



METACOGNITION IN THE CONTEXT OF EDUCATION: AN OVERVIEW

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ABSTRACT

Teachers today are faced with classroom full of students who come to them with varying levels of knowledge about how they learn. Some students are active, self-directed learners who know how to regulate their learning. Others may be average students who work hard, are aware of their learning strengths and weaknesses but who may not adequately regulate their learning. Still others may be passive learners with little awareness of how they learn and how to regulate their learning. In other words, we can say that students possess different levels of metacognition. Metacognition is generally defined as the activity of monitoring and controlling one's cognitive processes. It emerged as a specific focus of research in the early 1970s, with John Flavell pioneering great amount of work in the area. Although the construct of metacognition has wide appeal and applicability but this paper is confined to metacognition in an academic context. An attempt has been made to give a brief conspectus of the concept, its components and its importance in the field of education. Several strategies to develop metacognition in learners have also been discussed.

Keywords: Metacognition, Students, Cognitive Processes, Education, Strategies

Introduction

What are the characteristics of academically successful students? Successful students have built an extensive knowledge base, but what is perhaps even more significant, they possess a vast repertoire of strategies for accessing their knowledge and for acquiring new information to add to their knowledge base. As they study, they are able to monitor when they do not understand and know when and how to use effective strategies to improve their understanding. When they are assigned a difficult and lengthy project or paper, they exhibit the necessary planning and organisation skills to execute it in a timely fashion. These behaviours are indicators of high levels of metacognitive knowledge and skills. Given that sophisticated metacognition is a quality found in academically successful students, one way to support the development of academic skills in students is to foster the development of metacognition.

The construct of metacognition has had wide appeal and wide applicability, simulating a great deal of research across a broad spectrum of disciplines. Research today spans the sub-disciplines of educational, developmental, cognitive, clinical, social, comparative and cognitive psychology as well as other related fields. Once developmental psychologists began to study metacognition in the 1970s, the construct quickly attracted the attention of educational psychologists seeking an explanation for why some students fared better in schools than others. The consistent finding for more than 30 years has been that students who are more successful in a domain exhibit higher levels of metacognitive knowledge about the domain and are more skilled at regulating their cognitive processes. Instructional interventions to promote metacognition quickly became popular and remain so today. Therefore, the focus in this paper is on metacognition in educational contexts.

Metacognition- Concept, Definition and Components

The **concept** of metacognition is of recent origin in cognitive theory. It is the process of 'thinking about thinking' or our ability to know what we know and what we don't know. It refers to higher order mental processes involved in learning, such as making plans for learning, using appropriate skills and strategies to solve a problem, making estimates of performance and calibrating the extent of learning. It consists of two basic processes occurring simultaneously: monitoring one's progress as one learns and making changes and adapting one's strategies if one perceives one is not doing so well (Winn and Synder, 1996).

Metacognition is a combination of two words: Meta and Cognition. 'Meta' means something that transcends the subject it is related to while 'Cognition' is the internal structure and process that is involved in the acquisition and use of knowledge including sensation, perception, attention, learning, memory, language, thinking and reasoning. Thus, metacognition is a level of thinking that involves active control over the process of thinking that is used in learning situation. Metacognition also includes the psychological processes that are involved in the way a person controls, modifies, and appraises his own thoughts (Kaur, 2010).

The term 'metacognition' is most often associated with John Flavell. According to Flavell (1976), metacognition consists of both metacognitive knowledge and metacognitive experiences or regulation. Metacognitive knowledge refers to acquired knowledge about cognitive processes, knowledge that can be used to control cognitive processes. Flavell further divided metacognitive knowledge in to three categories: (i) person variables or knowledge about one's self and other's thinking (ii) task variables or knowledge that different types of tasks exert different types of cognitive demands and (iii) strategy variables or knowledge about cognitive and metacognitive strategies for enhancing learning and performance (Flavell, 1979, 1987). Metacognitive

experiences involve the use of metacognitive strategies or metacognitive regulation. Metacognitive strategies are sequential processes that one uses to control cognitive activities and to ensure that a cognitive goal has been met. These processes help to regulate and oversee learning and consist of planning and monitoring cognitive activities as well as checking the outcomes of those activities (Kaur, 2010).

Soon after Flavell's introduction, interest in metacognition flourished. Brown (1980) applied metacognitive theory to reading and differentiated between cognitive and metacognitive processes. She identified the metacognitive process as reader controlled strategies that include selecting and studying the most important part of text, selecting retrieval cues and estimating readiness for tests. She also distinguished between knowledge about cognition and regulation of cognition. Knowledge about cognition deals with all the concepts which are related to our thinking processes such as self-concept of knowledge, self-intelligence, self-memory, attention, study habits etc. It can be stable, late developing and remain relatively consistent within individuals. Regulation of cognitive processes includes all those mechanisms through which we regulate our thinking process such as orientation, planning, monitoring, testing, repairing, evaluating, reflecting etc. It can be relatively unstable, age independent and changes rapidly from situation to situation.

Paris, Wasik and Turner (1991), while recognizing the rate of self-regulation and motivation in metacognition, emphasized self-awareness and self- efficacy. On the other hand, Zimmerman, Bandura and Martinez-Pons (1992) while noting the importance of motivation and self-efficacy to self-regulation emphasised that self-regulation differentiates between academic success and failure. Thus, metacognition tends to be interpreted as a process in head, rather than as an interactive one.

Thus, the concept of metacognition can be described as a higher order cognitive structure, i.e. knowledge and processes that control, execute, and evaluate cognition. Metacognition is a superior system that encompasses a person's self-awareness of his/her cognitive functions and facts and that enables a person to purposefully direct these functions and facts. In other words, it's a person's knowledge, about his/her own knowledge; thoughts about his/her own thoughts, or eye on his/her own cognitive process.

Flavell (1976) **defines** metacognition as "the individual's own awareness and consideration of one's cognitive processes and strategies."

Paris et al. (1984) describe three aspects of self-control strategies for learning:

- Declarative Knowledge: the ability to describe some thinking strategies.
- Procedural Knowledge: knowledge of how to use the selected strategies.
- Conditional Knowledge: Knowledge of when to use it.

Metacognition refers loosely to one's knowledge and control of one's own cognition system (Brown, 1987).

"Metacognitive skills include taking conscious control of learning, planning and selecting strategies, monitoring the progress of learning, correcting errors, analysing the effectiveness of learning strategies and changing learning behaviour and strategies when necessary" (Ridley et al., 1992).

According to Houston (1995), 'Metacognition is knowledge or beliefs about factors affecting one's own cognitive activities; also reflection on monitoring of one's own cognitive processes such as memory or comprehension.'

Wilson (1999) defines metacognition as:

- Metacognitive Awareness: It relates to an individual's awareness of where they are in the learning process, their knowledge about content, personal learning strategies and what has been done and needs to be done.

- Metacognitive Evaluation: It refers to judgments made regarding one's thinking capacities and limitations as these are employed in a particular situation or as self- attributes.

- Metacognitive Regulation: It occurs when individuals modify their thinking.

"Metacognition and reflection both are concerned with the process of monitoring, regulating and controlling an individual's thinking about their thinking" (Daniels, 2002).

Mayer (2003) viewed metacognition "as the knowledge and awareness of one's own cognitive processes."

Metacognition is "one's knowledge and beliefs about one's own cognitive processes and one's resulting attempts to regulate those cognitive processes to maximize learning and memory" (Ormrod, 2004).

Veenman et al. (2006) regard metacognition as "...a higher order agent overlooking and governing the cognitive system while simultaneously being a part of it."

Metacognition can be defined as the ability to evaluate one's own comprehension and understanding of subject matter and use that evaluation to predict how well one might perform on a task. This is the process where the student takes conscious control of the learning and thinks about how one is thinking in a cognitive sense.

Most researchers have conceptualised metacognition as consisting of the following **components**:

I. Metacognitive Knowledge: Knowledge of cognition refers to what individuals know about their own cognition or about cognition in general. It deals with all the concepts, which are related to our thinking processes such as self- concept of knowledge, self- intelligence, self-memory, attention, study habits etc. It includes three different kinds of metacognitive knowledge:

- **Declarative Knowledge:** This includes knowledge about oneself and others as a learner and about what factors influence one's performance. For example, research investigating meta-memory (i.e., knowledge about memorial processes) indicates that adults have more knowledge than children about the cognitive processes associated with memory (Baker, 1989). Good learners appear to have more knowledge about their own memory and are more likely than poor learners to use what they do know (Garner, 1987). Declarative knowledge is stable, familiar, constant, established long-term knowledge which involves self-knowledge, self- awareness and a sensitivity to and evaluation of this knowledge.
- **Procedural Knowledge:** This refers to knowledge of processes and actions and knowledge about the execution of procedural skills. Individuals with a high degree of procedural knowledge use skills more automatically, are more likely to sequence strategies effectively and use qualitatively different strategies to solve problems (Schraw & Moshman, 1995).
- **Conditional Knowledge:** Refers to knowing when and why to apply various cognitive actions. It allows students to allocate resources and use strategies effectively. Students select different strategies most appropriate for each situation in an effort to better regulate their learning. Many theorists believe that metacognitive knowledge appears early and continues to develop throughout adolescence. Adults tend to have more knowledge about their own cognition than do young children and are better able to describe that knowledge (Kaur, 2010). Conditional knowledge supports awareness and knowledge of task type, demands and context and is also needed to support both declarative and procedural knowledge.

II. Metacognitive Regulation: It refers to those mechanisms that help to regulate one's thinking or learning. Three essential skills included in the process of controlling one's thinking or learning are:

- **Planning:** It involves the selection of appropriate strategies and the allocation of resources that affect performance. For example, making predictions before reading, selection of strategies and allocation of resources before beginning a task, etc.
- **(b) Monitoring:** It refers to one's on-line awareness of comprehension and task performance. The ability to engage in periodic self-testing while learning is a good example. Research indicates that monitoring ability develops slowly and is quite poor in children and even adults. Studies also suggest that monitoring ability improves with training and practice (Schraw & Moshman, 1995).
- **(c) Evaluation:** Refers to appraising the products and a regulatory process of one's learning. For example, re-evaluating one's goals and conclusions. A number of studies indicate that metacognitive knowledge and regulatory skills such as planning are related to evaluation. (Schraw & Moshman, 1995).

III. Metacognitive Experiences: For the effective functioning of metacognitive skills and for metacognitive experiences to occur metacognitive knowledge, including its three main forms i.e. declarative, procedural and conditional is the essential ingredient. Metacognitive experiences are those instigated during the monitoring of cognitive processes, problem-solving and not all forms are directly related to memory monitoring. Metacognitive experiences are influenced by a number of factors, i.e. task factors such as task complexity, performance and previous experiences; personal factors such as cognitive ability, personality, and self-concept and metacognitive factors such as metacognitive knowledge (Efklides, 2001).

Importance of Metacognition in Education

Metacognition is important because it produces powerful knowledge that enables students to control their learning by demonstrating a conscious application of cognitive strategies.

- **Metacognition for Conscious Engagement:** Very often students become passive recipients of information leading to less engagement and involvement in the learning process. The metacognitive process helps students dwell on and analyse the learning task. This makes the students mindful learners. Mindfulness can be thought of as creating an optimally receptive state for new learning and experience, increasing the likelihood that appropriate metacognitive skills will be selected and employed. Mindfulness practice requires the activation of metacognitive knowledge, monitoring, and control.
- **Metacognition for Reflective Education:** One of the roles of education is to develop reflective practitioners. Metacognition involves deep reflection on the cognitive processes and then regulation of those processes to maximize learning. Metacognitive skills help learners to reflect on the task at hand and also –in action and –on action. It also helps learners to reflect on their own reflections, thus leading to learning that is self-directed, goal oriented and self-evaluated.
- **Metacognition for greater Experiential Learning:** Experiential learning is a process that takes place when the learner gains insights from direct experiences encountered by him/her. To gain these insights the learner has to be conscious of the learning experiences at hand and the strategies that would help in the learning process. Therefore, greater the

metacognitive awareness greater would be the benefits obtained by the learners from the experiential process.

- **Metacognition for Enhanced Thinking:** Besides helping in reflective thinking, metacognition also enhances analytical and critical thinking thus enabling the learners to gain an appropriate perspective of the learning task at hand.
- **Metacognition for Deep Learning:** Metacognition does away with surface learning and helps learners go through various loops of learning thereby leading to deeper understanding. The learners are able to know and thereby tap the relevant resources for gaining deep learning.
- **Metacognition for Greater Accountability:** Students used to metacognitive thinking, assume greater responsibility for their own learning. They are aware of their own strategies and are open to modifications in their thought processes if the situation demands. Training in metacognitive skills would help students plan their tasks and activities more effectively.
- **Metacognition for Lifelong Learning:** Most students drop out or do not take up further studies, as they lack the skills that are required to be self-directed learners. A practice of metacognitive skills would help in lifelong learning as they get accustomed to goal setting and strategizing their learning.

Strategies for Developing Metacognition in Learners

Nair, Sudharma & Poulouse (2004) gave following strategies for developing metacognition in learners:

- **Planning Strategy:** Prior to any learning activity, teachers should point out strategies and steps for tackling problems, rules to remember and directions to follow.
- **Choosing consciously:** Teachers can provide the students with chances to select their own choices for learning and select appropriate methods for fruitful learning.
- **Modelling:** The probability of greatest influence on pupils is that of teachers modelling. Modelling and discussion develop the vocabulary that the learners need for thinking and talking about their own thinking. The teachers who publicly demonstrate metacognition produce pupils who cogitate.
- **Asking thought- provoking questions:** It causes pupils to define their terminology operationally and examine the premises on which their thinking is based. It is also helpful to clarify pupils' problem solving processes.
- **Clarifying pupils' terminology:** Pupils often use hollow, vague and non- specific terminology. Teachers need to clarify them in detail so that the meaning and values are explained to the full extent.
- **Paraphrasing:** Teachers should invite pupils to restate, translate, compare and paraphrase ideas of other people. It would lead them to become not only better listeners of other's thinking, but also better listeners of their own thinking as well.

Conclusion

The study of metacognition has provided educational psychologists with insight about the cognitive processes involved in learning and what differentiates successful students from the less successful ones. It also holds several implications for instructional interventions, 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. The task of teachers is to acknowledge, cultivate, exploit and enhance the metacognitive capabilities of all learners. Metacognition, or awareness of the process of learning, is a critical ingredient to successful learning.

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