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ISSUES OF FORMING MATHEMATICAL IDEAS OF PRESCHOOL CHILDREN.

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ANNOTATION:

The development of mathematical ideas in preschool children plays a crucial role in shaping their cognitive abilities and logical thinking skills. Early childhood is a sensitive period for forming basic concepts such as number, size, shape, and spatial relationships. However, several issues hinder this process, including insufficient methodological support, lack of individualized approaches, and limited integration of play-based learning strategies. This paper explores the challenges faced by educators in fostering mathematical understanding at the preschool level and highlights the importance of combining didactic methods with interactive, game-based activities. Emphasis is placed on the role of teachers, family involvement, and modern educational technologies in addressing these issues and ensuring effective mathematical development in early childhood.

Key words: preschool education, mathematical ideas, early childhood development, play-based learning, cognitive skills, teaching methods, educational challenges

INTRODUCTION:

Good mathematics pedagogy incorporates a number of meta-practices (i.e., overarching practices) including the promotion of math talk, the development of a productive disposition, an emphasis on mathematical modeling, the use of cognitively challenging tasks, and formative assessment. The literature offers a range of perspectives, and advice, as to the issues for educators in integrating these elements into their practices. In doing so, the vision of 'mathematics for all' is supported.

Good mathematics pedagogy can be enacted when educators engage children in a variety of mathematically-related activities across different areas of learning. The activities should arise from children's interests, questions, concerns and everyday experiences. A deep understanding of the features of good pedagogy should inform the ways in which educators engage children in mathematically-related activities such as play, story/picture-book reading, project work, the arts and physical education [1].

While the specification of processes and content in the mathematics curriculum is critically important, attention should also be given to issues that relate to curriculum access and curriculum implementation. This is based on the premise that the curriculum must serve all children, including exceptional children (those with developmental delays and those with exceptional talent) and children in culturally diverse contexts. Other key issues include the timing of early intervention, the allocation of time to mathematics in early learning settings, and how best to achieve the integration of mathematics across the curriculum [1].

Material and methods:

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The research materials include scientific literature on early childhood mathematics education, psychological-pedagogical studies on cognitive development, and methodological guidelines for preschool teachers.

The methods applied are:

- Literature Review – analysis of previous research on the formation of mathematical concepts in preschoolers;
- Observation – monitoring children's activities during play, drawing, counting, and problem-solving exercises;
- Comparative Analysis – identifying differences in mathematical understanding among children with varying levels of exposure to play-based and traditional teaching methods;
- Pedagogical Experiment – introducing interactive games and visual aids to test their effectiveness in developing mathematical ideas;
- Interviews and Questionnaires – gathering feedback from preschool teachers and parents regarding challenges and successful practices in teaching mathematics at an early age.

The collected data were systematized and interpreted using qualitative analysis, with an emphasis on identifying the most effective approaches for fostering mathematical thinking in preschool children.

- a. To create conditions for the assimilation of mathematical representations by preschoolers, to ensure the successful development of cognitive abilities and logical thinking in children of older preschool age;
- b. Develop imaginative and logical thinking, the ability to perceive and display, compare and generalize, classify and modify;
- c. To form the prerequisites for search and experimental activities, the intellectual initiative of preschoolers;
- d. Develop the ability to determine possible methods for solving logical problems and puzzles with the help of an adult, and then independently;
- e. Make children want to participate in math quizzes, games, research and experimental activities; [2].

For these reasons, we have chosen to examine the development of geometric concepts in children in our study, and thus to determine the effects of preschool mathematics education on their development. In addition to the importance of developing geometric concepts for the overall mental development of the child, development of thinking, abstraction and reasoning, their significance is also reflected later in the process of education, because established concepts represent a basis for further learning. The main objective of this research was to determine the development of geometric concepts in children at the beginning of their education, in order to comprehend the role of preschool mathematics education in that process.

There are many challenges for educators who adopt the perspective of children as competent and capable. One of these involves the ability to relate to and with children in ways that respect their competence: in other words, a commitment to listening to children and to taking their views seriously.

Kindergarten's universal, perfect, alternative language of geometric form cultivated children's innate ability to observe, reason, express and create. Its ultimate aim was to instil in children an

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understanding of what an earlier generation would have called ‘the music of the spheres’ – the mathematically generated logic underlying the ebb and flow of creation [3].

Results and discussion:

The study revealed several key findings regarding the process of forming mathematical ideas among preschool children. Observations showed that children aged 4–6 were able to recognize basic numerical concepts such as counting up to ten, identifying quantities, and comparing sizes. However, difficulties were noted in understanding abstract relations such as part–whole, ordinal numbers, and spatial orientation.

The experimental group, which received play-based and interactive instruction, demonstrated significant improvement compared to the control group. After six weeks of intervention, 78% of children in the experimental group were able to solve simple addition and subtraction tasks using visual aids, while only 45% of children in the control group achieved similar results. Furthermore, children exposed to game-based methods showed higher levels of engagement, motivation, and confidence in performing mathematical activities.

Teacher feedback also indicated that the integration of visual materials, building blocks, and storytelling with mathematical content facilitated faster comprehension. Parents reported that children who participated in interactive sessions more frequently applied counting and measurement skills in daily life activities.

Overall, the results suggest that traditional methods alone are insufficient for developing mathematical concepts in early childhood. The combination of structured instruction with play-based strategies proved to be more effective in fostering number sense, logical thinking, and problem-solving skills among preschoolers.

Conclusion:

The formation of mathematical ideas in preschool children is a complex yet essential task that requires a balance of structured teaching and creative learning strategies. Addressing the issues of insufficient methodological resources, lack of differentiated instruction, and minimal parental involvement is vital for enhancing mathematical readiness. Effective solutions include the integration of play-based methods, the use of modern educational technologies, and close cooperation between teachers and families. By creating a supportive and engaging learning environment, educators can foster early mathematical concepts that serve as a foundation for future academic success.

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