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Modern approaches to teaching logic and formation of critical thinking: methodological aspects

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ABSTRACT

An integral approach to the theory and practice of the implementation of the innovation process involves consideration of possible ways and existing contradictions in its development, as well as the generalization of the results of educational experiments in the form of specific patterns. The creation of a new education system, oriented at the international level, requires a review of innovative approaches to the training of future specialists. The main concept of the improvement of the higher education system is to improve the possibilities of assimilation of knowledge in the university environment by using modern technologies and educational systems. The foundation for the innovative educational process is the development and dissemination of advanced achievements in the field of education, as well as the implementation of the obtained educational achievements in practice.

Interest in educational innovations arises from teachers' awareness of the separation of pedagogical theory from practice. Technology is a mechanism that guides the learning process and the entire education system, turning it into a driving mechanism. A practice-oriented scientific foundation is what determines the direction of this transformation. The principle of variability is relevant in the educational system. It allows teachers to choose and develop a variety of learning models, including authoring approaches. The use of innovative methods has increased. Educational technology is a structured system of actions that contributes to the achievement of educational goals. The teaching methodology is connected with various ways of implementing theoretical principles.

A promising direction in the development strategy of the educational system is the implementation of the principle of person-oriented education aimed at cognitive activity. The development of critical thinking becomes a necessary condition for social progress and is an incentive for personal improvement and support of self-realization. Innovative learning technology is a system of clearly defined actions aimed at achieving educational goals.

KEYWORDS: critical thinking, mental processes, educational technology, innovation strategy.
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1. Formulation of the problem. Improving the education system requires research on innovation as a separate field of interdisciplinary scientific knowledge. The intensive development of the innovation process in modern conditions forces us to review approaches to pedagogical technologies. A comprehensive understanding of the theory and practice of designing and implementing the innovation process involves revealing the main trends and contradictions in its development and formalizing the results of these studies in the form of laws, regularities and principles. The creation of an updated education system, focused on interaction with the global educational space, requires significant changes in the direction of innovations in the professional training of future specialists.

The use of pedagogical technologies in teaching logic and critical thinking is important for the development of students' intellectual and analytical abilities. This contributes not only to personal growth, but also to the realization of national interests through the formation of an educational process that actively affects the development of society. The use of interactive methods, such as group work and pedagogical games, promotes the development of logical thinking. Critical thinking and analysis are developed through critical analysis of texts and conducting debates. Additionally, the national context can be taken into account through the study of the country's history and culture. Adapting tasks to national characteristics helps students better understand and discuss national interests. All this contributes to the creation of an effective learning environment and corresponds to national educational goals.

2. Analysis of recent research and publications. Modern approaches in pedagogy about educational technologies are: contextual learning (V.I. Hordienko, O.G. Karpenko, M.D. Kasyanenko); dialogue and modular training (L.N. Herasina, V.G. Alkema, etc.); training using innovations (P.I. Pidkasisty, M.V. Artyushina, I.M. Dychkivska); constructive project training (T.V. Lavrykova, V. M. Sofronova, O.V. Bezpalko, etc.); problem-based modular learning (I.M. Bohdanova, V.I. Orlenko, N.F. Maslova, V.V. Popov, etc.); learning through solving educational problems (V.A. Kovalchuk, V.O. Slastyonin, G.O. Boll, etc.) and game modeling (S.Y. Shashenko, O.V. Ponomarenko, etc.).

3. The purpose of the article. The purpose of this article is to study techniques and methods used in modern educational technologies for teaching logic and critical thinking, as well as the peculiarities of their detection during the professional training of future specialists.

4. Presenting main material. Note that the central idea of the modernization of the higher education system is that increasing the efficiency of acquiring knowledge in a higher educational institution is possible through the introduction of the latest educational technologies and systems.

As O. Dubaseniuk notes, the need for innovative direction of pedagogical activity in the development of education and society in modern conditions is due to several aspects. According to the first circumstance, the entry of Ukraine into the European space requires the renewal of the higher education system, in particular, it concerns the methodology, technology, and methods of organizing the educational process in higher education. It is important to note that the innovative orientation of the activities of teachers and students involves the creation, development and use of pedagogical innovations not only of domestic, but also of foreign scientists and teachers.

The need for continuous introduction of the latest technologies and forms of education organization stems from the need to strengthen the humanization of educational content, change the scope and structure of educational subjects, and introduce new specialties and disciplines. Thus, there is a need to increase the role of the teacher to introduce and implement a more modern and improved approach. Let's emphasize that today innovative activity is becoming more and more selective and nature research. The teacher has greater opportunities to implement his own approaches to the specifics of learning. Because of the new conditions of competition in the educational sector, the question of the competitiveness of higher educational institutions becomes relevant (Dubasenyuk, 2015, p. 74).

Also, the researcher determines the criteria of pedagogical innovation, with the help of which innovative orientation is formed. It is through them that you can assess the effectiveness of a specific innovation. In particular, these criteria include novelty (determining the level of novelty of the experience); optimality (contributes to achieving high results with minimal time spent); the possibility of creative use of innovations in mass experience (presupposes the suitability of tested experience for wide implementation in higher education institutions) (Dubasenyuk, 2015, p. 75).

The expression "critical thinking" indicates the use of cognitive skills or techniques that increase the probability of achieving the desired result. The results of critical thinkers will be better than those of "non-critical" thinkers (Nor&Sihes, 2021, p. 199).

Therefore, the main essence of the educational innovation process consists, firstly, in the assimilation, popularization, and dissemination of advanced pedagogical experience, and secondly, in the implementation of psychological and pedagogical achievements in practice. Solving these two tasks requires an integrated approach.

The reflective aspect is a necessary component of critical thinking, different from a one-sided approach. The main goal is cognitive development, and therefore critical thinking is activated only when a person carefully examines his thought processes. An important place for this type of thinking is assigned to the establishment of standards of mental activity. By developing his own standard of thinking, a person adapts his approach to social problems. Thus, all educational programs promote the development of critical thinking of students who shape the future society (Bekiroğlu&Güllühan, 2022).

It is important to note that theoretical knowledge requires specific tools for practical implementation. And, as a rule, these tools are technologies. It is obvious that the choice of teaching methods always involves the determination of priorities, interactive systems, teaching and education strategies, as well as the work style of teachers and students.

As a higher cognitive skill, critical thinking is essential for decision-making in professional, personal, and public spheres. For students, critical thinking skills not only contribute to their understanding of the subjects they study, but also stay with them long after the specific knowledge has been forgotten (Niu et al., 2013).

Critical thinking helps a person to determine his priorities in his personal and professional life, involves taking individual responsibility for the choice made, increases the level of culture of working with information, forms skills of analysis and formulation of independent conclusions, involves forecasting the

consequences of his decisions and their responsible adoption, allows developing a culture of dialogue in joint activities (Sultanova, 2021, p.45).

Teachers' interest in pedagogical technologies arises from the awareness of the border between pedagogical science and practice. Identifying a scientific theory of learning is not enough in itself. The theory should closely interact with life situations. The key mechanism that should govern the reality of learning and the education system as a whole, to make it a transformational movement, is technology. The engine of this transformation is scientific and practical orientation (Lebedyk et al., 2020, p.18).

Professional training of teachers of higher educational institutions should meet the requirements of technical progress. Educational activity should improve, becoming technological. Currently, the main criterion of pedagogical skill should not be how much educational material the teacher provides, but how he teaches students to independently learn the subject content and adapt to life situations based on social experience. World achievements show that the educational process is considered a learning technology, turning learning into a production-technological process with a certain positive result (Kazak, 2018, p. 27).

Explanations of pedagogical technologies are different, including seeing them as methods, techniques, tools, principles, models of learning and education, previously known as methods of learning and education; special organization of learning content and selection of creative tasks for it; pedagogical technique; algorithm for achieving planned results; designing the process of forming the student's personality; approach to the description of the pedagogical process; a field of knowledge that includes methods, means of learning and the theory of their use to achieve the goals of education (Anishchenko, &Yakovets, 2007, p. 11).

It should be noted that in practice, the term "educational technologies" is used at different levels. First, the general pedagogical level (includes general didactic and general educational technologies that describe a holistic educational process in the region and educational institution). Secondly, the subject-methodical level, where educational technology acts as a "separate method" (a set of methods and means for implementing the specific content of education and training within the framework of one subject or class). Third, the local level (focused on the technology of individual elements of the educational process, such as the cultivation of personal and professional qualities, the formation of concepts, the assimilation of new knowledge, independent work, control, and correction) (Dubasenyuk, 2015, p. 82).

The structure of educational technology includes methods, techniques and ways of planning training, as well as organization and management of educational and cognitive activities of students aimed at forming a culture of educational activity. The content of educational technology consists of scientifically based and rationally selected educational materials and conditions for stimulating the educational and cognitive activity of students (Dubasenyuk, 2015, p. 84).

When organizing the educational process, interactive methods are used, in particular, problem-based learning, work in small groups, project methods, business game, role-playing game, case method, training, information and communication technologies, and others.

For example, the basis of the project method is a person-oriented educational technology, which is aimed at the development of such competencies as independent thinking, cognitive abilities, creative

initiative, the ability to solve problems, predict and critically evaluate the results of one's activities, as well as orientation in the information space.

Regarding the generation of ideas for solving problems and stimulating cognitive activity, the method of "brainstorming" is used, which promotes the active participation of the maximum number of students and forms their creative abilities and skills of expressing their own position.

The pedagogical technology of the case method is based on modeling real situations in order to identify problems, make optimal decisions, and find alternatives. Practically, this method is implemented through the analysis of specific situations that not only challenge students to solve a certain problem, but also activate the knowledge necessary to successfully overcome this problem.

The translation of knowledge into the context of activity can be considered as the use of a business game that focuses on the subject and social content of professional activity. It models systems of social relations and promotes the development of teamwork skills, culture of decision-making, communication, and organizational skills, as well as critical thinking and tolerance.

A current pedagogical strategy that allows all students to be involved is work in small groups. It promotes the development of cooperation skills, communication skills, the ability to resolve conflicts, developing the ability to work as a team and a sense of collective responsibility.

The organization of language communication through role-playing games is a special form that helps to distribute social roles in game plots. Participants of the role-playing game master different manners and ways of behavior, according to different roles in the future profession, polishing psychological techniques and rhetorical skills.

The method of interactive learning, aimed at the development of skills, knowledge, skills, and social attitudes, is presented by the training. In this context, it can be considered training aimed at working out and, accordingly, the formation of certain skills and abilities. It is important to note that training also acts as a psychological means of forming the mental structures of an individual, as a result of which personal experience regarding professional activity appears, motivational and behavioral attitudes are created, and self-confidence and positive self-esteem are formed.

An important aspect in the field of educational technologies is the role of the student in the educational process and the attitude of teachers towards him. There are various types of technologies here, but the main one is a person-oriented approach, which is aimed at putting the student at the forefront of the university's educational system and providing him with comfortable and safe conditions for the development and realization of his natural abilities.

In particular, personal-oriented technologies are defined by an anthropocentric and humanistic focus on the diverse and creative development of the individual. Educational technologies should also contribute to the development of professional and social mobility of future specialists, positively influence their competitiveness in the labor market and help them quickly adapt to educational needs.

The ability of students to formulate a problem is a key element for starting research activities. This ability involves identification, verbalization and discussion. The research orientation of the study takes into account the student's own experience, which is organized by the teacher. The goal is to provide students with the opportunity to creatively master new experiences based on purposeful formation of creative and critical thinking, mastery of educational and research tools, as well as the search and

determination of personal values and value relationships. This approach makes the learning process and its results individual, reflecting the uniqueness of each individual (Strelnikov, 2013, p. 129).

The course "Logic" contributes to the formation of a clear style of thinking, and develops the discipline of thinking and creative abilities in theoretical and practical activities (Yerushevich, 2004, p. 22). It examines the philosophical problems of logical analysis of scientific knowledge, various aspects of teaching logic and the disciplines of the logical cycle, the modern theory of argumentation and the history of logical thinking in Ukraine (Kostytskyi, 2014, p. 7). The study of logic is a simplified way of understanding the principles of creating and using knowledge about various modern technologies (Kuznetsova, 2006, p. 56). A specialist must possess the skills of effective criticism, conduct constructive discussions, substantiate and defend his point of view (Hudzenko, 2020, p. 81].

The use of interactive technologies in the virtual classroom during classes in the discipline "Logic" expands the teacher's ability to present new material in real-time, easily use multimedia technologies, and monitor the work of the group as a whole and each student individually. It also enables students to remotely present their projects on the teacher's computer, express their opinions and participate in collective discussions (Kovalchuk&Ivanytskyi, 2021, p. 96).

The use of critical thinking strategies contributes to the transition from learning methods aimed at memorization to forms of mentoring aimed at the development of students' conscious thinking. In addition, it contributes to the formation of the child's readiness for life in the information society, where it is necessary to be able to distinguish the essential, critically evaluate information, and interact with others (Tyaglo, 2002, p. 32).

Critical thinking techniques are designed to develop a variety of skills, such as distinguishing facts from opinion, determining directions for obtaining information, analyzing and evaluating arguments in texts and statements, formulating different types of questions and answering them according to the source of information or the specifics of the situation, creating your arguments and their evaluation by using refutation, writing different types of texts in oral and written form, effective participation in discussions and debates, development of communication and team skills, ability to critically evaluate information, use of psychological operations during information processing, logical and conscious thinking, identification of causes, prerequisites, and consequences of existing problems, as well as readiness to make efforts to solve them (Hudzenko-Aleksandruk, 2010, p. 147).

An interesting point of view is the pedagogy of critical thinking, which is used in the field of English language learning. In particular, the authors recommend specific lesson plans with elements of critical thinking, looking at techniques, methods, and strategies that can be used to create practical tasks for students to develop their critical thinking skills in the process of learning English as a foreign language (Xue Yin et al., 2023, p. 15).

It is necessary to provide teachers with a scientifically based basis for teaching the principles of scientific thinking. These principles should be combined with evidence-based methods to avoid potential errors in reasoning and belief. When introducing students to the world of science, it is important to familiarize them with the basic principles of scientific thinking. Courses that focus on the development of scientific thinking, as well as those that examine cognitive biases, logical fallacies, and other aspects of the scientific approach, tailored to each grade level, can be effective. Providing students with the basics of scientific thinking will enable them to better formulate and evaluate arguments, and to extend these skills in other areas of study. To determine the best method of introducing scientific thinking into the curriculum, it is important to evaluate the effectiveness of such courses, combining it with scientific research (Schmaltz et al., 2017).

The use of critical thinking methods not only stimulates interest in learning but also contributes to the effective assimilation of the material by students. They also learn to apply new knowledge based on previously learned material, develop the ability to make decisions and resolve conflicts independently or in a group, search, filter and apply information from various sources using modern technologies, as well as effectively perform specific tasks. The development of critical thinking is based on partnership pedagogy and has a universal and interactive character.

Clear explanations that include examples for each thinking skill from different domains are an application of a cognitive principle known as encoding variability (Marin&Halpern, 2011).

Therefore, the development of critical thinking is a complex, systematic, and long-term educational process for students. It includes purposeful, organized and staged psychological activities conducted under the guidance of teachers. It is important to note that mastering the basics and operations of logical thinking allows students to develop a new way of critical thinking, which contributes to the analysis of problems and the search for optimal solutions in various spheres of life (Facione, 1990, p. 8).

5. Conclusions. Summing up, it is worth noting that the principle of variability is actively being introduced into the educational system, which allows teachers to choose and develop various models of educational processes, including author's approaches. Various teaching methods and innovative approaches are widely used.

Therefore, learning technology is a system of clear actions that guarantees the achievement of defined goals; the teaching method is connected with the variety of application of theoretical principles.

The main strategic direction of the development of the educational system all over the world is the solution of issues related to person-oriented education, which focuses on cognitive activity.

It is important to note that the development of critical thinking is necessary not only for the individual but also for social progress. This becomes a necessary condition for moving forward and an incentive for self-realization.

Pedagogical technologies in teaching logic and critical thinking are a key tool for the formation of competent citizens capable of making a significant contribution to the development of their country. The use of innovative methods, such as the use of information technologies and the active implementation

of practical tasks, contributes not only to the assimilation of theoretical knowledge, but also to the development of practical skills.

Pedagogical technologies make it possible to adapt the content of education to modern challenges and realities of the national education system. They contribute to the education of a critical view of events in society and form in students the ability to reasonably analyze and evaluate various aspects affecting national interests.

An important part of teaching logic and critical thinking is the integration of knowledge from other fields such as politics, economics, and culture. It helps students gain a deeper understanding of complex problems and use this knowledge to solve real-world problems.

Thus, pedagogical technologies in the context of teaching logic and critical thinking play a strategic role in the formation of intellectual resources necessary to overcome modern challenges and achieve national interests.

Regarding the prospects of research in this area, they include a deeper study of the peculiarities of improving the methods and techniques used in teaching logic and critical thinking.

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