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DEVELOPMENT OF MATHEMATICAL LOGICAL THINKING SKILLS IN FUTURE PRIMARY SCHOOL TEACHERS

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Abstract: Improving the quality of primary education is of great importance for raising a generation with modern knowledge and strong logical thinking skills. The development of mathematical logical thinking skills in future primary school teachers is a central component of this process. This article examines the necessity and significance of developing mathematical logical thinking skills among future primary school teachers.

Keywords: thinking, logical thinking, case studies, creativity exercises, intellectual games.

Introduction

In the process of building a democratic state governed by the rule of law, special attention is being paid in Uzbekistan to fostering independent thinking, free expression of ideas, and the development of intellectual and logical reasoning among young people. In particular, there is a growing demand for competitive specialists who possess advanced logical thinking abilities, a high socio-cultural level, and well-developed practical competencies. Therefore, it is essential to create favorable conditions for developing logical thinking skills in future primary school teachers.

Future primary school teachers with well-developed logical thinking abilities can independently analyze the vast amount of information circulating globally and draw appropriate conclusions. From this perspective, developing logical thinking skills among future primary school teachers has become an important objective within the ongoing reforms of the education system. In the context of globalization and the rapid growth of information flows, increasing demands on individuals' intellectual outlook, scientific and cultural awareness, professional competence, and creative abilities require the establishment of conditions that promote continuous educational and professional development.

Today, the professional activity of a primary school teacher is characterized by its multidisciplinary, integrated, multifaceted, and universal nature. A primary school teacher simultaneously performs the roles of a mathematics teacher, language and literature teacher, natural science teacher, and geography teacher. Therefore, future teachers should possess comprehensive knowledge of these disciplines, establish interdisciplinary connections, master educational content independently and effectively, and be capable of generating and implementing innovative teaching ideas.

Developing logical thinking skills and introducing future primary school teachers to effective pedagogical methods are essential components of teacher education. Several practical approaches are presented below.

Case studies significantly contribute to developing teachers' abilities to solve problematic situations while enhancing critical and logical thinking skills. Through this method, future teachers learn how to guide pupils toward meaningful solutions in various real-life situations.

Teachers should create practical scenarios that reflect everyday life. For example, pupils may be asked to calculate shopping expenses in a supermarket by considering prices and discounts.

Working in small groups through role-playing activities enables learners to improve their reasoning skills. For instance, one student may act as the shop assistant while others play the role of customers. Through this scenario, pupils compare prices and make purchasing decisions.

The price of apples is 3,000 UZS per kilogram, while oranges cost 4,000 UZS per kilogram. If apples are sold with a 20% discount, how much should a customer pay for 5 kilograms of apples and 3 kilograms of oranges?

Students are first encouraged to analyze the problem carefully. They determine that the discounted price of apples is:

$3000 \times 0.8 = 2400$ UZS per kilogram

The total cost is calculated as follows:

$5 \times 2400 + 3 \times 4000 = 12000 + 12000 = 24{,}000$ UZS

Finally, students discuss how they arrived at the solution and evaluate whether their reasoning process was correct or contained mistakes.

Creativity exercises are designed to develop pupils' creative thinking and encourage them to approach mathematical problems from different perspectives. Such activities help learners analyze problems more deeply and generate innovative ideas.

Example 1. Calculating the Area of a Triangle

Students are encouraged to determine the area of a triangle using different formulas based on various known sides or angles. Solving the same mathematical problem using multiple methods teaches students to examine problems from different perspectives.

Example 2. Calculating Daily Expenses or Travel Costs

Real-life mathematical situations such as calculating daily expenses or transportation costs can be solved using mathematical reasoning. Graphs and diagrams may also be used to visualize mathematical data and facilitate understanding.

Interactive teaching promotes communication and cooperation among students, enriching their learning experiences. This approach encourages learners to work collaboratively, express their opinions freely, and find solutions together. Every student actively participates in the learning process and acquires new knowledge more effectively.

The teacher assigns the same mathematical problem to several groups and observes how each group develops its own solution strategy. Afterwards, each group presents its solution and discusses it with the others. Students compare different approaches, evaluate their strengths and weaknesses, and reflect on alternative methods.

"A village organizes a regular market every 10 days. In addition, a major market is held once every three months. How many markets are organized in one year?"

Students determine that there are 365 days in a year.

Regular market:

$365 \div 10 \approx$ **36 times**

Major market:

$12 \div 3 = 4$ times

Total:

$36 + 4 = 40$ markets per year

Critical thinking aims to develop students' ability to identify problems, conduct investigations, analyze collected information, and evaluate the obtained results. This competence occupies an important place in mathematical activities.

Students are encouraged to investigate mathematical problems thoroughly, collect the necessary information, analyze relationships among the data, compare different solution methods,

and determine the advantages and disadvantages of each approach. Such activities improve both analytical reasoning and mathematical decision-making skills.

Intellectual Games

Intellectual games enhance logical reasoning while stimulating both individual and collaborative thinking.

Mathematical Quests

In mathematical quests, students solve mathematical problems while progressing through several stages. At each stage, they encounter a new puzzle or challenge.

Example

"Mr. X wants to pass through six stages. At the first stage, his age is doubled, then five years are added, resulting in 45. Determine his age."

Students formulate the equation:

2x + 5 = 45

Subtracting 5 from both sides:

2x = 40

Dividing both sides by 2:

x = 20

Therefore, **Mr. X is 20 years old.**

Mathematical Puzzles

Each student solves mathematical puzzles independently and later compares solutions with classmates. Activities such as Sudoku and magic squares improve concentration, reasoning, and problem-solving skills.

Example:

"In a Sudoku puzzle, each row, column, and 3×3 subgrid must contain the numbers from 1 to 9 exactly once."

Students complete the puzzle by placing each number in its correct position.

Educational Quizzes

Educational quizzes promote teamwork by encouraging students to solve mathematical problems collectively.

Example: *"Who Solves It First?"*

Students work together to solve the following equation:

x + 3 = 10

Solution:

x = 7

Group members cooperate to find the correct answer as quickly as possible.

Number Chains

Number sequence activities develop students' abilities to recognize numerical patterns.

Example:

1, 2, 4, 8, 16, ...

Question: What is the next number?

Solution:

The next number is **32**, since each number is multiplied by two.

Competitive Mathematical Games

Mathematical Relay Races

Mathematical relay races create a healthy competitive learning environment among groups.

Example:

Each group receives five arithmetic problems that must be solved within ten minutes. Teams compete to solve the greatest number of problems accurately within the allotted time.

Intellectual Mathematical Games

Number Puzzles

Number puzzles help students develop computational fluency and logical reasoning.

Example:

"Using the numbers 1, 2, 3, 4, and 5 only once, obtain the number 15."

Solution:

5 + 4 + 3 + 2 + 1 = **15**

Logical Mazes

Logical mazes combine mathematical reasoning with problem-solving strategies. Students solve mathematical tasks in order to identify the correct route through a maze.

Example:

"To find the correct exit from a square maze, students must solve each mathematical problem accurately before proceeding to the next stage."

At every step, learners complete mathematical calculations to determine the correct path.

These educational games enable students to understand and apply mathematical concepts and procedures more effectively. They make mathematics lessons engaging, interactive, and enjoyable while fostering a healthy competitive atmosphere in the classroom.

Training sessions on implementing innovative teaching methodologies in mathematics not only facilitate students' learning but also contribute positively to their psychological well-being and improve the overall quality of instruction. Contemporary teaching methods increase students' interest in mathematics and provide opportunities to apply theoretical knowledge in practical situations. Professional seminars and workshops enable teachers to master innovative instructional strategies and effectively integrate them into classroom practice. Consequently, these methodologies contribute to improving students' academic achievement and strengthening their mathematical competence.

Conclusion

In conclusion, the approaches discussed in this study provide future primary school teachers with effective opportunities to improve both their own professional competence and their students' mathematical learning. The implementation of innovative pedagogical methods and interactive teaching strategies facilitates a deeper understanding of mathematical concepts while enhancing students' logical thinking, creativity, collaboration, and problem-solving abilities. As a result, learners become more motivated to study mathematics and more capable of applying mathematical knowledge in real-life situations. Therefore, the systematic integration of modern pedagogical technologies, innovative instructional methods, and practice-oriented activities significantly increases the effectiveness, quality, and attractiveness of the educational process.

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