The Role of Metacognition in Strategic Learning. Critical Analysis and Exemplifications

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Abstract	
Keywords: "thinking about thinking"; metacognition; learning; strategy; strategic learning	Metacognition is often referred to as "thinking about thinking". It is a regulatory system that helps people understand and control their cognitive performance. Metacognition allows students to take charge of their own learning. It involves awareness of how they learn, an assessment of their learning needs, generating strategies to meet those needs, and then implementing the strategies (Hacker, 2009). Strategic learning represents that type of learning in which the learner consciously participates in the act of learning, is responsible for the learning process, and controls his efforts in the direction of building, using, and promoting particular, specific cognitive strategies, techniques, and tools, gains independence, learns how to learn independently and effectively.

Zusammenfasung	
Schlüsselworte: Nachdenken übers Nachdenken"; Metakognition; Lernen, Strategie; strategisches Lernen	Die Metakognition wird häufig als das "Nachdenken übers Nachdenken" erwähnt. Sie ist ein Regulierungssystem, das den Menschen hilft, ihre eigene Leistung zu verstehen und zu kontrollieren. Metakognition ermöglicht es den Studenten, sich mit ihrem eigenen Lernen zu beschäftigen. Es handelt sich darum, dass die Studenten sich ihres Lernens bewusst sind, ihre Lernbedürfnisse einschätzen und Strategien generieren, um diese Bedürfnisse zu erfüllen und die Strategien in die Tat umzusetzen (Hacker, 2009). Strategisches Lernen stellt eine Art des Lernens dar, bei der der Lernende bewusst am Akt des Lernens teilnimmt, für seinen Lernprozess verantwortlich ist, seine Bemühungen zur Verwendung und Förderung von bestimmten kognitiven Werkzeugen überprüft und zum Schluss lernt, wie er selbständig und effektiv lernen soll.

1. Introduction

"Metacognition" is a concept that has been used to refer to a variety of epistemological processes. Metacognition essentially means cognition about cognition; that is, it refers to second-order cognitions: thoughts about thoughts, knowledge about knowledge, or reflections about actions. So if cognition involves perceiving, understanding, remembering, and so forth, metacognition involves thinking about one's own perception, understanding, remembering, etc. These various cognitions about cognitions can be labeled as "metaperception", "metacomprehension" and "metamemory" with "metacognition" remaining the superordinate term. (Papaleontiou- Louca, 2003)

Flavell (1978) referred to it as "knowledge that takes as its object or regulates any aspect of any cognitive effort" (p. 8). Moore (1982) defines it as "an individual's knowledge about various aspects of thinking" and it has also been described as "the abilities of individuals to adjust their cognitive activity in order to promote more effective comprehension" (Gavelek & Raphael, 1985, pp. 22-23).

Moreover, a definition of "metacognition" according to Paris & Winograd (1990) "captures two essential features …: self-appraisal and self-management of cognition" (p. 17). Self-appraisals are people's reflections about their knowledge states and abilities, and their affective states concerning their knowledge, abilities, motivation, and characteristics as learners. Such reflections answer questions about 'what you know, how you think, and when and why to apply knowledge strategies" (Paris & Winograd, 1990, p. 17). Self-management refers to "metacognition in action", that is mental processes that help to "orchestrate aspects of problem-solving" including "the plans that learners make before tackling a task", "the adjustments they make as they work", and "the revisions they make afterward" (p. 18). It is important to note, here, that "theoreticians seem unanimous – the most effective learners are self-regulating" (Butler &

Winne, 1995, p. 245). Key to effective self-regulation is accurate self-assessment of what is known or not known (Schoenfeld, 1987). Only when students know the state of their knowledge can they effectively self-direct learning to the unknown.

A regulation system helps people understand and control their cognitive performance. Metacognition allows students to take care of their learning. It involves awareness of how they learn, an assessment of their learning needs, generating strategies to meet those needs, and then implementing strategies (Hacker, 2009). Metacognition consists of two complementary processes: 1) knowledge about knowledge and 2) the regulation of knowledge.

1. *Knowledge about knowledge* has three components:

a) knowledge of the factors that influence a person's performance;

b) knowledge of the different types of strategies used for learning;

c) knowing which strategy to use for a specific learning situation.

2. *The regulation of knowledge* involves setting objectives and planning; monitoring and controlling learning; evaluating one's adjustment (evaluation of results and strategies used).

Considering the peculiarities of strategic learning highlighted in the specialized literature and analyzing the approaches and definitions for strategic learning, I have elaborated the following own/ working definition:

Strategic learning is the type of learning in which the learner consciously participates in the act of learning, is responsible for the learning process, and controls his efforts towards building, using, and promoting particular, specific strategies, techniques, and cognitive tools, gains independence, learns how to learn independently and effectively.

"Strategic" students – have a set of thinking and learning strategies that they use competently, to reflect on and control their own learning process, as well as to acquire new knowledge (Fennimore & Tinzmann, 1990 apud Popovici Borzea, 2017, p. 158).

2. What is the role of metacognition in strategic learning?

"A metacognitive approach to instruction can help students take control of their learning, define their own learning goals, and monitor their progress in achieving them." (Bransford et al., 2000, p. 18)

When students use metacognitive strategies, they can take a step back to observe their way of thinking and to reflect on the learning process. They are also active participants in learning (Kohen & Kramarski, 2018). Students who use metacognitive strategies know themselves and know exactly their learning style, strengths, and weak points, beliefs and motivation, level of knowledge of different strategies, and the ability to apply and transfer these strategies and skills. They plan, monitor, and evaluate their processes and summarize the lessons of learning and reflect on learning.

Metacognitive skills are learning skills that benefit learners and help them develop into a wide range of domains, including cognitive and affective. Students with metacognitive skills learn better. Metacognition comes into play when learners engage in independent learning, self-regulating learning, reflective learning, understanding, problem-saving, communication, and collaboration. Metacognition develops students' critical thinking skills. Good critical thinkers engage in several metacognitive activities, especially high-level planning, and high-level evaluation strategies (Ku & Ho, 2010). Metacognition is positively linked to self-regulating, independent learning, learning, and self-management. Metacognitive regulation is essential for self-regulating learning and relates to student performance to a large extent.

In general, metacognitive regulation promotes academic success, especially in higher education since both organizational structures and academic tasks at this educational level underline self-management and independent learning (Backer et. al., 2015).

Metacognition and metacognitive learning promote communication and collaboration skills. Students are asked to verbalize their way of thinking and to discuss in pairs or groups the formation of metacognitive skills. Students are recommended to work in a team; and they must be able to express or present their way of thinking, opinions, and arguments. The training helps to facilitate both collaboration and communication skills.

When using this approach, they could use such questions: "What is the problem that needs to be solved?" "How should I solve the problem?" "How well am I doing?" "How well did I do?" "How can I do better next time?"

Kamei (2021) develops a holistic framework for learning. It describes learning as a continuous cycle that involves setting your own goals for the study, drawing up the study plan following the set objectives, implementing the study plan, and then revising the plan. After which the process resumes. This part of the learning framework is known in the scientific literature as the Metacognitive Cycle (Tanner, 2012; Zimmerman, 2002).

(Tanner, 2012) published an article on metacognition in which she offers several strategies to help students monitor their learning. She provides a list of separate questions to be given to students as a guide to planning, monitoring, and evaluating their training.

Table 1.: *Questions of learning planning, monitoring, and evaluation* (translated and adapted after Tanner, 2012)

Planning	**Monitoring**	**Assessment**
What strategies will I use to study (eg: study groups, problem study, making graphs, hands-on experiments), or do I spend many hours studying and doing recaps? How long do I intend to study? How much time do I need to devote to study? Which aspects of the study material should I emphasize more and which less, considering my current comprehension capacity?	To what extent am I organized in studying the materials for the exam? To what extent do I make use of all the available supports in my study? Do I have problems motivating myself? What ambiguities have I clarified? How did I go about clarifying them? What uncertainties do I still have and how will I clarify them?	What was effective in my training and what should I capitalize on it next time? What went wrong, what should I change? Which questions did I not answer correctly? Why? How does my answer compare to the suggested answer? What uncertainties do I still need to clarify?

These questions favor the engagement of students in such processes of self-reflection, which will allow them to become self-sustaining learners. Essentially, these questions provide students with a roadmap for organizing and monitoring their learning.

Strategic learning begins with the formulation of learning goals (Kamei, 2021, p. 14).

In formulating the learning objectives, students will be able to use the SMART method (Lawlor, 2012), as follows:

- (S) Specific: Is your objective clearly defined?
- (M) Measurable: Can you measure the criteria to track your progress?
- (A) Achievable: Can you achieve your goal?
- (R) Relevant: Is the goal aligned with what you want?

(T) Framed in time: Is there a reasonable, defined time for achieving/measuring this goal?

For example, many of the students have quite high and ambitious goals (such as becoming a doctor or lawyer, winning a gold medalist in the Olympics, or having their society) that may or may not be achievable in a short period. However, it is recommended that SMART goals be complemented by aspirational goals. Thus, SMART goals can be the steps towards achieving aspirational goals and help to monitor the achieved progress. Whether they are SMART goals or aspirational, effective strategic learning is also based on the permanent rethinking and reformulation of learning objectives (Kamei, 2021, p. 27).

The effective use of strategies can increase motivation, perseverance, and self-esteem and consequently promote academic success and independent learning.

Students who use metacognitive strategies can find solutions even for the moments when their demotivation occurs in learning. A useful example of

this is the "5 why?" model. (Kamei, 2021, p. 97). So, students can formulate solutions for certain demotivating situations they face. Such a situation would be: "I feel demotivated to study because I don't like the subject very much."

1. Why don't you like it very much?

a. I don't like it too much because I'm not doing well.

2. Why don't you do well in this?

a. I'm not doing well because I don't spend enough time studying.

3. Why don't you spend time studying?

a. I don't spend enough time studying because I can't concentrate.

4. Why are you not able to concentrate?

a. I can't concentrate because I'm unhappy with the fact that I can't sit with my friends and talk to them about my problems.

5. Why can't you see your friends?

a. I prioritized the study instead of going out with friends because I'm not doing well in class. But maybe it would be better to take a few breaks from classes planned for study to meet with my friends. That will make me more effective when I study (Kamei, 2021, pp. 96-97).

A useful technique for self-motivation and self-discipline is in Kamei's view (2021) to create types of "If-Then" statements. "If" is a goal that is intended to be achieved (such as solving five exercises within an hour). "Then" is what you can do if you finish successfully (I'll go for a walk with friends.)

(Kamei, 2021, pp. 124-125) proposes for the evaluation of how it was learned, the use of the model "The 3 R's" – Recapitulation, Reflection, and Review.

Recap: What happened when you implemented a different way of learning?

Reflection/ Self-Reflection: Considering my observations about my learning, are there any aspects of my learning plan that I should return to?

Review: How should I best revise my learning plan considering personal reflections on how I learned? (If the student has achieved the learning plan, he can reflect on what he could do better to become an even better learner).

For the metacognitive system to work, it is necessary for students to have adequate information about both general and specific strategies, as well as why, when, where, and how to use these strategies.

Phrases like *learning strategies, teaching strategies, and strategic learning* are widely used to suggest that students can choose specific procedures to accomplish specific tasks. Learning metacognitive strategies is useful because:

- Strategies help students to start and understand the learning process.

- Strategies help students overcome their areas of weakness and perform at the level at which they are capable.

- The strategies promote flexible thinking and teach students the importance of addressing different tasks.

- Strategies encourage and facilitate independent learning.

Learning strategists are important in helping students capitalize on their skills.

3. Why should we teach learning strategies?

As Dunlosky states, "Teaching students how to learn is as important as teaching the content because acquiring both the right learning strategies and the foundational knowledge is important—if not essential—to promoting lifelong learning" (2013, pp. 12–13).

An understanding of how metacognition develops, and what we can expect children of different ages to be capable of, necessarily underpins approaches to teaching metacognition. In principle, the earlier you introduce metacognition to children in age-appropriate ways, the more time learners have to develop and deepen their knowledge, skills, and experiences. (Smith-Ferguson, 2020).

As Kuhn (2000) notes, the development of metacognition is about gradually increasing the use of adequate strategies, "with the inhibition of inferior strategies as important an achievement as the acquisition of superior ones" (p. 179).

From an educational perspective, research suggests the most important determinant of metacognitive ability through the early schooling years is explicit instruction and support for the

development of metacognitive skills (Dimmitt & McCormick, 2012).

(Whitebread & Neale, 2020) suggests that preschool-aged children should be offered opportunities to explore metacognitive strategy use in a wide-array of contexts: with parents, teachers, and peers, including through both play-based learning and ways that encompass explicit dialogue and reflection (Whitebread & Neale, 2020). Outside of formal learning contexts, the development of metacognition in young children can also have important positive effects on behavior, motivation, and emotion, establishing the basis of self-regulation (Bronson, 2000).

Learning strategies can only be successful when students are willing and able to generate strategies, capitalize on them, and take responsibility for the strategies learned. Students need to understand how they learn and how specific strategies can help them improve the accuracy and effectiveness of their learning. The willingness of students to apply strategies for their work in the classroom and at home, therefore, depends on the extent to which they recognize the specific value of these strategies. Students need to know their learning profiles and needs as learners and recognize how and why strategies can help them achieve success in learning. Therefore, an essential ingredient for learning successful strategies is the awareness of each student of the strengths and weaknesses as well as the strategies that are most suitable for their learning profile.

Although students obtain greater accuracy over time by using specific strategies, they can initially sacrifice the speed and efficiency of the learning activity. However, the systematic use of strategies ensures that students are becoming more and more efficient, and their working time is reduced. The use of strategies can lead to a written product that is much more organized and that requires less drafting. As a result, less time is ultimately required for the written work of students, and the results materialize into better-written products and higher grades.

4. What could be the benefits of using metacognitive strategies for students and teachers?

Metacognitive strategies facilitate the process of learning how to learn.

Students can successfully use a series of metacognitive strategies:

1. Knowing the limits of one's memory capacity and developing an external means of support.

2. Adopt and adapt strategies according to(s) the learning situation, self-monitoring learning strategies.

3. Identifying how to understand what they have read and then reviewing the approach, changing the strategies used, if they have proved ineffective.

4. Making the selection of the information necessary for a better understanding of the material.

5. Repetition of skill-acquired abilities, to obtain competence.

6. The periodic application of self-testing, and self-evaluation to see how well they have learned and fixed what they have learned.

To develop the metacognition of their students, the teacher can address the following metacognitive strategies:

1. Questioning. The questions allow students to reflect on their learning processes and strategies.

2. The use of self-reflection. Encouraging students to critically analyze their assumptions as well as how they might have influenced the learning process.

3. Encouraging self-riding. They are asked to generate their questions and develop answers to increase understanding. The questions may be aimed at achieving personal goals.

4. Promoting autonomous learning. Teaching appropriate metacognitive strategies fosters autonomous learning.

5. Facilitating access to mentors. Many people learn best by interacting with peers who are somewhat more advanced.

6. Solving problems in the team. Solving problems through cooperation can help improve metacognitive strategies, thus facilitating mutual and collaborative learning.

7. Thinking out loud. It is useful for students to be taught how to think aloud and report their thoughts while performing a difficult task.

8. Self-exploration. Self-explanations in writing and orally can help students more easily understand a difficult topic.

9. The possibility of making errors. The possibility of making errors while they are formed

stimulates the students to reflect on the causes that caused their errors.

5. Conclusions

Before class, teachers can prompt students to revisit what they do and do not know about the topic, activating their prior knowledge with questions. During class, teachers can prompt and probe them, to monitor their learning and progress. In the learning process, that is, when we use metacognition, the results take a back seat in favor of the analysis of the process of obtaining the result. Thus, by dialoguing with the student on how he worked, what tasks he proposed, how he found and used resources, whom he collaborated with, what strategy he approached, how he felt, what he would change in the way he works, we manage to achieve and other training objectives, much more important for him in the learning process, such as self-questioning, self-knowledge, development of new learning strategies, multiplication of learning resources, socialization, development of reflective communication skills, modeling of an autonomous personality (Răduț-Taciu, Bocoș, & Chiș, 2015, p. 128). Metacognition has an important role and contributes to the development of self-assessment.

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