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**Psychology**

# Metacognition and Learning: An Overview

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**ABSTRACT**
*In recent years 'Metacognition' has emerged as an interesting field of research in cognitive psychology. It is now recognized that metacognition or self-awareness including awareness of ourselves as learners, helps us to learn more effectively. Learning is the process by which an individual acquires new habits, knowledge, attitude and experiences that are necessary to meet the demands of life in general. Metacognition enables us to be successful learners. It is therefore emphasized that teacher should help the students to develop metacognitive awareness and identify the factors that enhances metacognitive development. Meta teaching strategies can stimulate student's metacognitive thinking and transfer of learning. Here in this article an attempt has been made to have an overview about metacognition, its nature and the strategies of meta teaching to foster metacognition in children.*

**KEYWORDS : Meta cognition, Metacognitive Strategies, Learning.**

## Introduction

Metacognitive ability is the higher order thinking essential for meaningful learning. Learning is the process by which an individual acquires various habits, knowledge, attitude, experiences are necessary to meet the demands of life. Use of systematic and meaningful strategies in learning leads to better academic achievement. Metacognitive ability is the knowledge concerning one's own cognitive process and product. Meta cognition, literally means knowing about thinking. It is an appreciation of what one already knows, together with a correct comprehension of the learning task. Flavell, (1979) coined the term Metacognition and since then research activities are going on 'metacognition as a learning theory. A review study by Wang, Haertel and Walberg (1990) revealed metacognition to be most powerful prediction of learning. Flavell refered meta cognition as 'the individuals own awareness and consideration of his or her cognitive processes and strategies. It is a unique capacity of people to be self regulative, not just to think and know but to think about their own thinking and knowing. Metacognition refers to higher order thinking which involves active control over the cognitive process engaged in learning. Activities such as planning how to approach a given learning task, monitoring comprehension, and evaluating progress towards completion of a task are metacognitive in nature. Metacognition separates metacognitive knowledge from skills. The former refers to a person's declarative knowledge about the interaction between persons tasks and strategy characteristics (Flavell 1979) while the later refers to a person's procedural knowledge and skill for regulating one's problem solving and learning activities (Brawn and Deloache 1978, Veenman 2005). The learner high in metacognitive ability plan their work properly, know well to manage the information available, monitor their own progress and evaluate them periodically, correct their mistakes in time and always be aware of their knowledge that leads to meaning learning.

## Components of Metacognition:

There are several terms currently in use to describe 'metacognition' e.g. self-regulation, executive control, meta memory for which a simple definition of Metacognition is not easy. Metacognition originally referred to as the knowledge about and regulation of one's cognitive activities in learning process (Flavell 1979, Brawn 1978). According to Flavell (1994) Metacognition consists of two components; metacognitive knowledge and metacognitive experiences or regulation.

## Metacognitive Knowledge:

Metacognitive knowledge refers to acquired knowledge about cognitive process, knowledge that can be used to control cognitive process. Flavell further divide metacognitive knowledge into three categories –

1. Knowledge of person variables
2. Task variables
3. Strategy variables

Metacognitive knowledge is knowledge about ourselves, about the cognitive processes that indicate awareness about how well we perform certain types of tasks or our proficiency levels, knowledge that can be used to control cognitive processes. The metacognitive knowledge is used to monitor and regulate cognitive process such as reasoning, comprehension, problem solving and learning (Met Calfe and Shaimamura 1994). Knowledge of person variables refers to knowledge about human being's learning as well as individuals' knowledge of one's own learning process. For example, a student is aware that his study will be more effective in group discussion than self study at home. Knowledge of task variables includes knowledge about the nature of the task as well as the type of processing demands that it will place upon the individual. Knowledge about task indicate knowledge about the difficulty level of the task. For example, a student may be aware that for him solving a mathematical problem is easier than English comprehension. Knowledge about strategy variables include knowledge about both cognitive and metacognitive strategies as well as conditional knowledge about when and where it is appropriate to use such strategies.

## Metacognitive Regulation:

**Metacognitive regulation:** Regulation of cognition occurs when individuals modify their thinking. It is a sequential process that one uses to control cognitive activities and to ensure attainment of a cognitive goal. This dimension includes information management, planning, Monitoring, debugging and evaluation as its sub-dimensions. Metacognitive experiences involve the use of metacognitive strategies or metacognitive regulation (Brown 1987). These process help to regulate and oversee learning, plan and monitor cognitive activities as well as checking the outcomes of these activities. For example, for attaining the cognitive goal of understanding a content of a text, a student may ask himself (self question) if he or she understand the content discussed. If the student does not understand the content than he or she may decide to re read the text or divide the text into small unit and answer the questions for understanding it. Thus, meta cognitive strategy of self questioning is used to attain the cognitive goal of understanding and comprehending the text.

**Meta cognitive Skills:** Metacognitive skills consists of two basic processes occurred simultaneously - monitoring the progress of learning in the process of learning, and making changes and adapting strategies for improving learning. Metacognitive skills emphasize on conscious control of learning, planning and selecting strategies, monitoring progress of learning, correcting errors, analyzing the effectiveness of learning strategies and changing learning behaviours and strategies when necessary.

## Cognitive and Metacognitive Strategies:

Flavell (1979) acknowledge that metacognitive knowledge may not be different from cognitive knowledge. The distinction lies how the information is used. Cognitive strategies are used to help an individual achieve a particular goal while metacognitive strategies are used to ensure that the goal has been reached. Metacognitive experiences usually preceded or follow a cognitive activity. They often occur when cognition fail, such as the recognition that one did not understand what one just read. (Roberts and Erdos 1993). According to Dirkes (1985), the basic meta cognitive strategies are-connecting new information to former knowledge, selecting thinking strategies deliberately, planning, monitoring, and evaluating thinking process.

## Metacognition and Cognitive Strategy Instruction (CSI):

Most individuals of normal intelligence engage in metacognitive regulation when confronted with an effortful cognitive task, some are metacognitive than others. The children with greater metacognitive

objectives have scope for greater success in learning. One can learn to better regulate cognitive activities through cognitive strategy instruction programme.

Meta cognitive and cognitive strategy may overlap in the same strategy, such as questioning, could be regarded as either a cognitive or a meta cognitive strategy depending on the purpose for using that strategy . One may use a self questioning strategy while reading as a means of attaining knowledge (cognitive) or as a way of monitoring what one have read(meta cognitive). Knowledge is considered to be meta cognitive if it is actively used in a strategic manner to ensure that a goal is met. Cognitive Strategy Instruction (CSI) is an instructional approach, that emphasize on the development of thinking skills and processes as a means to learning. Cognitive strategy instruction enable students to be more strategic, self-reliant, flexible and productive in their learning (Scheid 1993).

### Cognition and Metacognition:

Metacognition or ability to control one's cognitive process (self regulation) has been linked to intelligence (Borkowski et al, 1987, Brown 1987, Strenberg 1989). According to Strenberg, metacognitive processes are executive processes that involve planning, evaluating and maintaining problem solving activities. In terms of metacognitive skills, one cannot engage in planning without carrying out cognitive activities, such as generating problem solving steps and sequencing those steps. One cannot check one's outcome of a calculation without comparing the outcome with an estimation of it or recalculating the outcome in another way. However, despite their interwined relation with cognitive process, metacognitive skills cannot be equated with intellectual ability (Strenberg 1990). On the average, intellectual ability uniquely accounts for 10 percent of variance in learning, metacognitive skills uniquely accounts for 17 percent of variance of learning, whereas both predictors share another 20 percent of variance in learning for students of different age and background, for different types of tasks, and far different domains (Veenman and Spaans 2005). The implication is that an adequate level of metacognition may compensate for students cognitive limitations.

### Developmental process in Metacognition:

From the literature on Metacognition, metacognitive skills emerge at the age of 3 to 10 years and expand during the years thereafter (Berk, 2003, Veenman and Spaans 2005, Veenman et al 2004). Certain metacognitive skills, such as monitoring and evaluation appears to mature than others like planning. Metacognitive knowledge and skills already develop during pre-school level are at basic level, but become more sophisticated and academically oriented whenever formal education requires the explicit utilization of a metacognitive repertoire.

### Assessment of Metacognition:

The assessment and evaluation of student's metacognition is difficult because of the variations in the definition of the construct and the relation of the constructs with others that helps in explaining student's learning. Besides, due to the methodologies, research strategies and instruments that might be employed to seek empirical data, different methods are being used for measuring Metacognition, such as questionnaires (Pintrich and de Groot, 1990, Thomas 2003) interviews (Zimmerman and Martinez-Pons 1990), the analysis of thinking aloud protocols (Afferbach 2000, Veenman 1993), observations (Veenman and Spaans 2005), online computer – logfile registration (Veenman et al, 2004), stimulated recall, eye movement registration observing children's behaviour in naturalistic setting. All these methods have their merits and limitations.

### Acquision and Instruction of Metacognition:

Majority of students acquire metacognitive knowledge and skill from their parents, peers and teachers to certain extent, with considerable variation in their metacognitive adequacy. However, a substantial group cannot spontaneously acquire this ability, because of unfavourable condition and lack of effort in building up this metacognitive repertoire. From the literature, it is observed, that metacognitive instruction appears to enhance metacognition and learning in a broad range of students. (Veenman, Elshout and Busata 1994). The key to become a self regulated learner is to realise that one's ability to learn a skill develops over time rather than a fixed trait. Students have to plan their time in the learning task, spend more of their time in goal oriented searching and periodically remind themselves of their cur-

rent goal to be a self regulated learner. For this, students should be given opportunities to practice self monitoring and adapting to set realistic goal and improve their performance.

Three fundamental principles for successful metacognitive instruction are –

- Embedding metacognitive instruction in the content matter to ensure connectivity.
- Informing learners about the usefulness of metacognitive abilities to make them exert the extra effort.
- Prolonged training to guarantee the smooth and maintained application of metacognitive activity.

Veenman (1998) referred these principles as WWW and H rule – (what to do, when, why and how). Besides these, teachers can adopt following strategies for fostering metacognitive abilities among the students. Such as

- Identifying the status of existing knowledge of the students.
- Talking about thinking aloud to demonstrate the thinking process to the students..
- Exposure to the problem solving strategies of experts through biographies, journals etc.
- Using prompts, thinking journals, learning log, to facilitate thinking while learning among students.
- Encouraging planning and self regulation of learning among students.
- Guiding students for debriefing the thinking process and for self evaluation through conferences and checklists focussing on thinking process.

### Implications:

The study of Metacognition has provided educational psychologists with an insight about the cognitive process involved in learning. It has educational implications, such as teaching students how to be more aware of their learning processes and products as well as how to regulate those processes for more effective learning. For developing meta cognitive abilities, problem solving activities should be incorporated in subjects. Along with process goals, content goals should be formed to enable the students to understand and transfer learning.

**Conclusion-** The new generation teachers have to face different challenges in the school setup. To address these challenges of classroom practice teacher training curriculum have to be updated with new strategies. Meta cognitive awareness helps the teacher trainees in improving cognitive skills of the students. Therefore, emphasis should be given on developing and accelerating cognitive capabilities among the students and teachers to make them better in information management, to bring awareness about how to plan and monitor the activities towards the achievement of goals, to understand the errors that may creep in learning and to evaluate the progress in learning.

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