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METACOGNITIVE MONITORING AS METACOGNITION COMPONENT

Abstract

The theoretical analysis of metacognitive monitoring as metacognition component is done in the article. Such concepts as “metacognition”, “metacognitive monitoring” and “metacognitive control” are analyzed and correlated. The peculiarities of metacognitive monitoring in the structure of metacognition, its importance in the educational activity are also described.

Key words: *educational activity, metacognitive control, metacognitive monitoring, metacognition.*

Problematic aspects of the article. Scientific study of metacognitive monitoring which is a way of studying the subject’s cognitive activity and its results in the implementation of any cognitive task becomes widely spread today, especially taking into account the importance of the role of this metacognitive phenomenon in educational activity. This is because in the modern information society in the context of informational oversaturation of educational sphere the ability to constructively monitor educational material is required because it affects how a learner will regulate his or her own knowledge in the learning process. So there is an urgent need to study the characteristics of metacognitive monitoring as a structural component of metacognition in educational activity.

Analysis of recent researches and publications. Features of metacognition as the basis of metacognitive monitoring in general, and the main characteristics of metacognitive monitoring as regulatory aspect of metacognition, its main aspects and spheres of influence in the process of learning activities in particular are being

studied by such scientists as J. Flavell, A. Brown, R. Kluwe, S. Tobias, H. Everson, T. Nelson, L. Narens, J. Dunlosky, G. Shraw, R. Dennison, D. Moshman, A. Koriat, J. Metcalfe, F. Johnson, S. Maksymenko, I. Pasichnyk, T. Khomulenko, V. Voloshyna, R. Kalamazh, A. Sihinishyna, T. Dotsevych, E. Savin, A. Fomin, A. Karpov, I. Skitiaieva, M. Kashapov, A. Samoylichenko, and others. In particular, J. Flavell delineates the concepts of metamemory and metacognition, and having separated metacognitive monitoring from the latter actually scientifically introduces the concept (proposed in 1970's J. Flavell's structure laid the foundations of modern understanding of metacognition in general and metacognitive monitoring in particular), and for the first time emphasizes the connection between metacognitive processes and learning activities [10; 9]; S. Tobias and H. Everson outline and analyze the component model of metacognition, and describe the importance of knowledge monitoring accuracy [19; 20]; A. Koriat analyzes metacognition as the structure of consciousness emphasizing that monitoring is the subjective evaluation of our own knowledge [14], G. Shraw and D. Moshman describe basic metacognitive theories highlighting in the sphere of metacognition metacognitive knowledge and metacognitive regulation [17]; T. Dotsevych describes theoretical and methodological approaches to diagnosis of metacognition as a psychological phenomenon [1]; in the studies of E. Savin and A. Fomin there is a description of various aspects of metacognitive monitoring, including establishment of the role of subject's knowledge in a particular area in successful metacognitive monitoring of knowledge tests [3], and so on. On closer examination of the works of these and other researchers we will focus our attention analyzing key concepts of the article.

The aim of the article is to do theoretical analysis of metacognitive monitoring as an effective component of metacognition in order to highlight its peculiarities in the process of educational activity. **The tasks** of the article are as follows:

- 1) to do a theoretical analysis of the main characteristics of metacognitive monitoring;

- 2) to correlate such concepts as metacognition, metacognitive monitoring and metacognitive control;
- 3) to describe the features of metacognitive monitoring in educational activity, etc.

Main part of the article. The object of our study is metacognitive monitoring that takes place in the educational activity, but before we start to analyze this concept we consider it necessary to describe the conditions and the starting points of this metacognitive concept. As the review of the scientific literature on the subject showed in order to give objective and thorough definition of metacognitive monitoring, to describe its context and basic functions it must first be determined the importance of metacognition as a starting point of the effective functioning of metacognitive monitoring in the process of doing different educational tasks.

A detailed study of metacognition began in 1960-1970's. At that time J. Flavell clearly differentiated the concept "metacognition" and "metamemory" pointing out the basic features of both these concepts [10; 9]. It should be noted that T. Khomulenko to the main features of metamemory refers metamnemonic awareness that is the knowledge of individual memory characteristics and patterns of effective remembering, ability to plan while remembering which provides objective nomination, strategy selection and means of its achievement, as well as the ability to monitor mnemonic introspective view and looking after the course of memory processes [4]. In his work about metacognitive aspects of problem solving (1976) J. Flavell explains metacognition as individuals' knowledge about their own cognitive processes and performances, and stresses out that in metacognition except other things there is a direct link between active monitoring and regulation of cognitive processes [10; p. 232]. In another his work (1979), which develops the concept of metacognition and cognitive monitoring, metacognition is being explained as the cognition of one's cognition, or any knowledge or cognitive activity that can regulate any aspect of any cognitive enterprise [9].

Since that time a lot of researches have been conducted in this area, but the definition of the notion of metacognition has not significantly changed, except for

some changes of its semantic features with a focus on the most particular aspects. Metacognition is an understanding of knowledge, but the kind of understanding that can be displayed as in an effective use and a clear explanation of knowledge [6, p. 85]; it is an ability to reflect, understand and control our own learning processes [16, p. 460]; it is an awareness of our own cognitive processes, assessment of our skills, knowledge and awareness in the tasks' performance, and an important component of information process, which can be used both in education activity and in manufacturing [12, p. 162]; it is knowledge about our thinking processes and strategies, and an ability to conscious reflection, change and implementation of the actions based on this knowledge [2]; it is monitoring and control of lower levels of mental processes which are done by higher levels of mental processes [11]; it is, on the one hand, an evaluation of what people think about their own thinking processes and memory, and, on the other, a process of monitoring and control of knowledge, understanding, analysis, synthesis and assessment of learning or other activities [15, p. 71]. So, generally, we can say that metacognition is the ability of any individual to monitor his or her own cognition.

R. Kluwe gives definition of the phenomenon of metacognition as a description of actions defined as metacognitive: a) the thinking subject has some knowledge about his or her own thinking and that of other persons; b) the thinking subject may monitor and regulate the course of his or her own thinking, i.e., may act as the causal agent of his or her own thinking [13, p. 202]. Usually, the first available scientific treatment option is entitled "metacognitive knowledge" (for the first time used by J. Flavell, later by G. Shraw, R. Dennison, and D. Moshman, et al.) which is provided by J. Flavell as proper knowledge, knowledge of knowledge tasks and strategies, while the second option is a cognitive activity that is called by J. Flavell "metacognitive strategies" [10, p. 232], and by A. Brown – "metacognitive skills" [6].

L. Baker and A. Brown, and later G. Shraw with colleagues identify two main components of metacognition such as metacognitive knowledge or knowledge about cognition that is what we know about their own learning

processes, and metacognitive regulation that unlike metacognitive knowledge is our actual activities in which we are included to facilitate the processes of learning and memory. The components of metacognitive knowledge are declarative knowledge (knowledge about ourselves and necessary strategies, i.e., what we know about how we learn, and how that affects how we do it (in other words, self-assessment)), procedural knowledge (knowledge of how to use these strategies, i.e., our knowledge about the processes of learning and memory, which are the most efficient for us), and conditional knowledge (knowledge of when and why to use these cognitive strategies). Regulation of cognition includes planning (selection of appropriate strategies and sources of cognition), strategy of operating information, monitoring understanding (ability to perform cognitive tasks and identify activities), and evaluation of understanding (review and establishment whether it coincides with the objectives and whether the use of the regulatory process was effective) [5, p. 5; 16, p. 460; 17, pp. 352-353]. In general, our knowledge of cognition is what we know about how we learn, what we know about the most effective treatments and strategies, and what we know about the conditions that are optimal for the various cognitive actions [17, p. 353].

J. Dunlosky and T. Nelson highlight two structural components of metacognition such as monitoring and control correlations between which are highly important for metacognition theory [8, p. 545]. With the help of monitoring the subject's cognitive activity may obtain information on the metacognitive level about the level of knowledge or strategies on the cognitive level, and control is carried out to use metacognitive knowledge or understanding of metacognitive level with the aim to regulate thinking processes on the cognitive level [11]. For a more detailed examination of the relationship between metacognitive monitoring and control it should be considered the proposed by scientists T. Nelson and L. Narens (1990) schematic connection between meta-level and objective level, which results in the flow of information where the processes of monitoring and control emerge. Thus, we came to a more detailed analysis of the concept of "metacognitive monitoring" in the system of metacognition.

It should be taken into account the theory of P. Winne stating that monitoring can identify inconsistencies between objectives and achievements while metacognitive monitoring provides a distinction between plans set to achieve goals and processes used for this action [22, p. 476]. This is due to the fact that cognitive level provides perception and processing of information with the help of assessing, remembering, forgetting, etc., and metacognitive level provides awareness of a subject of cognition of these processes, their monitoring and control, and their influence.

A. Koriat analyzes the nature of monitoring being a subjective assessment of our own knowledge. Subjective monitoring of knowledge, i.e., knowledge about knowledge, is one of the key constructs of consciousness, since consciousness includes not only that I know something, but that I know I do not know. Therefore, knowledge and metaknowledge are structural components of consciousness. That is why A. Koriat assigns metacognitive monitoring and control the main place in the structure of consciousness [14].

For S. Tobias and H. Everson metacognition is a complex of knowledge and skills – knowledge of cognitive processes (knowledge about metacognition), monitoring of cognitive processes and learning processes, and their control. Scientists organize these components into a hierarchical system (first place takes planning, then go strategy choice, evaluation learning and monitoring of knowledge, and control exists parallel to them), where metacognitive skill of knowledge monitoring serves as the starting point of other metacognitive skills. These particular skills define knowledge monitoring as the ability of the individual to know what he or she knows and what he or she does not know [19; 20].

Metacognitive monitoring in most cases is regarded inseparably from metacognitive control. For example, J. Dunlosky and J. Metcalfe determine metacognitive monitoring as an assessment of current cognitive activity, whereas metacognitive control is an understanding of current cognitive activity regulation, emphasizing the impossibility of existence of metacognitive control without

monitoring what takes place in our thinking processes [7, p. 3]. It is also proved that efficient control of learning cannot occur without monitoring accuracy. If students are not able to distinguish between what they know and what they do not know, they are unlikely to control their learning activities, or, so to say, select the necessary strategies to achieve their goals [19; 20].

As metacognition include two main aspects such as reflective (includes knowledge of human being about his or her knowledge, the idea of the capabilities and limitations of his or her own cognitive sphere) and regulatory one (includes different strategies, intellectual skills with the help of which man is able to control his or her own cognition, and, after all, to regulate it), it is the regulatory aspect of metacognition that include metacognitive monitoring as the skill that monitors the process and result of any cognitive task.

A. Valdez defines metacognitive monitoring as an assessment of an individual his or her own knowledge, i.e., knowledge of important cognitive strategies and knowledge of conditions by which it can be determined when and how it is better to annihilate strategies which have detrimental effect on the learning process [21, p. 141]. Metacognitive monitoring as an important metacognitive skill of an individual to assess his or her own cognitive processes enables subjects of educational process to evaluate necessary actions and to use appropriate strategies in a case of failure [17]. Metacognitive control, in its turn, refers to an individual's ability to select, manage and regulate his or her own knowledge [21, p. 141], or, in other words, cognitive activity [7, p. 3], with the aim to be the most effective for the objectivity of the educational activity processes [21, p. 141]. P. Winne projects a kind of formula where metacognitive monitoring and metacognitive control are the components of self-regulated learning process [22, p. 476].

Metacognitive monitoring processes are crucial indicators of human learning. Metacognitive monitoring consists of different so-called "assessments" of knowledge that allow subjects of the educational process to be included in the self-regulatory processes important both for receiving knowledge and monitoring

of this knowledge when its assessment is needed [21, p. 141]. They are so-called “metacognitive judgments” made by a subject of cognition while doing certain tasks. Confidence judgments, ease of learning judgments, judgments of learning, and feeling of knowing judgments are usually referred to them.

K. Thiede focuses his attention on the importance of metacognitive perspectives in learning process. According to the researcher, during the study of a material a person is able to monitor how well the material is learned. The monitoring results in the base regulatory learning (for example, it is being decided whether there is a need to continue learning) [18, p. 662].

S. Tobias and H. Everson provide such an assumption. In situations where the subjects of learning process have to master (to understand) a large amount of new material, those of them who are able to carefully distinguish between what is studied and what is not have a significant advantage as they can jump over already learned material, or recall it briefly. Such individuals can dedicate more time and learn new material. On the contrary, those individuals who do not have such thorough monitoring processes are likely to spend their time and efforts less effectively learning what is already known but is thought to be unknown for them, and, as a consequence, have more difficulties while learning new material. Therefore, the authors of the system of metacognitive knowledge monitoring assessment aim to develop a procedure of correction of the effectiveness of learning activity subjects’ assessment of their knowledge monitoring level in order to be able to distinguish between what they believe they know and do not know, and what they actually know and do not know [19].

Findings of the article and some hints for further research in this direction. So, metacognitive monitoring takes one of the main places in metacognitive processes of learning activities. By carrying out theoretical analysis of the main characteristics of content features of metacognitive monitoring as the phenomenon of metacognition, and revealing its features in the educational activity, we came to conclusion that metacognitive monitoring as the regulatory aspect of metacognition is an important component of effective educational

activity, since it allows individuals to observe their learning process and result of any cognitive problem and thus to assess their own knowledge. There is noteworthy fact that in the implementation of the objective metacognitive monitoring it is important to monitor not only how an individual estimates that he or she knows, but also what he or she does not know and why (i.e., whether one really knows that he or she knows, and knows that he or she does not know). Notions revealed in the article do not cover all aspects of metacognitive monitoring, but on the contrary, are only a starting point for future researches. Therefore, further research in this direction must be a detailed study of the properties of metacognitive monitoring, and its structural components, particularly those that cause the illusion of knowing.

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