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DEVELOPING CRITICAL THINKING IN PRIMARY STUDENTS USING INTERACTIVE TOOLS IN MATHEMATICS

Modern transformations in the education system of Ukraine associated with the implementation of the Concept of the New Ukrainian School lead to a reorientation of the educational process from the simple acquisition of knowledge to the formation of key student competencies [1]. One of the most important among them is critical thinking, which involves the ability to analyze information, draw reasoned conclusions, make well-founded decisions, and take responsibility for them [4].

The development of critical thinking in primary school pupils is particularly relevant, as it is during the early school years that the foundations of logical thinking, cognitive independence, and intellectual activity are formed. Mathematics as an academic subject has significant potential for the development of critical thinking, since its content is based on logic, analysis, reasoning, and the search for optimal ways to solve problems.

At the same time, traditional teaching methods do not always ensure a sufficient level of student engagement and do not fully contribute to the development of analytical skills. In this context, interactive learning technologies act as an effective means of activating the cognitive activity of primary school pupils and creating conditions for the development of critical thinking.

In contemporary scholarly research, critical thinking is regarded as a complex intellectual process aimed at the conscious analysis, evaluation, and interpretation of information based on logic and evidence. Its formation is associated with the ideas of J. Dewey, who emphasized the reflective nature of thinking and its practical orientation [2].

Critical thinking involves the ability to ask questions, analyze different viewpoints, distinguish facts from judgments, identify errors in reasoning, and defend one's own position in a reasoned manner. In today's information society, these skills are a necessary condition for successful socialization of the individual.

Primary school age is a favorable period for the development of critical thinking, as this stage is characterized by the transition from visual-imagery thinking to verbal-logical thinking. Children gradually master basic logical operations such as analysis, synthesis, comparison, classification, and generalization. At the same time, the thinking of primary school pupils remains closely connected to concrete situations, which necessitates the use of visual and practice-oriented teaching methods.

An important psychological factor is also children's emotional sensitivity, fear of making mistakes, and the need for positive reinforcement. Therefore, the effective formation of critical thinking is possible only in a supportive educational environment where mistakes are viewed as a resource for learning.

Mathematics in primary school performs not only an instructional but also a developmental function. Solving mathematical problems contributes to the formation of pupils' abilities to analyze problem conditions, establish cause-and-effect relationships, choose appropriate solution strategies, and verify the correctness of obtained results [6].

The effective development of critical thinking is facilitated by tasks with excessive or insufficient data, comparison of different solution methods, analysis of completed solutions containing errors, as well as logical and practice-oriented problems. The organization of teamwork is also of great importance, as it enables pupils to learn how to argue their own opinions, listen to others, and jointly find optimal solutions [3, pp. 12–16].

The structure of a mathematics lesson built around the stages of knowledge activation, comprehension of new material, and reflection creates conditions for active cognitive engagement of pupils and contributes to a deeper understanding of the learning material.

Interactive learning involves active interaction among all participants in the educational process and the creation of conditions for cooperation, dialogue, and the exchange of ideas. In primary school, interactive technologies enhance learning motivation and promote the development of communication skills and critical thinking [5].

The most effective interactive technologies include whole-class methods (“brainstorming,” “microphone”), group and pair work, situational modeling, didactic games, and digital educational resources. The use of such methods in mathematics lessons allows all pupils to be involved in active learning, creates situations of problem-based inquiry, and stimulates independent thinking.

Digital interactive technologies (online quizzes, interactive exercises, educational games) expand opportunities for visualizing learning material, provide rapid feedback, and contribute to the individualization of learning. Their use is especially relevant in the context of the ongoing digitalization of education.

Thus, the formation of critical thinking in primary school pupils is an important task of modern education. Mathematics as an academic subject has considerable potential for the development of analytical and logical skills in young learners. The effectiveness of this process largely depends on the use of interactive technologies that ensure active cognitive engagement, cooperation, and reflection.

The application of interactive methods in mathematics lessons creates conditions for developing pupils' abilities to analyze information, justify their own viewpoints, and make well-reasoned decisions. Further research may focus on the experimental verification of the effectiveness of specific interactive methodologies in the development of critical thinking among primary school pupils.

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