



THE ROLE OF MATHEMATICAL PROBLEMS IN FORMING STUDENTS' INDEPENDENT THINKING SKILLS

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Abstract

This article analyzes the role and significance of mathematics, in particular, mathematical problems, in the formation of students' independent thinking skills. Independent thinking is considered as one of the main goals of modern education, and the role of mathematical issues in the development of analytical and logical thinking is highlighted in the formation of this skill. The article is based on the fact that different types of issues (arithmetic, logical, vital, open type) have different effects on the thinking of readers. Also covered are methodological approaches that serve to stimulate the creative and critical thinking of students — such forms of active education as creating problem situations, creating issues, working in a group, exchanging ideas, drawing logical conclusions. Through the practical examples presented in the article, the role of mathematical problems in the formation of not only theoretical knowledge, but also vital skills is shown. Results of this study mathematics textbook

Keywords. Methods, innovative, independent, educational system, scientific, research.

INTRODUCTION

Today, the changes taking place in education systems around the world, the introduction of digital technologies, and the speed of the flow of knowledge require students not only to acquire ready-made knowledge, but also to be able to use it independently, analyze it, draw conclusions, and create new knowledge.



From this perspective, the formation of independent thinking skills in students is emerging as one of the main tasks of modern education. Independent thinking means that a student can independently understand a problem, analyze it, find a logical solution, and justify his or her opinion. This skill is of immense importance in the intellectual development of a student, in making life decisions, in a creative approach, and in overcoming problem situations. Mathematics is one of the most convenient tools for achieving this goal. Because mathematics is not only numbers and formulas, but also thinking, logic, consistency, and systematic thinking. In particular, mathematical problems allow students to activate independent thinking, search for various alternative solutions, and come to logical conclusions through alternative ideas. As many methodologists and modern educators have noted, a properly organized approach to teaching mathematical problems not only increases students' interest in science, but also teaches them to think logically, analyze consistently, and express their opinions independently. In particular, Polya (G. Polya) in his work "How to Solve It" emphasizes that solving problems is the most effective tool for a teacher to direct students to think, research, and experiment. The Strategic Program of the Republic of Uzbekistan in the Field of Education for 2022–2026 also identifies the development of students' critical and independent thinking as one of the most important areas. Therefore, research in this area is of urgent importance not only at the practical, but also at the state level. This article provides a comprehensive analysis of the role of mathematical problems in developing students' independent thinking skills in mathematics, their types, methodological approaches, and ways to develop this skill through practical examples [4,6].

RESEARCH METHODOLOGY AND RESULTS

Independent thinking and its importance in education Independent thinking is not just thinking, but the ability to analyze existing knowledge, independently search for new knowledge, see connections between information, and make sound decisions. This skill is part of the "soft skills" necessary in the 21st century. A student with independent thinking in the educational process: gives well-founded answers to questions, not superficial ones, tries to solve problems on his own, tries to prove his own opinion, and has a critical approach. Therefore, the



formation of independent thinking is an urgent task for any subject. Mathematics is especially important in this regard, because each mathematical problem encourages the student to think, find evidence, and justify his decision. Mathematical problems and their role in the development of thinking In mathematics lessons, problems are used as the main teaching tool. A problem is not just a calculation task, but a logical task that activates the student's thinking and requires a specific analytical work. The main components of the problem (condition, the quantity being studied, the solution method and the result) force the student to think at each stage. Through mathematical problems, consistency of thinking is formed, patience, attention, accuracy and logic develop, the student learns to apply known formulas to real problems, understands that there are several solutions to a problem and learns to think critically. Also, through problems, students develop the ability to reflect, that is, to analyze their own thinking, realize their mistakes and correct them. Types of mathematical problems and their educational and methodological role From a pedagogical point of view, mathematical problems can be divided into the following groups: Traditional arithmetic and algebraic problems Such problems develop students' computational skills. However, they require not only algorithmic thinking, but also the ability to choose a method and create a mathematical model [1,3,5].

For example: "It takes 5 workers to complete the work in 4 days to hire one worker. If 3 workers work, how many days will the work be completed?" Logical problems These problems develop higher levels of thinking, such as logical analysis, reasoning, and cause-and-effect analysis. For example: "There are 5 houses in a village, each house has 3 children, and each child has 2 cats. How many cats are there in total?" Life (practical) problems They form students' thinking skills through real-life situations. Through this, the student learns to apply mathematics in everyday life. Methodological approaches to forming independent thinking The teacher should use methods that encourage students to think, ask questions, argue, and find alternative solutions during the lesson. The following are considered the most effective methods: Problem-based teaching method: A problem is given in the lesson, the solution to which is not immediately obvious. Students independently search, argue, and exchange ideas. Analytical method: The problem is analyzed step by step, with questions asked at each stage.



“Mind map” method: Ideas related to the problem are visually displayed through drawings. Group work: The solution to the problem is discussed in a group, with each student trying to defend their opinion. Problem-solving task: Students independently formulate a problem is one of the most powerful creative approaches. Sample practical lesson

For example, in grade 7, the following problem may be given: “A student bought a book at a bookstore for 48,000 soums with a 20% discount. What was the original price?”

Through this problem: the concept of interest is strengthened, the skill of constructing inverse problems is developed, real-life situations are analyzed; the student develops an independent solution strategy.

CONCLUSION AND SUGGESTIONS

In conclusion, it can be said that the formation of students' independent thinking skills is one of the priority tasks of modern education. Such thinking allows students to make independent decisions not only in the classroom, but also in everyday life and in their future professional activities, approach problems from different angles, be open to innovation and be inclined to research. The analysis shows that the role of mathematics in the educational process is very important in the formation of independent thinking. In particular, mathematical problems are the most effective tool for comprehensively developing the student's analytical, logical, creative and critical thinking skills. In the process of solving a problem, the student learns to understand the problem, look for solutions and justify his opinion based on his knowledge, experience and observations. The types of problems analyzed in the article - arithmetic, logical, life and open-ended problems - have different effects on the thinking activity of students. Especially open-ended, real-life-based, and multi-solution problems are effective in developing students' creative and free thinking. The role of the teacher in developing independent thinking in students is invaluable. The teacher should not just give problems, but also involve the student as an active participant by analyzing them, provoking debate, developing alternative solutions, and posing new questions based on the problem. Interactive methods, problem-based learning, group work, problem formulation, and research tasks should be widely



used in the process of teaching problems. In addition, when choosing mathematical problems, it is necessary to pay attention to their age characteristics, level of thinking, interests, and relevance to modern life. Only in this case will the problems become a tool that stimulates independent thinking. If mathematical problems are selected correctly and methodically worked out thoroughly, they will serve to form not only knowledge in students, but most importantly, the ability to think independently, consistently, and systematically. This contributes not only to the development of mathematics, but also to the development of the entire education system, and to the formation of an active, thoughtful individual in society.

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