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Cognitive and Metacognitive Aspects of Key Competency "Learning to Learn"

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Abstract. The article analyzes the key competence of "learning to learn" from the cognitive and metacognitive perspective. "Learning to learn" is one of the competences identified by the European Commission as a key to successfully addressing the challenges of the 21st century. In this paper, we argue that the cognitive and metacognitive aspects of learning are most important to gain an understanding of this key competence and enable individuals to pursue an independent and successful learning at school and beyond. Research into these processes began in the early 1980s, especially in the fields of cognitive and educational psychology, and a lot of correlation was found between cognitive learning strategies and learning achievements. It is argued in the article, that learning to learn is a competence that needs to be developed through formal schooling and beyond. It affects changes in teaching approaches and organization of students' learning as a whole.

Keywords: *key competences, learning to learn, cognitive strategies, metacognition, self-regulated learning*

Introduction

Lifelong learning has become the need of every citizen. In lifelong learning, we develop various competencies and skills in order to personally get fulfilled and actively participate in the society in which we live. We are successful in the world of work that is constantly changing. Our personal competencies and knowledge are also a catalyst for innovation, productivity and competitiveness. In addition to our working ability and skills, there are also vital keys of competencies that enable quick adaptation to change, hence lifelong learning is a tool through which individuals accumulate more knowledge for a better

living. Key competences enable individuals with functional response to operate in a wider range of different activities. They are not dependent on the operating conditions and are transferable between different professions. It also enables individuals to be successfully educated and to actively participate in a society and personal development. They promote independence and personal effectiveness. In a modern multicultural society, they are indispensable to work in a specific environment.

In the last two decades, the European Union and the OECD (European Council, 2000; Eurydice, 2002; OECD, 2001, 2003) began to draw attention to the importance of knowing our own learning processes. As early as 2000 has the European Council, in paragraph 26, considering the context of the Lisbon process, stressed the necessity (in the context of EU's economic development) of developing basic skills in citizens, skills that will be used throughout their lives (European Council, 2000). In December 2006, a Recommendation of the European Parliament and the Council (2006) on key competencies for lifelong learning was published, which draws its attention to eight key competences, that citizens today need for their "…personal fulfilment, active citizenship, social cohesion and employability in a knowledge society" (p. 13). These were: Communicating in a mother tongue; Communicating in a foreign language; Mathematical, Scientific and technological competence; Digital competence; Learning to learn; Social and civic competences; Sense of initiative and entrepreneurship; Cultural awareness and expression. (ibid., p. 14). The competence that is directly related to teaching and learning is "Learning to learn", that was defined as *"the ability to pursue and persist in learning, to organize one's own learning, including through effective management of time and information, both individually and in groups"* (ibid, p. 16). The Recommendation (2006) also mentions that this key competence includes *"awareness of your learning process and needs, identifying the opportunities that are available, and the ability to overcome obstacles on one's path to successful learning. It means acquiring, processing and accepting new knowledge and developing new skills and searching for advice, and using it"* (p. 16). The previous work and life experiences and the importance of motivation for the realization of this competence were emphasized. It should be noted that the competence framework was revised in 2018. Some areas have been transformed, renamed, and merged with some key competencies (Council Recommendation…, 2018). The key competency "learning to learn" has been merged and complemented with the key competency "social competence". Thus, a new key competency "personal, social and learning competence" was created.

At the present time, when the importance of "learning outside of school" and the importance of informal and non-formal learning" (Coffield, 2000; Vrečer, 2014) is increasingly emphasized in educational sciences, the understanding of the theoretical and empirical starting points of this key competency has become even more important. Some authors also point out that cognitive and metacognitive abilities are an essential part of information literacy (Pečiuliauskienė & Dagys, 2015).

Purpose of this study

The purpose of this study is to examine and clarify the theoretical relations between the key competency of learning to learn and components of self-regulated learning. The competence of learning to learn is inextricably linked to the cognitive and metacognitive aspects of learning, so it is important that these relations are examined. In addition, we will examine the relations of learning to learn components on student performance on academic tasks. Finally, successful teaching strategies to develop learning to learn will be presented.

In summary, the three research questions are:

1. How are the cognitive and metacognitive components related to the key competence learning to learn?
2. How are learning to learn components related to student performance on academic tasks?
3. What teaching strategies can lead to the development of learning to learn competencies?

Methods

The steps we made in our literature review were summarized from the article by Cronin et al. (2008).

Criteria for Inclusion

Only articles with a consolidated theoretical and empirical background were considered for the inclusion in our review. The criteria to select a model were that: (a) it should be published in JCR (Journal Citation Reports) journals or peer-reviewed handbooks that deal with the researched topic; (b) we picked mostly publications that have been written in English; and (c) one criterion was also the number of citations of the journal article. We picked mostly articles with at least 10 cites per year.

Selection Process

As a first step, we analyzed the models of SRL or learning to learn concepts that were published in relevant sources. We identified the main topics and authors that contributed the most in this area. We decided that the main topics are research in the field of cognition of metacognition. The second step in the literature review was to define those teaching strategies or methods that were empirically proven as beneficial in the development of learning to learn competencies.

A literature search was performed in PsycINFO and Google Scholar using the terms "self-regulated learning", "metacognitive strategies", "cognitive strategies", and "learning

to learn". No specific date was determined, since the main criteria were publication's relevance. The main research findings will be discussed in the chronological order.

Cognitive and metacognitive components of learning to learn

The interest in learning how to learn dates to the '80s, when researchers' were concerned with the question of how a person can control, direct, and manage the process of his/her learning. Various psychological authors began studying the factors of successful learning management, especially the storage and retrieval of information from our memory, and they consequently contributed to the knowledge on learning processes–mostly in the school context. From a historical point of view, we can view the learning on how to learn strategies as a natural process of transition from behavioral to a cognitive way of learning. While the behavioral approach is based primarily on how individual teacher's actions and behavior affect the behavior of learners, the focus of the cognitive approach is, above all, the understanding of how information is processed and structured in memory. From this perspective, the learning outcomes do not depend only on the teacher's method of teaching (the teacher's influence), but also on how this information is processed. Claire Weinstein and Richard Mayer (1986), two leading authors in this field, summarize that the learning outcomes are crucially influenced by teaching strategies (how and when the teacher presents the subject) and learning strategies (how an individual organizes or processes materials). With this, they summarized two important areas of research that were the basis for the creation of different learning models (e.g. "self-regulating learning", Zimmerman & Schunk, 2011), as well as the concept of "learning to learn" (Crick, Stringher, & Ren, 2014; Stonkuvienė, 2018).

Metacognition involves guiding and managing learning, and it's one of the most important components of learning. Fox and Riconscente (2008) define metacognition simply as "knowledge or awareness of self as knower, and self-regulation, viewed as control of or acting upon self as actor" (p. 374). Knowing learning strategies does not, in any way, guarantee that the person understands its advantages and knows when to properly use such strategies. This understanding is extremely important for individual's continued use of learning strategies because it motivates a person to use the strategy they learned.

Speaking of metacognitive theory, we must first mention John H. Flavell, who used and described the concept of *metamemory* as early as 1971. Using the term, he presented the ability of humans to manage and regulate entry information, storage, and retrieval of data from their memory (Flavell, 1979). Flavell emphasized knowledge, while Ann Brown (1987), on the other hand, focused on the aspects of the executive nature of cognition, such as the planning, controlling, and monitoring of one's thinking. Brown (1987) established a distinction between *knowledge about cognition* and the *regulation of cognition*. Cognitive knowledge can consist of stable, correct/incorrect, or late-developed

information that an individual has about his or her mental processes. Regulation can, on the other hand, be relatively unstable, depending on an individual's age, and concerns the activities with which we manage and control learning. An individual can, therefore, control behavior in one situation better, and not so well in another.

Studies in cognitive monitoring have examined the individual's knowledge, which is our own knowledge about mental processes, and how closely we can control the current state of own knowledge and processes (Kluwe, 1982). Many of these surveys estimate the anticipation of achievements and own performance and the direction of effort and attention (e.g. the distribution of learning according to an individual's assessment of knowledge that this person currently has or does not have). To effectively regulate learning, the correctness of assessing one's knowledge is the most important step. Examples of such knowledge are the beliefs that we can learn better by listening than reading, or by considering our friend to be more socially aware than ourselves. These beliefs can, of course, encourage or hinder performance in learning situations. This knowledge leads the individuals in solving the task and informs them of the level of achievement that they will most likely achieve.

We have already pointed out that only the knowledge of (learning) strategies does not yet guarantee that an individual will understand how a strategy can provide for more effective learning and better learning outcomes. Knowledge about the usefulness of strategies should encourage the continued use of the strategies learned. This theoretical assumption has spurred a lot of research, which usually addressed both training for the use of certain strategies, as well as observing the transfer of these strategies to other tasks (Dignath, Buettner, & Langfeldt, 2008; Callender, Franco-Watkins, & Roberts, 2016). In these studies, a person usually had to decide whether to use, change, or abandon a current strategy for another, to successfully complete the task. Attempts in this field usually included training for the use of strategies for a particular type of task, as well as the use of the learned strategy in other tasks.

Cognitive learning strategies

We have already emphasized that one of the key elements of learning is the ability of an individual to effectively choose, combine, and coordinate learning strategies–in this context we use the term "cognitive control" (Ben-Eliyahu & Linnenbrink-Garcia, 2015). Research has repeatedly drawn attention to the positive correlation between cognitive learning strategies and learning achievements in traditional or online learning environments (Broadbent & Poon, 2015; Diseth, 2011; Pintrich & De Groot, 1990). It is therefore not surprising that researchers have a great deal to discover how much the use of learning strategies contributes to learning achievements.

The term "cognitive strategy" concerns the mental processes of an individual who attempts to achieve a specific learning goal or solve a learning task (Paris & Paris, 2001). Some authors also warn that cognitive strategies are triggered deliberately, and that they

consist of an active role and control; they are not merely just individual's compliance with instructions (Paris & Paris, 2001). In the best case, cognitive learning strategies are therefore used intentionally, they are selected according to task requirements and include cognitive skills and motivation (Weinstein & Mayer, 1986). In their definition of learning strategies, they pay attention to the following aspects:

Learning strategies are / ... / behavior and thoughts by which a learner is actively influencing the process of encryption of information between learning / ... /; the goal of each learning strategy is to influence the motivational and emotional states or the way in which the learner chooses, acquires, organizes or integrates new knowledge. (p. 315).

Marentič Požarnik (2008), who has long been involved in the classification and definition of learning strategies and related concepts in Slovenia, defines learning strategies as "the sequence or combination of targeted learning activities that individuals use as their initiative and change according to the requirements of the situation" (p. 167). This definition pays greater attention to target orientation and motivational factors. It divides strategies into two categories, cognitive (e.g. how to memorize, structure) and material (e.g. how to make notes).

Development of cognitive and metacognitive abilities

Wellman (1992) has already found that mental concepts are already expressed in 3–4 years-old children. Later studies have shown even that 2 and 3 years-old understand the existence of the mental world, and 4-year-olds clearly distinguish between mental concepts such as thinking and memory. Some authors in the explanations of the development of cognitive and metacognitive self-regulative abilities emphasize the difference between intentional and organismic self-regulation. Organismic self-regulation is relatively "automatic", on the other hand, intentional self-regulation is mainly goal-directed and personal. Soon after birth organismic self-regulation is mainly present; in the period of childhood, and even more so in adolescence and adulthood, intentional self-regulation is intensified (Gestsdottir & Lerner, 2008). The results of the research carried out by Checa et al. (2008) have shown that the development of some aspects of self-regulation (e.g. executive attention) is linked to academic performance as well as aspects of social adaptation. This study shows that individual differences in the development of cognitive and metacognitive abilities are also related to understanding the process of learning and social adaptation at school.

Types of cognitive strategies

Learning strategies can be classified according to various criteria. They can be divided according to the purpose of learning, subject and subject area, and the age of the learner. Strategies can also be divided into groups based on the content and information that an individual wants to understand and learn. The author differentiates between learning by using reading strategies and divides them into strategies for determining the main

theme, the strategies for determining the details, the strategies for determining the organization/text structure, the critical reading strategies, the strategy for reading visible information, and the strategies for improving the vocabulary. One of the commonly used criteria to classify strategies on a time scale that refers to when a person's strategy is used during their learning process. For this criterion, we divide strategies into pre-reading strategies, reading strategies during the act of reading, and reading strategies after we finish reading. Perhaps the most popular classification of strategies is the one created by already mentioned Weinstein and Mayer (1986). Authors distinguish between rehearsal, elaboration, and organizational strategies.

Rehearsal strategies allow you to keep information in memory by learning by heart where we rely on repetition of the given information until we memorize it, and these belong in a group of "superficial" cognitive strategies. Learning by heart can be helped with the usage of lower-order strategies, such as "reading out loud" (*recitation*), *clustering*, *imagery*, and the use of mnemonic techniques (Pressley & Harris, 2006; Weinstein &Mayer, 1986). Repetition strategies are useful in some learning activities, but many tasks require a deeper understanding, not just a simple retrieval of data. Therefore, too much reliance on repetition strategies can be detrimental and ill-advised when it comes to learning and the results of learning.

Among the more in-depth approaches to learning are the elaboration strategies in which the individual already slightly transforms the content, sums it up, and then makes connections between different things. The elaboration strategies contain the creation of links between new and old information by formulating conclusions and solving problems using new information. Paraphrasing, summarizing, forming analogies, making notes (when data is deliberately processed and linked in new ways), and questioning (Weinstein & Mayer, 1986) are all included in the group of elaboration strategies.

The latter are organizational strategies that also include some deeper ways of processing information, by identifying essential ideas from text or given subject, making notes, drawing diagrams, and creating thought patterns. They relate to how learners systematically structure their knowledge (Woolfolk, 2016). This may include selecting the main idea and text, sketching a thought-based pattern of related terms, or identifying the organizational structure of a text or a lecture (Weinstein & Mayer, 1986).

Metacognitive learning strategies

Metacognitive strategies can also be classified into three major sets according to the stage of learning they are used. They are classified into three categories: planning, managing, and monitoring (Woolfolk, 2016).

Planning strategies take place before learning, and they include activities such as setting goals for learning, reading/skimming through a text before reading it and splitting the task into smaller tasks. Planning involves deciding on how much time we will devote to a task, which strategy we will use, how we will begin to learn, which resources we will

need, in what order we will work, what we will skim over, and what will we pay more attention to (Woolfolk, 2016). These activities help us activate appropriate previous and strategic knowledge and facilitate the understanding and organization of the material (McKeachie, Pintrich, & Lin, 1985; Pressley & Harris, 2006).

Monitoring strategies (control strategies) relate only to solving problems or learning, and they allow assessing the effectiveness of using different strategies (i.e., focusing our attention on something, understanding it, etc.). They show themselves in activities such as keeping the attention while reading and listening, self-testing during learning to verify our understanding, controlling the time that has elapsed during verification, and assessing the information learned to check what we've learned. The focal point of the accompanying activities is the focus on understanding. With accompanying activities, an individual is vigilantly supervising the disturbances regarding the focus of one's attention and understanding. As such, they are the first condition for balancing.

Regulation strategies are closely linked to surveillance strategies; they are conducted after completing the learning process and refer to the assessment of the process and learning achievements, as well as overcoming the problems that we have detected while supervising the learning process. For example, an individual can slow down their reading when a chapter is challenging, recount a passage from the chapter or form a new summary of material learned. The balancing strategies, therefore, relate to attempts to remove the deficit in attention and understanding, and they include the assessment of the processes and results of thinking and learning (Woolfolk, 2016).

Cognitive and metacognitive strategies and their relation to academic performance

A positive correlation between the use of cognitive and metacognitive learning strategies in academic achievements was repeatedly confirmed (Bail, Zhang, & Tachiyama, 2008; Dent & Koenka, 2016; Rosário, Núñez, Valle, González-Pienda, & Lourenço, 2013; Svensson, 1977; Zimmerman & Schunk, 2011). In one of the first studies, Svensson (1977) compares the default learning approach with exam results. Students who had a deep-level learning approach were much more successful than those with a surface-level learning approach. Similarly, Bail et al. (2008) study of SRL skills impacted on students' academic achievement showed that the students with better SRL skills achieved better learning outcomes than students without SRL skills.

Research also suggests that female's use learning strategies more often than males (Vrugt & Oort, 2008). Vrugt and Oort (2008) surveyed 952 students of psychology whose an average of 21 year old. A week before the exam, respondents completed a questionnaire on their regulation of effort, setting goals with the use of metacognitive and cognitive strategies. They found that in terms of self-regulation, female students

were much more effective than male students. Female students tend to be more active when using metacognitive and cognitive strategies, they posed more demanding goals and had better learning outcomes than male students.

The use of learning strategies varies also by age. Many studies have confirmed that older students use more in-depth learning strategies than younger ones. Flavell (1992) linked the ability of metacognition with Piaget's development phases and the ability of formal thinking. Greater use of cognitive and metacognitive strategies can also be explained from the perspective of knowledge. Moos and Azevedo (2008) found that students with more knowledge often use metacognitive strategies, such as planning and monitoring. Other researchers came to similar conclusions (Miles & Stine-Morrow, 2004; Veenman & Spaans, 2005). All reports show the increased use of cognitive and metacognitive strategies of older students compared to the younger ones. Veenman and Spaans (2005) compared the importance of intellectual abilities and age to the use of metacognitive strategies, they found that age-related impact on metacognitive strategies is greater than the ability itself. This was also argued by Schunk (2005). In his opinion students' skills and abilities are not the only determinant of their academic achievement, other predictors, such as the use of learning strategies should be taken into consideration.

Teaching strategies to develop learning to learn competencies

So far, we have established that learning to learn develop skills and are imperative for people to gain new knowledge and skills, therefore it is important to know how self-regulatory skills are obtained. Although it is possible that we learn them by ourselves, the central way for developing these skills are observation, reading and modelling (from parents, teachers, co-workers, etc.). Social cognitive theories emphasize that learning is always embedded in a social environment and that a person can learn when interacting with others.

Table 1

Developmental levels of regulatory skill

Level	Name	Description
1	Observation	Vicarious induction of a skill from a proficient model
2	Emulation	Imitative performance of the general pattern or style of a model's skill with social assistance
3	Self-control	Independent display of the model's skill under structured conditions
4	Self-regulation	Adaptive use of skill across changing personal and environmental conditions

Note: Adapted from: Zimmerman (2000, p. 29).

The importance of social models in learning and acquiring new skills is present throughout life. This is also the case with the learning of self-regulatory skills (Zimmerman, 2000, 2002). The level of observation occurs at the beginning when a student becomes acquainted with the main characteristics of a particular learning strategy that he or she wants to learn. It is followed by the imitation of strategy implementation, when the student implements the strategy, with the support of the teacher. Then the student plans to use these strategies to monitor the progress and compares it with the model. The last step is that the student adapts the implementation of the strategy to various internal and external conditions and thus makes it completely self-regulated.

The development of learning strategies, therefore, starts at school, and in many ways, it has changed the teacher's role and competencies needed in the classroom (Makovec, 2018). Pressley and Harris (2006) propose a systematic guidance for students in learning and using the learning strategies consequently in the development of self-regulatory skills. The learning environment also has a great role to play. In this regard, we must be aware that the development of self-regulatory skills is not automatically maturing, and that the learner does not take these skills passively from the environment, but requires a systematic development of self-regulatory skills (Schunk & Zimmerman, 2003).

The development of self-regulatory skills can be promoted directly or indirectly (Paris & Paris, 2001). In the indirect teaching of self-regulatory skills, the student is exposed to a lesson in which a teacher can use several self-regulatory elements, for example, the teacher addresses the learners on the goals they will achieve by the end of the hour, the best learning strategy tools to use, and at the end of the hour he will determine if the goals were achieved or not. In such a way, it is important that the teacher at the end of the class also reflects the process of learning. Furthermore, the importance of setting goals and the use of different learning strategies is emphasized.

In the direct teaching of self-regulatory skills, the teacher tries to develop certain self-regulatory skills directly in the class. Thus, the teacher explains the strategy directly, model it, demonstrates it and guides the use of the strategy, then thereafter the teacher monitors the student training and gives them feedback. The goal of direct teaching of self-regulating skills is the independent use of the learning strategy which is transferred to other areas. Thus, the teacher gradually diminishes his share of responsibility, while in the student it increases.

Conclusion

In the article, we have presented some theoretical starting points for understanding the key competencies for learning to learn, as identified by the European Union. We divided our analysis into three parts: (a) how are the cognitive and metacognitive components related to the learning to learn competence; (b) how is learning to learn competence

related to academic performance, and (c) how can teachers help in the development of this competence?

Cognitive learning theories have been dealing with this topic for a long time, and the lessons in this field are unambiguous: both cognitive and metacognitive strategies need to be used for autonomous and qualitative learning. Both (cognitive and metacognitive dimensions of learning) are an essential part of learning to learn competence and are important for learning in formal settings, but also in informal circumstances.

It is true, that learning to learn competence can be learned at any time, even later in adulthood, but research shows, that it is most effective if it begins to evolve at the time of formal education. It is important that teachers, in addition to teaching - learning content, promote the use of different learning strategies as an integral part of their course. We have explained that the development of self-regulatory skills takes place in the group and while interacting with others. Developing of learning to learn competence can be promoted directly or indirectly. This means that the teacher's selection of strategies should be based on the knowledge of students (e.g. their learning motivation, prior knowledge), and also shows how learning strategies are used emphasizing their usefulness. The teacher must seek and use these learning strategies to improve students learning achievements, to increase their learning motivation, and to raise awareness of the importance of setting goals and the use of different learning strategies.

In our opinion, learning to learn is one of the vital key competencies to successfully address the challenges of the 21st century. Regardless of the purpose and context of defining this competence in EU, we agree that the awareness of the processes of learning and its guidance is the utmost importance of learning in formal and non-formal education. Now it is up to everyone involved in education and training to transfer these lessons into pedagogical practice and to develop such teaching and training, which will encourage students to increase their learning autonomy and self-regulation.

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Svarbiausios *mokėjimo mokytis* kompetencijos kognityviniai ir metakognityviniai aspektai

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Santrauka

Straipsnyje pateikiama keletas teorinių minčių, padedančių suprasti svarbiausias *mokėjimo mokytis* kompetencijas, pripažintas Europos Sąjungoje. Analizė suskirstyta į tris dalis: 1) kompetencijos kognityvinių ir metakognityvinių elementų aprašymas; 2) *mokymosi mokytis* kompetencijų svarba mokinių akademiniams pasiekimams ir 3) siūlomos mokymo strategijos *mokymosi mokytis* kompetencijai ugdyti. Per pastaruosius du dešimtmečius Europos Sąjungoje ir EBPO (Ekonominio bendradarbiavimo ir plėtros organizacijoje) buvo daug veiklos šia tema. 2006 m. patvirtinta Europos Parlamento ir Tarybos rekomendacija „Dėl bendrųjų visą gyvenimą trunkančio mokymosi gebėjimų“. Apibrėžti aštuoni pagrindiniai gebėjimai; mūsų temai buvo svarbiausia pagrindinė *mokėjimo mokytis* kompetencija. Iš kompetencijos apibrėžimo tampa aišku, kad teoriniai ir empiriniai šios kompetencijos pagrindai slypi mokymosi teorijose, – jie tiksliau apibūdina savireguliuojamo mokymosi teorijas. Kognityvinės mokymosi teorijos šią temą jau seniai nagrinėja, o šios srities pamokos yra vienareikšmės: tiek pažinimo, tiek metakognityvinės strategijos turi būti naudojamos autonominiam ir kokybiniam mokymuisi. Mes teigiame, kad *mokymosi mokytis* kompetencijos gali būti įgyjamos bet kuriuo amžiaus tarpsniu, net ir vyresniajame amžiuje, tačiau tyrimai rodo, kad vis dėlto efektyviausias *mokėjimo mokytis* kompetencijos naudojimas yra ankstyvajame formaliame švietime. Tai reiškia naujus iššūkius mokytojams, nes rekomenduojama, kad ši kompetencija būtų įtraukta į mokymą. Mokytojai turėtų naudoti šią kompetenciją ir skatinti mokėjimą mokytis, siekdami pagerinti mokymosi pasiekimus, didindami mokymosi motyvaciją bei stiprindami besimokančiųjų mokymosi autonomiją ir savireguliavimą.

Esminiai žodžiai: *svarbiausios kompetencijos, mokėjimas mokytis, kognityvinės strategijos metakognicija, savireguliacinis mokymasis.*