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APPLICATION OF A SYSTEM APPROACH IN THE CONTEXT OF DISSERTATIONS

Abstract. *The system approach is widespread in pedagogical research and each of the cases of its application in a particular scientific work is unique. In addition, the literature review did not reveal specific works on the systemic approach within our subject. In this regard, the article provides a theoretical analysis of the application of a systematic approach in the context of the scientific theme «Development of metacognitive skills of students in a blended learning environment». As a method, we applied a step-by-step algorithm: the purpose of using the approach; the integrity of the object as a system; the structure of objects; component communication; component functions; analysis of the system's connection with the external environment. The result is the identification of significant details about both metacognition in general and its applicability in the context of blended learning, coupled with an analytical justification for the use of a systematic approach. After the work on the algorithm, we recommend a step-by-step «decoding» of the sequences presented in theoretical articles, since this greatly simplifies the analytical process, allows you to pay attention to new facts, get a new stream of thoughts during the implementation of a particular scientific work.*

Keywords: system approach, metacognition, metacognitive skills, blended learning, development

Introduction. Despite the deep philosophical foundations of the approach (Plato, Aristotle of the IV century BC; Kant, Schelling of the XVIII-XIX centuries) and the rootedness of its use, the term systemic approach has entered scientific circulation since the late 1960s – the beginning in the 1970s in English-language and Russian scientific and scholarly literature. A system approach is one of the fundamental ones for pedagogy and psychology. The system approach is also one of the most fundamental for scientific methodology in general and considers the object under study as a system. It is aimed at revealing the holistic potential of any research object, consistency allows for an expanded and in-depth, versatile approach to almost any issue, therefore this approach is relevant and practically ubiquitous for science. It should be taken into account that the system approach is a general scientific one, on the basis of which the basic categories of various sciences have been developed and structured, the universality of the approach makes it possible to build a scientific knowledge system [1].

The system approach is very consonant with modern science, the philosophy of science in general, one of the multiple goals of which is to organize knowledge. Sometimes a system approach means working on a problem from the perspectives of various disciplines, which, in our opinion, does not fully reveal its essence and can be replaced by the term multidisciplinary approach. A notable characteristic of the system that has been noted by many researchers is the integrity of the system. Philosophically speaking, we can single out about the systemic approach that, while analyzing the structure, features and components, the system approach nevertheless considers the object as a single integrated system with characteristics of both individual parts and universal, integral ones. In addition, the methodology of the system approach indicates that the system is always in development, which characterizes psychological and pedagogical phenomena.

When the integral is «decomposed» into parts, the researcher will observe subordination, a hierarchy of definitions of the object under consideration. All analytical work in line with a systematic approach is a kind of scientific organization of the object, which makes it possible to effectively conduct psychological and 1 educational research [2].

In this regard, our theoretical work substantiates and reveals the grounds for using a system approach in the context of the work «Developing students' metacognitive skills in a blended learning environment». The relevance of the topic of the article, in our view, is determined by the following factors. Firstly, metacognitive research, based on our experience working on this topic, should be attributed to a poorly developed area in the context of Kazakh science, which recently began to attract the attention of scientists and practitioners, and therefore the testing of methods in practice in the context of Kazakhstani educational environments, as well as the development of theoretical issues are still relevant. In addition, the trend of metacognition research conducted worldwide is characterized by a greater emphasis on applied research, under these conditions the development of theoretical issues has faded into the background, which also enhances the importance of the chosen topic.

Despite the prevalence and development of the systems approach, there is a tendency, very clearly described by S.A. Kudzh and V. Tsvetkov: «Many dissertation studies contain a mention of the use of systems analysis. However, elements of systems analysis or a description of the actual application of this analysis are not provided in the dissertations» [3]. Scientists emphasize that when using the terms systemicity, systems approach in dissertation studies, they often do not have the proper justification to the question: «How is systemicity expressed in your research?» - the authors most often do not answer» [4].

Thus, the degree of popularity of the systems approach in pedagogical research does not always correspond to the degree of its development in the works, the systems approach is ubiquitous, but not always worked out, which determines the central problematic of this article. The purpose of the current article is to analyze the system approach as an indicative and template based on our own research topic. In our case, the categorical apparatus of metacognition requires a consistent system analysis as a complex, step-by-step system. The implementation of the algorithm for analyzing the use of the system approach will be carried out within the framework of the topic: «Development of metacognitive skills in the context of blended learning».

The system approach in scientific and pedagogical literature is considered by B.F. Lomov and is characterized as multidimensional, hierarchical, polydeterministic [5]. According to Belomestnova N.V. the system is holistic, there is a functional determinism of the system and its subsystems, the system has a genetic-hierarchical structural-level organization, the genetic-hierarchical levels of the system are vertically regulated [6]. The systems approach was considered in the context of various psychological and pedagogical topics: the development of inclusive schools [7], a systems approach to improving the quality of education [8], in health pedagogy [9], and informatization of the pedagogical process at a university [10]. The systems approach was also effectively applied in the context of studying metacognition. S.D. Maksimenko and L.I. Shragina use a systems approach to provide a methodological justification for the control functions of metacognitive processes. The authors' analysis is based on the personality itself, which is considered as a functioning system that controls «itself» through self-development, self-determination, conscious subject activity, and self-regulation. «The ability to perform a metacognitive process - a process for managing processes - and thereby manage its cognitive activity includes active control over the cognitive processes performed by the subject and their interaction towards the set goal, the authors state, highlighting 5 principles of systems analysis of the article's problems: the principle of analysis by units; the principle of the unity of the biological and the social; the principle of creativity in relation to actions; the principle of reflexive relativism (relativity) to the manifestation of reflection in humans, its diversity and the principle of the unity of the

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experimental and genetic lines of development in the study of personality [11]. However, we have not found other detailed works at the intersection of metacognition and the systems approach.

Conditions and methods of research.

Analyzing the authors, we can identify many «templates» for substantiating a systems approach in pedagogy and psychology, psychology in particular.

For example, according to V.A. Ganzen, a description of a system includes:

1. its elemental composition;

2. structures, or subsystems, formed by these elements;

3. functions of the system, its subsystems and elements;

4. integral properties of the system;

5. system-forming factors;

6. relationships with the environment.

«At the synthesis stage, a model of a real system is created, the level of its abstract description is increased, the completeness of its composition and structures, the bases of description, the patterns of dynamics and behavior are determined» [12].

The steps of the systems approach in the interpretation of foreign authors are called:

1. Systems analysis - the needs, values, elements and functions of the system are analyzed.

a) Determine what tasks will be performed by the system;

b) Analyze the methodology of each component, taking into account the needs and elements of the system in accordance with the goals;

c) Conduct an analysis in accordance with the existing environment

2. System design: At this stage, ideas are synthesized and, consequently:

a) Defining the goals and objectives of the system;

b) Selecting appropriate methods, strategies, approaches;

c) Developing a comprehensive system program in accordance with its goals and various elements. Primary data, final result, environment.

3. Process, evaluation of systems: At this stage, it is determined whether the built system is «working». For this, the system is tested under simulated conditions to ensure its reliability and usefulness. The feedback obtained is used to make adjustments.

4. Monitoring systems [13].

Thus, based on such an analytical routine, it is possible to identify or discover new knowledge about the system, organize it. Based on the synthesis of these patterns of system analysis in pedagogy, we carried out a step-by-step analysis of the system approach for the development of metacognition in the context of blended learning:

1. The purpose of using the system approach

2. The integrity of the system

3. The structure of objects

4. The relationship of components

5. Functions of components

6. Analysis of the relationship of the system with the external environment.

Research results and discussion. We will analyze metacognition in the context of blended learning as a system based on successive logically connected stages. A systematically conducted analysis will reveal the properties of an object as a system.

Purpose of using a system approach

Theorists of metacognitive studies have given several variations of it with different interpretations, metacognition is detailed in different ways in the works of leading authors. The construct of metacognition and the concept itself are quite broad, and different authors include their own elements of understanding the term. We also conclude that our ideas about metacognition tend to expand rather than narrow and designate strict frameworks in terms of the construct itself. This feature is also noted by the Russian author in his dissertation, speaking about the ambiguity and lack of a clear definition, in particular [14]. In defining the purpose of using a systemic approach, it should be noted that the analysis of the construct of metacognition as a system in our case pursued the goal of identifying a niche, the meaning of metacognitive skills as the target object of the study. Metacognitive skills are an existing category of concept, the skills are practice-oriented, specifically designated skills can be developed, the concept of skills is often used in scientific articles.

The integrity of the metacognitive construct as a system is important. The system approach has become the basis for a holistic consideration of the term metacognition. Thus, it is not possible to discard part of the construct – metacognitive knowledge – for the purpose of developing metacognitive skills, which is the goal of scientific work. The development of skills assumed by the study relates largely to mental actions, intellectual actions, to metacognitive knowledge, thus, the two components of the theory – knowledge and regulation remain an interconnected construct, and both are necessary for the development of metacognitive skills. The system retains the integrity of its meaning. Despite the fact that various components of metacognition are common in scientific literature, such as metacognitive skills, metacognitive awareness, metacognitive knowledge, metacognitive regulation, all of them are interconnected to one degree or another and represent the initial ones from one concept.

Structure of objects. System analysis allows us to identify the structure of metacognition, simultaneously analyzing which skill is associated with a particular concept. We have synthesized the elements of the structure based on two primary sources. On this basis, the construct of metacognition consists of the following components:

a) metacognitive knowledge

declarative - knowledge about oneself as a learner and about what factors influence this activity;

procedural - related to knowledge of how to perform any action during learning;

conditional - to knowledge of "why" and "when" to apply cognitive actions.

b) metacognitive experience

c) metacognitive goals and objectives

d) metacognitive actions and strategies that can be compared and equated in meaning with metacognitive regulation, according to Schraw G., Moshman D. - how someone uses metacognitive knowledge to regulate cognition. Includes skills such as planning (e.g. anticipating and regulating learning strategies before learning begins), monitoring (understanding and awareness during a learning task, a good example being the ability to periodically check oneself during learning), and evaluation (e.g. re-evaluating learning goals and conclusions) [15, 16].

Connection of components. The component connection in metacognition is clearly expressed and sometimes it is difficult to separate concepts from each other.

The main connection of components is expressed in the fact that all structural elements together are called upon to implement self-regulation of the educational process. In this regard, the issue of self-regulated learning in general is being developed in science.

The connection of components is also based on the general nature of thinking, the fact that both metacognitive knowledge and metacognitive regulation are carried out at the mental level makes it difficult in practice to accurately separate them. Despite the fact that theoretical articles clearly distinguish knowledge and regulation, the identification of both can be based not on observing actions, but on identifying the student's thought processes. Their identification is carried out on the basis of thinking out loud (think aloud protocols), which is difficult to implement in practice.

There is also a connection between knowledge and regulation, metacognitive knowledge consciously and unconsciously controls the educational process; for example, metacognitive knowledge about oneself determines the educational strategy used; metacognitive knowledge about others can be used in the «ask others» strategy of assistance. It is possible to discuss the connection between the components of monitoring and evaluation in the structure of metacognitive regulation. They are practically indistinguishable in practice: a student, concluding that he/she cannot cope with the academic workload, simultaneously monitors and evaluates himself/herself. This presents a certain difficulty for researchers who code certain components of metacognition that students encountered and classify them. Therefore, researchers differentiate and justify in detail how they classified the components in this particular case, especially if they are similar and indistinguishable.

Functions of components. Based on the presented structure of metacognition as an object, having analyzed each element of the system, it is possible to identify and synthesize in a logical order the functions of the components, in our case this is simply the content of those same metacognitive skills that usually have a functional load of meaning.

Functions of components:

1. In general, regulate the educational process,

2. Know your strong and weak cognitive abilities,

3. Select the best educational strategies and methods for performing educational activities, and apply them in the appropriate situation,

4. Apply help-seeking strategies in learning in a timely manner,

5. To plan - implement goal setting at different stages of learning as a hierarchical skill, planning how to complete an educational task, choosing a place for online classes etc.,

6. Monitor the educational process, that is, be able to judge the learning process, how effective the learning is, how well it copes with something, including for the purpose of «correction» if some educational process does not bring useful results.

Analysis of the system's connection with the external environment - analysis of the importance of metacognition for blended learning.

Blended and online environments are becoming increasingly popular: such environments are flexible, provide opportunities for combining, saving time and other resources. Blended learning is a combination of traditional and online learning based on appropriate pedagogical and software technologies.

In these conditions, it is possible to state that students may have problems with concentration, motivation, self-study and self-organization, which will worsen the effectiveness of learning in this case. Researchers have found that students are often distracted from the online learning process [17].

Such problems may also arise from a lack of interactions between students, between students and the teacher. One of the

solutions in this case is the development of metacognitive skills: by their nature, they are meta-subject and universal and are suitable for all students, regardless of their specialty. If cognitive strategies analysis, reading, performing certain tasks in a specific algorithm, then metacognitive skills are above them and are organizational, reflexive, regulatory and auxiliary to them, and as is often written in scientific literature, they are «above» cognitive.

The connection between metacognition and the blended learning system is due to the fact that correctly, classically constructed, pedagogically developed blended learning has the basis, the foundation for developing independence, student subjectivity in learning, individualization of the learning process. The pedagogical significance of blended learning as «integration of learning and self-study» is very clearly defined by the Russian author [18].

Let us justify metacognition as a component of blended learning. The theoretical development of metacognition for blended learning is important, since it will partly allow developing the formal blended learning that exists, combining online and offline parts based on almost the same methods, reaching a more complete level with elements of self-regulation of learning. The results of empirical studies confirm the relationship between the development of metacognition in students and academic results in blended learning [19]. In particular, metacognition in blended learning has the potential to create instructions, prompts and comments for the electronic part of learning. Metacognition can act as a tool to develop electivity, selectivity in the educational process, and enhance the individualization of the learning process. Metacognition will allow you to form a learning background that is in tune with the modern model of blended learning: it contradicts authoritarian learning, it allows the student to express his thoughts and ideas more openly and freely, it is built democratically, taking into account the interests and needs of the student himself first of all, thus the nature of metacognition and blended learning is similar.

The systems approach in this article is considered in the context of the psychological and pedagogical topic

«Development of metacognitive skills in the context of blended learning» and is similar to the works in which this kind of analysis was carried out. Kinsella W., Senior J. implement a systems approach to the development of schools in the paradigm of organizational psychology; Abaskalova N.P., Zverkova A.Yu. apply a systems approach in health pedagogy, Maksimenko S.D. and Shragina L.I. applied a systems approach to personality analysis. Thus, a distinctive feature of our work is the context of applying a systems approach. Often, a systems approach is applied when the solution to one problem is seen in the context of various disciplines / aspects / industries or components, as in Garkina I.A., Danilov A.: a systems approach to improving the quality of education from the point of view of education, culture, upbringing; systematicity in informatization of university processes by means of information and communication means of training, subsystems of collection, storage, processing and transmission of educational information by Sharipov F. In our analysis, the system approach does not have such a functional load as in the latter cases, the analysis of the system is carried out «inside» - as an analysis of the object under study as a system, it is also distinctive that the connection of the system with the external environment is affected.

Detailing and interpretation of each step allowed to carry out a scientific analysis and justify the use of a system approach within a specific topic. «Decoding» of such sequences greatly simplifies the analytical process, in addition, it allows to pay attention to new facts, to receive a new stream of thoughts in the course of implementation of a particular scientific work.

A system analysis was carried out, such, according to the authors S.A. Kudzha and V.Ya. Tsvetkov, mentioned in the introduction, should be carried out in dissertation research.

Conclusion. The systems approach is fundamental for scientific methodology [20]. The systems approach is one of the fundamental bases of scientific analysis, since it allows considering the phenomena under study not in isolation, but as parts of integral structures with internal interrelations. This approach is especially valuable in the study of complex objects, where it is important to take into account not only the properties of individual elements, but also the nature of their interaction, the functional role in the system, as well as external influences. Thanks to systems thinking, the researcher can identify stable patterns, understand the logic of the development of processes and offer more substantiated scientific conclusions. In the article, we have undertaken a holistic systems analysis in the context of the scientific topic «Development of metacognitive skills in the context of blended learning», namely, the constituent elements of the system, some relationships between the elements, between the elements and the whole are considered, the connection with the external environment - blended learning - is determined. Thus, gradually from the construct of metacognition, we moved to metacognition in blended learning. The methodology of systems recommends clearly distinguishing between the concepts of a systems approach and systems analysis, both the first and the second are present and substantiated in this article. By implementing a detailed systems approach, we conclude that applying a systems approach to developing metacognition in blended learning involves implementing structured methods and techniques that help students become more aware of and control their thinking processes. We conclude that blended learning, which combines traditional face-to-face instruction with online learning components, offers a unique opportunity to integrate metacognitive strategies into various learning environments. By systematically integrating metacognitive development into blended learning environments, educators can help students become more autonomous, self-directed, and effective in their learning processes.

To conclude, the scientific novelty of the research lies in the application of a system approach to the development of students' metacognitive skills in the context of blended learning.

A template example of applying a systematic approach in the context of a dissertation is shown, which can be applied in the context of other dissertation topics.

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ЖҮЙЕЛІК ТӘСІЛДІ ДИССЕРТАЦИЯ КОНТЕКСТІНДЕ ҚОЛДАНУ

Аңдатпа. Жүйелік тұғыр педагогикалық зерттеулерде кең таралған және оны белгілі бір ғылыми жұмыста қолдану жағдайларының әрқайсысы ерекше. Сонымен қатар, әдебиеттерге шолу біздің тақырып шеңберіндегі жүйелік тұғыр туралы нақты жұмыстарды анықтаған жоқ. Осыған байланысты мақалада «Аралас оқыту жағдайында студенттердің метакогнитивті дағдыларын дамыту» ғылыми жұмыс контекстінде жүйелік тәсілді қолдануға теориялық талдау жасалды. Әдіс ретінде біз қадамдық алгоритмді қолдандық: тәсілді қолдану мақсаты; жүйе ретінде объектінің тұтастығы; объектілердің құрылымы; компоненттердің байланысы; компоненттердің функциялары; жүйенің сыртқы ортамен байланысын талдау. Нәтижеміз, жалпы метатаным, сонымен қатар оның аралас оқыту контекстінде қолданылуы жайында жүйелік тәсілді қолданудың аналитикалық негіздемесімен бірге маңызды мәліметтерді анықтайды. Алгоритм бойынша жұмыс жасағаннан кейін біз теориялық мақалаларда ұсынылған тізбектерді кезең-кезеңімен пайдалануды ұсынамыз, өйткені бұл аналитикалық процесті едәуір жеңілдетеді, жаңа фактілерге назар аударуға, белгілі бір ғылыми жұмысты жүзеге асыру барысында жаңа ойлар туындауына мүмкіндік береді.

Тірек сөздер: жүйелік тәсіл, метатаным, метакогнитивті дағдылар, аралас оқыту, дамыту

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ПРИМЕНЕНИЕ СИСТЕМНОГО ПОДХОДА В КОНТЕКСТЕ ДИССЕРТАЦИИ

Аннотация. Системный подход распространен в педагогических исследованиях и каждый из случаев его применения в той или иной научной работе является уникальным. Кроме того, проведенный обзор литературы не выявил конкретных работ о системном подходе в рамках нашей тематики. В связи с этим, в статье осуществлен теоретический анализ применения системного подхода в контексте научной работы «Развитие метакогнитивных навыков студентов в условиях смешанного обучения». В качестве метода нами применен пошаговый алгоритм: цель использования подхода; целостность объекта как системы; структура объектов; связь компонентов; функции компонентов; анализ связи системы с внешней средой. Результатом является выявление значимых деталей как о метапознании в целом, так и его применимости в контексте смешанного обучения, вкупе с аналитическим обоснованием использования системного подхода. После проведенной работы над алгоритмом, нами рекомендуется поэтапная «расшифровка»

последовательностей, представленных в теоретических статьях так как, это во многом упрощает аналитический процесс, позволяет обратить внимание на новые факты, получить новый поток мыслей в ходе реализации той или иной научной работы.