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METACOGNITION, VYGOTSKY AND THEORY OF MIND: EXPLORING COGNITIVE DEVELOPMENT AND ACADEMIC ACHIEVEMENT

*Georgia Konstantia Karagianni

Hellenic Open University, Patras, Greece

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*Corresponding Author:

Georgia Konstantia Karagianni,

ABSTRACT

Metacognition is usually referred to as "thinking about thinking"; it is an important aspect of cognitive processes and educational psychology. It embodies knowledge in the regulation and reflection of one's learning strategies and thought processes. The paradigm of education keeps shifting, and considering meta-cognitive awareness will help improve the learning process for students in ways that are very significant. This paper discusses the importance of meta-cognition, its components, and how it can transform teaching and learning. It also incorporates Vygotsky's sociocultural theory, which argues that higher mental functions, such as metacognition, are developed through social contact. An account is provided of the concepts on scaffolding and Zone of Proximal Development postulated by Vygotsky and their relationships to metacognitive development. Further, the interlink between metacognition and Theory of Mind (ToM) is discussed here, underlining the part played by self-reflection and perspective and social problem-solving in cognitive development. By the adoption of methodologies that enhance meta-cognitive practices, besides taking these theoretical frameworks into consideration, students could be given the task of managing and directing their own learning process. This paper hence calls for further research on meta-cognition, especially in the context of open and distance learning, to have clear insights into its implications and dividends in different educational ecologies.

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INTRODUCTION

Meta-cognition can serve as a strong motivator because such awareness and understanding of one's thought processes allow learners to successfully overcome tough times in one's life, stay focused on their objectives, and persist even in the face of failure. This is indeed corroborated by personal experience if one reflects on the role of meta-cognition both in academic and personal life (Umemoto, 2013) · (Santangelo et al., 2021). Traditionally, schools have always implemented an instructor-centred approach in which the instructor dictates both the pace and the direction for learning. In that regard, little room may be allowed for reflection by the students themselves or independent learning on their behalf. Consequently, learners have fewer opportunities to govern, monitor, and assess their own educational journey, hindering them from taking ownership of their learning process (Kaput, 2018) · (Tang, 2023). To overcome these shortcomings, there is an increasing need to move away from traditional teacher-centered methods to more learner-centered approaches. This is known as learner-centered education, emanating from ancient Socratic times, where students are given the responsibility for their knowledge acquisition process and become more meta-cognitive in learning. Such skills play a significant role in fostering lifelong and autonomous learning, which Sternberg (2009), regards as central to education. In the words of Sternberg (2009), "The crucial thing to obtain from the training was not textbook factoids, but rather the learning to learn abilities and the skills in

accessing a knowledge base that constitute the heart of Meta-Cognition." However, Benson warns that providing learners with control of their learning does not by itself ensure that they will self-manage effectively because they may lack the relevant cognitive competencies (Karataş & Arpacı, 2021). Cognition encompasses intellect, reasoning, knowledge, and classification. It is what you know and think. It deals with symbols, fantasies, lower mental processes, organized muscular movements, and senses. Other variables that have been studied in association with cognition include emotions, motivation, and social cognition. According to Terrecone, a subcategory of cognition is meta-cognition defined as "second-order cognition" that provides the grounding for awareness, control, and monitoring of information during cognition (Veenman, 2015). Garner (1987), explained the difference between cognition and meta-cognition when he stated that cognitive skills are needed to execute a particular task, but the meta-cognitive ones are required to explain how a particular task was realised. This higher-order thinking is important for adequate learning strategies and self-awareness in education. Meta-cognition can be a very potent motivator because such awareness and understanding of one's thought processes provide the learner with ways of surmounting hard times in one's life, focusing on one's aims, and persisting even when faced with failure. This self-awareness is further brought forth through social contact as underlined in Vygotsky's sociocultural theory. Through scaffolding and guidance within the Zone of Proximal Development, individuals develop higher-order thinking skills such as metacognition. In addition, there is a tight link between the development of

metacognition and Theory of Mind, as both involve reflection upon the self and knowledge of mental states. As learners develop their skills in metacognition, they simultaneously become more adept at perspective-taking and social problem-solving, key components of ToM. This interplay between metacognition, social learning, and understanding others' mental states contributes to more effective learning strategies and improved social cognition.

MATERIALS AND METHODS

This paper draws on a holistic analytical procedure to explain and connect such concepts as metacognition, Vygotsky's sociocultural theory, and Theory of Mind. The methodology involves a critical analysis of the existing body of literature and theory that synthesizes current understanding and elaborates on the interrelationships between these cognitive processes. First, we will delve into metacognition, analyzing its key components: metacognitive knowledge (including person, strategic, and task knowledge) and regulation of cognition (encompassing planning, monitoring, and evaluation). This examination will provide a foundation for understanding how individuals reflect on and manage their cognitive processes. Next, we will explain the sociocultural theory of Vygotsky: the concepts of scaffolding, Zone of Proximal Development, and internalization, and then relate these to how social interactions and cultural contexts impinge on the cognitive development process generally, and more particularly metacognitive skills. The last one deals with the investigation of Theory of Mind regarding its development and relationship to metacognition. This will highlight how understanding other people's mental states relates to self-awareness and cognitive regulation. Throughout the paper, we will point out how these three areas are interconnected by elaborating on how they relate to and interact with each other in cognitive development and processes of learning. Such integration will allow us to provide a holistic view related to higher-order thinking and its development in social and educational contexts.

Meta-cognition: Meta-cognition failed to appear in the literature until the year 1976, while studies on theories of mind, in other words, in cognitive sciences, psychology, and education had been carried out. Flavell investigated meta-memory capabilities, and so-called "meta-memory" is discussed in works. The productivity effect of the 1976 study of Flavell's gives the right track to the introduction of meta-cognition. Flavell defines meta-memory as "one's own cognitive processes and outputs, as well as everything that is associated with them." Meta-cognition is the knowledge about one's processes where information of the mind is used to regulate one's own mental processes. As put by the authors, executive control is a concept in cognitive psychology. It is a process that includes two dimensions: monitoring and self-regulation. Other works have made a similar observation in their analyses. Meta-cognition has been studied in various aspects and has recently gained. Meta-cognition refers to the process of learning about and managing the brains or cognitive systems of individuals for learning. (Flavell, 1979) · (Leudar et al., 2004) · (Apperly, 2012) · (Roebers & Feurer, 2016) · (Wellman, 2018). Meta-cognition consists of several sub-elements, each with its own set of characteristics. Flavell gave an introduction to two dimensions of meta-cognition: metacognitive knowledge and metacognitive regulation.

Meta-cognitive knowledge: Meta-cognitive knowledge is one of the factors that influence self-directed learning since it is the knowledge base that students draw on while making decisions about learning. It involves self-awareness, task understanding, and strategic understanding—all contributing to conscious control of mental processes, cognitive goals, and learning experiences (Mariano & Batchelor, 2018) · (Jaakkola et al., 2022). The importance of meta-cognitive knowledge is that it offers productive learning outcomes. Students who possess this knowledge usually show faster and wiser learning capabilities. Meta-cognitive knowledge entails three important aspects:

Person knowledge: Personal knowledge involves profound insight into both individual and collective cognitive processes. Intra-personal awareness refers to the ability to identify and understand one's own psychological capabilities, style of learning and thinking, intellectual strengths, and inborn abilities. This self-awareness constitutes the basis for personal development and learning adjustment. Interrelated to intra-personal awareness is interpersonal awareness, which involves sensitivity to and an appreciation of other people's skills, abilities, and talents. Building on both intrapersonal and interpersonal awareness can enhance one's skills of effective communication, collaboration, and empathy, while nurturing richer interpersonal relationships and more effective team dynamics. Such understanding is essential in various contexts, including educational settings and professional contexts, where this synergy between personal insights and social cognition may be that significant difference that will make all the difference. This includes knowledge of how learning takes place, how information is processed, and insights into specific thinking patterns. It also considers diverse information-processing modes, such as auditory, visual, and kinesthetic, and their effectiveness for individual learners.

Strategic Knowledge: Strategic knowledge encompasses a comprehensive understanding of various learning strategies and their practical applications, ultimately empowering learners to navigate the educational landscape with greater efficacy. By selecting appropriate strategies rather than relying on chance, learners can tailor their approaches to suit individual needs and contexts. This intentional selection not only simplifies the learning process but also enhances it, enabling informed decision-making that promotes deeper engagement with the material. This is because strategic knowledge provides the learner with such abilities to decide when and how to apply different strategies, thus enabling adaptation and responsiveness in learning. It is reflective of knowledge about the processes occurring during educational experiences; this has provided a strong framework guiding learners in the best conducting of their study for the achievement of academic goals.

Task Knowledge: Task knowledge involves comprehensive insight into critical components integral to effective learning activities. This includes the clear articulation of the objectives that would drive learning and, by the process, give insights for educators and learners to equally identify what is sought in terms of desired outcomes and benchmark progress. More importantly, there is also awareness of how a particular task brings about changes in learning outcomes: "Such knowledge can help explain how various kinds of task structure facilitate or hinder the learning process." The former especially involves "a fine-grained analysis of the task characteristics with regard to the task nature and level of difficulty" since it plays a central role in the stimulation of learners' engagement and motivation. With these combined insights, educators can construct activities that meet educational goals while providing an enriching learning environment for deeper learning and retention. It leads the learner to get goals systematically achieved. A biology learner studying mitosis might proceed by using schemes and visualisation cognitive processes aimed at comprehension, whereas the method for rote memorising the periodic table in chemistry would be decidedly different, perhaps based on making mnemonic phrases from rows and columns.

Regulation of Cognition: Meta-cognition features a component of cognitive regulation, an important aspect that deals with how individuals regulate their thinking and learning. This self-regulating ability of meta-cognition splits into three important components: planning, monitoring, and evaluating (Winne, 2017) · (Akamatsu et al., 2019) · (Saxena, 2020).

Planning: Planning is quite indispensable in the efficient performance of any task; as such, it calls for a methodical approach that will embed several key elements in its structure. This involves the statement of well-defined objectives that give focus to the direction of effort, the determination of resources needed for the task, and a roadmap that clearly describes the specific steps to be taken towards the realization of what is desired. Furthermore, selection of

appropriate methodologies depends on their actual achievements, relating specifically to the improvement of learner performance. In reading comprehension, for instance, planning strategies make considerable achievements in understanding. These include the prediction of the content of the text, which encourages an active approach toward the material; using visual aids such as images and titles to contextualize information; and predicting the meaning of unfamiliar words in a text helps readers prepare themselves for dealing with vocabulary that is complex. Together, these approaches not only improve understanding but also provide readers with the wherewithal necessary to approach texts confidently and knowledgeably.

Monitoring: Monitoring refers to the sustained and heightened awareness of individual cognitive processes while a learner actively participates in and progresses through a certain activity. It is a crucial cognitive skill that truly enables and empowers students towards the development of a higher degree of self-awareness and reflectivity of their understanding and performance during their respective academic careers. Through the training course of their thought processes, learners are focused and acquainted in ways to better allocate their cognitive resources and to persevere in the face of challenges. In reading comprehension, a number of monitoring techniques have been found helpful. These include the practice of rereading challenging passages to enhance understanding, posing questions during the reading to clarify content and stimulate critical thinking, and making predictions about forthcoming material to maintain engagement and anticipation. Collectively, these techniques serve to enrich the reading experience, promoting deeper comprehension and sustained attention throughout the process.

Assessment : The evaluation phase of the learning process involves a comprehensive assessment of learning outcomes and making informed decisions regarding the overall effectiveness of the various learning processes employed. After the completion of a specific task or project, it is essential for learners to engage in deep reflection about the effectiveness of their individual approaches and strategies utilised throughout the task. One of the most useful and effective assessment methods in the realm of reading comprehension is the practice of summarising the content, as this technique significantly aids in solidifying a learner's understanding and retention of the material being studied. The three critical components of planning, monitoring, and evaluation work together synergistically to help regulate the process of learning, ultimately assisting individuals in becoming more meta-cognitively aware and proficient, which in turn enhances the overall learning outcomes experienced.

Vygotsky's Legacy: Foundations of Metacognitive Understanding: Undeniably, Vygotsky's broad-reaching contributions to metacognitive theory are several conceptual components that go well beyond those highlighted herein. His perceptive work regarding the necessary transition from other-regulation to self-regulation has proven to be extraordinarily influential in educational psychology. This major process consists of the gradual journey or process during which learners come to internalise cognitive strategies and self-regulatory behaviours that were earlier guided and supported by others—usually more knowledgeable and skilled ones, such as teachers or mentors (Fox & Riconscente, 2008), (Bodrova *et al.*, 2013). The Zone of Proximal Development—the concept of ZPD in more specific terms—relates to the process by which learning occurs and the development that might possibly take place by a student. It describes a discrepancy between a learner independently demonstrating an ability and beyond that learner's reach, whereby he can engage in such a task with some guidance from a more knowledgeable mentor or teacher. Strategies of scaffolding are utilised to facilitate support and guidance within the ZPD; however, concerted focus is paid to developing the metacognitive capabilities. To the extent that the learner utilises greater competencies and efficiencies in the utilisation and expression of the developing skill sets, greater removal of the scaffolding support through gradual means allows for greater independence and self-sufficiency within the learning process. (Margolis, 2020), (Alghamdy, 2024).

Vygotsky's significant emphasis on the role of language as a fundamental mediator of thought processes is also critically important in understanding the concept of metacognition. He pointed out that private speech, which refers to self-directed verbalisation that individuals engage in, plays a crucial role in the development of self-regulation as well as metacognitive awareness. In the case of developing children, the external self-talk they initially express externally finally gets internalised, thus forming the basic structure of their inner speech and giving a start to metacognitive reflection (Fernyhough, 2008). According to many, the intuitions put forward by Vygotsky, highly influential in his theories, have been regarded as the central element in understanding how this metacognitive skill evolves over time. Planning, monitoring, and evaluating skills, at first manifested as an external process that individuals engage in, are internalised through meaningful social interactions and guided practice that encourage deeper cognitive engagement. This more elaborative process of internalisation effectively develops the valuable metacognitive knowledge and essential skills that enable individuals to better regulate their own learning and thinking. It is from Vygotsky's comprehensive discussion of verbalised self-observation that a clear view is formed on how reflective awareness begins to set in and develop through his clear-sighted theories. What starts off as an activity that is highly prompted and scaffolded by others now evolves into an interactive and potent tool for promoting metacognitive development as the learners develop in their ability to observe, analyze, and conceptualise their own cognitive flow (Leontiev *et al.*, 2017) · (Stetsenko, 2017).

Metacognition and Theory of Mind (ToM): Metacognition and Theory of Mind are interrelated cognitive processes that make indispensable contributions both to human social cognition and to self-regulation. While metacognition deals with reflections on one's own cognitive processing, ToM emphasises the understanding of the mental states of others. In the course of child development, both faculties develop in a parallel manner; their growth is, to a large extent, interdependent (Ebert, 2015) · (Feurer *et al.*, 2015) (Dutemple *et al.*, 2023). Indeed, both seem to interact in a number of aspects of their development. Parallel to the development of sensitivity in children to their own thought processes, there is a parallel improvement in the ability of the children to infer and understand the mental states of others. This mutual relationship is very important for social interaction since it allows not only monitoring and regulation of one's cognitive activities but also predicting and interpreting other people's behaviours in light of their presumed mental states. It is believed that these cognitive skills develop owing to different influential factors, for example, environmental stimuli, social experiences, and neurological maturation. In engaging with social interactions and feedback from the environment, a child continues to sharpen both metacognitive skills and theory of mind. Co-development in this respect carries on into adolescence and adulthood; each of these abilities informs the other. Research has shown that individuals with strong metacognitive abilities often display more advanced ToM skills, as their capacity for self-reflection allows them to better understand and empathise with others' perspectives. Conversely, those with well-developed ToM abilities may exhibit enhanced metacognitive awareness, as their understanding of others' mental processes can inform their own self-awareness and cognitive regulation. The complex interrelation of metacognition and ToM bears strong implications for education, social development, and psychological intervention. Fully realising that these cognitive processes are interrelated, researchers and practitioners will be in a position to devise better ways to enhance social cognition and self-regulation across diverse domains of human experience (Mitchell & Phillips, 2015) (Ertürk & Tepeli, 2024).

This relationship is manifest in a number of ways, as is shown next. Self-reflection: Metacognitive skills help an individual to reflect upon his thoughts and beliefs, and they probably provide the very basis for understanding the mental state of others. The ability of introspection helps the individuals to recognise their cognitive processes, biases, and emotions, which also help them attribute a similar kind of mental state to others (Papaleontiou, 2008).

Perspective-taking: The emergence of both metacognition and ToM seems to involve the ability to transcend the immediate perspective and consider other perspectives. It suggests that other people may hold different beliefs, different desires, and different intentions from their own—a crucial building block in the development of ToM (Barnes, 2004).

Social problem-solving: Metacognitive strategies for planning and monitoring can also be applied to social situations, enhancing ToM abilities in predicting and interpreting others' behaviours. Utilising metacognitive skills to reflect upon social interactions will enable the individual to more easily and skilfully handle complex social situations and reactions from others (ÇETIN et al., 2012) · (Güner & Erbay, 2021).

Executive functioning: Both metacognition and ToM rely on the same executive functions, including working memory and cognitive flexibility; implying common neural substrates. The current cognitive processes—one can manipulate mental representations internally and switch between perspectives—make the following important to both metacognitive and ToM representations (Robson, 2019). That is, language development supports the acquisition of mental state terms and complex language structures in their contribution to the development of metacognitive awareness and ToM understanding. As children develop more sophisticated language, they increasingly have the facility to express and understand abstract concepts related to thoughts, beliefs, and emotions underpinning both metacognitive and ToM abilities.

False belief understanding: One important metacognitive aspect of understanding false belief, for instance, is the realisation that one's own beliefs may be wrong or incomplete. This provides a more critical comprehension of how others may hold beliefs that are not real (Hernik et al., 2009) · (Massaro et al., 2014).

Emotional regulation: Metacognitive skills regarding the monitoring and regulation of one's self-emotions may improve empathy and provide emotional understanding of others. In fact, through better awareness and regulation of one's own emotional states, the ability to recognise and respond appropriately to other people's emotions can be facilitated (Zaki, 2020) (Thompson et al., 2022).

Social learning: Metacognitive reflection upon social interactions can improve the subsequent use of ToM and social skills. Reflecting on previous social experiences and consequences, the person refines and develops social precepts through considering the thoughts of others (Wellman, 2017) (Goupil & Kouider, 2019). In sum, autism spectrum disorders involve both metacognitive and ToM deficits and therefore do share a common mechanism. This relation points out that these cognitive processes are interrelated and form the basis of social functioning. Educational implications: Teaching strategies offering metacognition might also enrich ToM skills. Consequently, social behaviour may improve, leading to improved academic performances. Hence, it may be that educators encouraging the development of metacognitive skills can support ToM development, with significant ramifications for students' social and academic success (Zalla et al., 2015) · (Bamicha & Drigas, 2022).

RESULTS

Our review of the literature on the topic clearly brought us into contact with highly interrelated ideas between metacognition and Vygotsky's sociocultural theory, especially so concerning ToM. The development of ToM is inextricably linked with metacognitive knowledge-development and regulation processes, with a particularly important mechanism being self-reflection and awareness of others' states of mind. Vygotsky's ideas of scaffolding and ZPD were seen to be important facilitators in developing metacognitive skills, especially in educational contexts. According to Vygotsky, internalization was that very process constituting the turning point from externally-conducted metacognitive strategies into internal self-regulation.

Further, our review evidenced that advanced ToM abilities were related to greater metacognitive skills, showing a bi-directional relationship between the two constructs. Such findings underline the complex interrelation of social, cognitive, and metacognitive processes concerning human development and learning.

DISCUSSION

In brief, metacognition forms a basis for cognitive development and learning processes. This article has looked into the intricacy of metacognition, its constituents of metacognitive knowledge and regulation that make up the construct of metacognition, and further considered how the acquisition of metacognitive skills is developed over time under the continuous influence of both internal cognitive processes and external social interactions. The work of Lev Vygotsky has been particularly influential in shaping our understanding of metacognition. His ideas regarding other-regulation moving to self-regulation, scaffolding, the Zone of Proximal Development, and internalization of social processes have provided a framework with which to understand how metacognitive abilities emerge and evolve. Moreover, we have discussed in detail the complex relationship of metacognition and Theory of Mind, specifying how these two constructs interrelate and inform each other in cognitive development. The connection underlines the role of social cognition in developing the skills of metacognition. As this area of research moves further forward, it has clearly become established that developing metacognitive capabilities is crucial to facilitate the utilization of appropriate learning strategies and problem-solving for enhancing cognitive development. By being better informed of how metacognition works, including in its development, educators and researchers can develop more adequate interventions and learning environments that support the development of these thinking skills. Future studies might be directed toward a deeper comprehension of the neurological underpinnings of metacognition, the cultural factors in the development of metacognition, or the devising of more nuanced assessment and instructional tools to elicit improvement in metacognitive skills across populations and contexts.

The findings from this study could easily be transferred into an open and distance learning environment for developing metacognitive skills and ToM development. Online collaborative tools can then be used to scaffold or peer-to-peer learning, encouraging virtual social interaction and knowledge co-construction. Self-reflection activities and digital portfolios are also useful to adapt for remote metacognitive knowledge and regulation. Adaptive learning systems can further be designed to recalibrate the level of difficulty according to individual students' zones of proximal development to provide an optimal level of challenge and growth. Virtual simulations and role-playing exercises can be embedded to develop Theory of Mind skills in online settings, enabling students to practice perspective-taking and social cognition. However, structured online discussions can be designed that allow internalization to take place during social interaction, hence actually bridging Vygotsky's sociocultural theory with distance education practices. Asynchronous learning modules can be created that walk the students through the planning, monitoring, and evaluation processes, hence enhancing metacognitive skills in them. AI-powered chatbots or virtual assistants can offer personalized metacognitive prompts and support, providing scalable personalized guidance. Online peer review systems for courses can be designed to enhance metacognitive awareness and Theory of Mind by challenging students to consider the multiple perspectives of others. Online multimedia course content can be designed to explicitly teach and model metacognitive strategies for distance learners through varied learning styles and preferences. It finally allows co-construction of knowledge and metacognitive development in virtual communities to create rich interactive learning with the potential to support the growth of individual and collective metacognitive gains along with Theory of Mind.

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