD: Cognitive Science, Cognition, Information Processing.

Introduction:

The study of mind remained province of Philosophy until the nineteenth century. Psychology is a legitimate child of Philosophy. The breakaway of psychology from philosophy is said to be for the reason that it gave up sheer speculation in favor of scientific procedure. The science of psychology is concerned with human nature and human activity more directly only for their own sake. It enables us to understand the general process of the mind and general laws about the activities and behavior of human beings.

Education is concerned with an all-round development of the personality of a child, therefore it is quite essential to understand Cognitive Science as it is science of mind/brain. Cognitive science is mainly useful to know nature and operation of mind. Therefore this science is directly related to student's mental process. So cognitive science is called as backbone of education.

History

Technical developments during Second World War led to the development of digital computer. It makes revolutionary changes in artificial intelligence. It paves the way to new world that is keen study of brain. The heredity of cognitive science extend back far in intellectual history, but its genesis as a collaborative attempt of psychology, computer science, neuroscience, linguistics, and related fields lies in the 1950s.

A key contributor to the emergence of cognitive science, psychologist George Miller, dates its birth to September 11, 1956, the second day of a Symposium on Information Theory at MIT. Though the 1956 symposium represented the birth of cognitive science, it had a lot of maturing to do before it solidified into a major recognizable area of scientific inquiry. It did not even obtain its name and institutional identity until

the mid- to late 1970s. Its first major institutions (a journal and society) were established in the late 1970s.

But in the intervening two decades, interaction and collaboration between computer science, psychology, and linguistics developed and began to bear fruit.

Founders of Cognitive Science

Attempts to understand the mind and its operation revert at least to the Ancient Greeks, when philosophers such as Plato and Aristotle tried to explain the nature of human knowledge. The study of mind remained the region of philosophy until the nineteenth century, when experimental psychology developed. Wilhelm Wundt and his students initiated laboratory methods for studying mental operations more systematically. Within a few decades, however, this psychology was dominated by behaviourism. According to behaviourists such as J. B. Watson, psychology should restrict itself to examining the relation between observable stimuli and observable behavioural responses. Talk of consciousness and mental representations was exiled from respectable scientific discussion. Especially in North America, behaviourism dominated the psychological view through the 1950s. Around 1956, the intellectual landscape began to change dramatically. George Miller summarized numerous studies which showed that the capacity of human thinking is limited to around seven items. He proposed that memory limitations can be overcome by recoding information into chunks, mental representations that require mental procedures for encoding and decoding the information. At the same time John McCarthy and Marvin Minsky developed a broad based agenda for the field artificial intelligence. By the mid-1950s, Allen Newell and Simon produce the first functioning program for reasoning, a theorem-prover called Logic Theorist and the first list-processing language. At the same time a linguist called Noam Chomsky rejected behaviourist assumption about language as a learned habit and proposed instead to explain language comprehension in terms of mental grammars consisting of rules. These thinkers mentioned above can be viewed as the founders of cognitive science.

Working areas of Cognitive Science

Following are the working areas in the field of cognitive science.

1. Knowledge of understanding process.
2. To understand the thinking process.
3. To understand memory process.
4. To understand speaking language and comprehensive process of language.
5. To understand learning process.
6. A change of mental circumstances.

Interdisciplinary approach of cognitive science

In cognitive science many disciplines work together those disciplines are-

- Psychology.
- Computer Science
- Neuroscience.
- Philosophy.
- Linguistics.

➤ Anthropology.

Need and significance of cognitive science in education

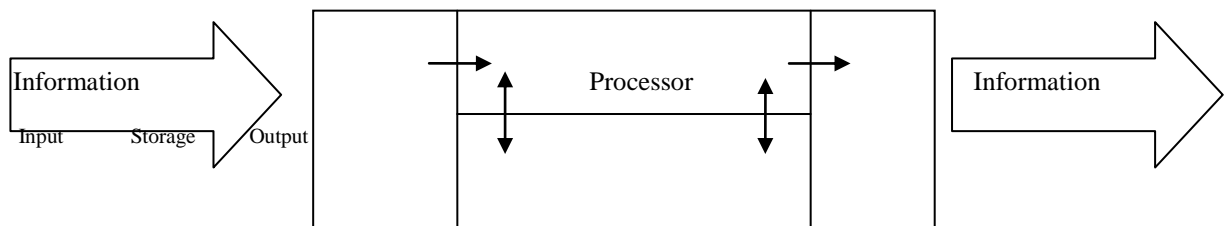
The study of cognitive science is useful on the following grounds -

- The inclusion of Psychology in a professional preparation program for the teachers has a very wide utility. Educational Psychology is one of the branches of Applied Psychology. In turn cognitive science consists of multiple research disciplines including psychology, artificial intelligence, philosophy, neuroscience, linguistics, anthropology, sociology and education. So the study of cognitive science is significant.
- Cognitive science examines what cognition is, what it does and how it works. It includes research on how information is processed. With the knowledge of cognitive science one should understand what cognition is? How it works.
- The study of language processing in cognitive science is closely tied to the field of linguistics.
- With the help of cognitive science one should know what differentiates between the cognitive process of recognition and recall.
- Education aims to help students acquire knowledge and develop skills which are compatible with their understanding and problem-solving capabilities at different ages. Thus, knowing the student's level on a developmental sequence provides information on the kind and level of knowledge they can assimilate, which, in turn, can be used as frame for organizing the subject matter to be taught at different school grades.
- The psychology of cognitive development involves understanding how cognitive changes takes place and recognizing the factors and processes which enable cognitive competence to develop.

Cognitive Science and Mental Process

Cognitive science gives new way to think about mental process. It is the interdisciplinary scientific study of mind and its processes. It examines what cognition is, what it does and how it works. In science cognition include mental processes like attention, remembering, producing and understanding language, solving problems, and making decisions. The term cognition refers to the processing of information, applying knowledge and changing preferences. In cognitive science the term cognition usually refer to an information processing view of individual's psychological functions. Information processing system, as its name suggest is a biological system which takes information in one form and transforms it into another form by an algorithmic process.

An information processing system is made up of four basic parts those are input, processor, storage, and output.



In the field of cognitive psychology ‘information processing’ approach is closely linked to the ‘computational theory of mind’ of philosophy. The philosophical concept of computational theory of mind is that the mind functions as a computer or symbol manipulator. The mind computes input from the natural world to create output in the form of further mental or physical states. This theory claims that there are certain aspects of the mind that follows step by step processes on input to create specific output. So above model represent the processing of information. While processing of information mental processes like remembering, producing, and understanding language, solving problems, and making decisions takes place. It is assumed that like computer, people were supposed to take information from the environment into “buffer” to “process” it before “storing it in memory” According to Atkinson and Shiffrin’s account, information is registered by the senses and then placed into a short-term storage area. Here, unless it is worked with in a “rehearsal buffer”, it decays after about 15 seconds. If information in the short-term store is rehearsed to any significant extent, it stands a chance of being placed into the long term store, where it remains more or less permanently.

A major problem that this approach to explaining human cognition pointed to was the relative inefficiency of human being at information processing. This is to be a result of limited capacity of working memory to roughly seven (Miller, 1956) pieces of information at one time.

Educational implications

Cognitive science in teaching-learning process can useful in the following manner.

- It is useful to find out remedial teaching method for dyslexic students because cognitive science studies linguistics.
- By the use of this science the frame work for training of player can be prepared. This science can be used in assimilating skills according to new theories in psychology.
- Cognitive science can work in the fundamental technical field to attain knowledge.
- We can also study history, sociology, and humanity science with the help of this cognitive science.
- Cognitive science is the interdisciplinary scientific study of mind and its processes. This science equips the teacher for understanding individuals mind and its processes. With the help of this science teacher can lead his students to acquire their maximum mental capacity and power.

Conclusion

Cognitive science is very vast concept and it is related to all fundamental sciences of education. This science is used as applicable science for comprehension of everything.

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