

DOI 10.36074/logos-30.04.2021.v2.21

## THE ROLE OF METACOGNITION IN LEARNING AND STUDENT PERFORMANCE

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Research on metacognitive development was initiated in the early 1970s by Ann Brown, John Flavell, and their colleagues. From the very beginning, metacognition was broadly defined as any knowledge or cognitive activity that takes as its cognitive object, or that regulates, any aspect of any cognitive activity. Obviously, this conceptualization refers to people's knowledge of their own information-processing skills, as well as knowledge about the nature of cognitive tasks, and about strategies for coping with such tasks. Moreover, it also includes executive skills related to monitoring and self-regulation of one's own cognitive activities. In a seminal article, Flavell (1979) described three major facets of metacognition, namely metacognitive knowledge, metacognitive experiences, and metacognitive skills, that is, strategies controlling cognition [1], [2].

Metacognition essentially means cognition about cognition. It refers to both people's awareness and control, not only of their cognitive processes, but of their emotions and motivations as well. A number of strategies are described that teachers can use to facilitate children's metacognitive development and promote the monitoring and regulation of their own cognitive enterprises. The educational benefits of the application of metacognitive strategies such as self-awareness and self-monitoring include the development of independent learners who control their own learning and learn how to learn for life [3].

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Studies show that metacognitive strategies can increase learning skills and that independent use of these metacognitive strategies can be gradually developed in people. The school library media center is the ideal place for students to learn how to develop metacognitive strategies; that is, they can learn how to connect new information to former knowledge, deliberately select thinking strategies, and plan, monitor, and evaluate these thinking processes. There are six basic strategies for developing metacognitive behaviors in students: (1) they must consciously identify what they "know" as opposed to "what they don't know"; (2) they must then develop a thinking vocabulary so that they can verbally describe their thinking processes; (3) they should keep a thinking journal or learning log in which they reflect upon their learning processes; (4) they must also learn how to assume responsibility for regulating their learning activities, including estimating time requirements, organizing materials and scheduling the procedures necessary to complete an activity (the media center's resources lend themselves quite well to this task); (5) they must learn how to review and evaluate these strategies as either successful or inappropriate; and (6) they must participate in guided self-evaluation through individual conferences and checklists focusing on the thinking process. Metacognitive environments must be established in schools if teachers and media specialists are to be able to encourage students' development of problem-solving and learning skills. (4 references and 4 additional readings) [4].

Metacognitive knowledge involves knowledge about cognition in general, as well as awareness of and knowledge about one's own cognition. One of the hallmarks of psychological and educational theory and research on learning since the original Taxonomy was published is the emphasis on helping students become more knowledgeable of and responsible for their own cognition and thinking. This change cuts across all the different theoretical approaches to learning and development...Regardless of their theoretical perspective, researchers agree that with development students become more aware of their own thinking as well as more knowledgeable about cognition in general. Furthermore, as they act on this awareness they tend to learn better [5].

Metacognition is important to learning and knowledge transfer and preparing students to become lifelong learners is a main aim of schooling. The engagement of young students in metacognitive thinking is considered necessary, as they seem capable of developing fundamental forms of metacognition after the age of three. The development of metacognitive skills helps young children to become thoughtful about their learning process. Specifically, the implementation of interesting activities in an enjoyable manner that develops young children's high-order thinking could help them to enhance metacognitive skills and become effective learners. Physical activities during reciprocal and self-check teaching styles are such activities that could guide young students to reflect on their own learning and realise what they are doing [6].

For the purposes of this paper we will use the definition offered by the Organisation for Economic Co-operation and Development (OECD), which states that metacognition is, ...a second or higher-order thinking process which involves active control over cognitive processes.

The majority of researchers separate metacognitive knowledge from metacognitive skills. Thus, there is a difference between knowing about metacognition and being able to successfully employ such skills to complete novel tasks. In addition to this, we accept the three level model suggested by Donker et al. who recognise "an interaction of cognitive, metacognitive and motivational processes, which work together during information processing". Various studies make strong

claims for the significance of metacognition on pupils' learning. Veenman and Beishuizen, for example, suggest that metacognition accounts for roughly 17% of a child's ability to be successful at school, while intelligence accounts for approximately 10%. This is a significant statistic, reinforced by other studies (e.g. Muijs et al. 2014) which clearly suggests the necessity for schools to teach metacognitive skill effectively [7].

Researchers have increasingly investigated the role played by metacognition in students' learning and performance. Metacognition is comprised of metacognitive knowledge and metacognitive experiences, and both components of metacognition are viewed as being important to learning and performance in academic settings. Metacognitive experiences involve, in part, students' awareness of progress on cognitive tasks. Such awareness is critical to learning, for students may fail to spend additional time reviewing or studying material if they believe they have understood the material adequately [8], [9].

As previously discussed, strategic/conditional knowledge is part of metacognitive knowledge. To ensure strategies are most effective, educators (regardless of level) should think about when and why they are employing declarative and procedural knowledge within the curriculum. For example, using activities such as "Discover What I Know" and "If-Then" must be strategic in their placement during a unit. Such activities may be better suited toward the end of a unit once students (regardless of level) have enough time to gain the declarative and procedural knowledge they need to be successful. While other metacognitive activities such as a pre-posttest or mind mapping, it may be beneficial to students to think about their starting point in relation to where they are headed. Also, it should be noted that the entire metacognitive process does not have to be completed every single lesson. If this is the case, it may help to break up the metacognitive activities throughout the unit or have time to work in whole or small groups. The main point is to intentionally plan for metacognition as you design each unit, monitor throughout the unit, and evaluate upon completion and make any necessary changes [10].

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