

**THE STEAM APPROACH IN SPECIALIZED PRIMARY EDUCATION AND ITS
ROLE IN MATHEMATICS INSTRUCTION****Usmonova Shoxsanam Nuriddin qizi**1st-year Master's student in Theory and Methodology
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Abstract: This article analyzes the theoretical and methodological foundations of applying the STEAM (Science, Technology, Engineering, Art, Mathematics) approach in specialized primary education. In the modern educational process, it is important to develop not only students' theoretical knowledge but also their practical skills. In this regard, the STEAM approach serves as an effective pedagogical tool in mathematics education by ensuring interdisciplinary integration, as well as fostering students' logical thinking, creative reasoning, and problem-solving abilities. During the research process, methods such as pedagogical observation, analysis of scientific literature, comparison, and experimental testing were employed. Mathematics lessons organized on the basis of STEAM elements enhance students' cognitive activity, promote independent thinking, and enable the connection of mathematical knowledge with practical activities. The research results indicate that this approach increases students' interest in mathematics and contributes to the development of their analytical and creative thinking skills.

Keywords: STEAM education, primary education, mathematics education, integration, creative thinking, interdisciplinary approach.

**IXTISOSLASHTIRILGAN BOSHLANG'ICH SINFLARDA STEAM YONDASHUVI VA
UNING MATEMATIKA TA'LIMIDAGI O'RNI**

Annotatsiya: Mazkur maqolada ixtisoslashtirilgan boshlang'ich sinflarda STEAM (Science, Technology, Engineering, Art, Mathematics) yondashuvini qo'llashning nazariy va metodik asoslari tahlil qilinadi. Zamonaviy ta'lim jarayonida o'quvchilarning nafaqat nazariy bilimlarini, balki amaliy ko'nikmalarini rivojlantirish muhim ahamiyatga ega. Shu jihatdan STEAM yondashuvi matematika ta'limida fanlararo integratsiyani ta'minlash, o'quvchilarning mantiqiy fikrlashi, ijodiy tafakkuri hamda muammoli vaziyatlarni hal qilish ko'nikmalarini rivojlantirishda samarali pedagogik vosita hisoblanadi. Tadqiqot jarayonida pedagogik kuzatuv, ilmiy adabiyotlarni tahlil qilish, taqqoslash hamda tajriba-sinov metodlaridan foydalanildi. STEAM elementlari asosida tashkil etilgan matematika darslari o'quvchilarning bilish faolligini oshirish, ularning mustaqil fikrlashini rivojlantirish va matematik bilimlarni amaliy faoliyat bilan bog'lash imkonini beradi. Tadqiqot natijalari shuni ko'rsatdiki, mazkur yondashuv matematika faniga qiziqishni oshiradi hamda o'quvchilarning analitik va kreativ tafakkurini shakllantirishga xizmat qiladi.

Kalit so'zlar: STEAM ta'limi, boshlang'ich sinf, matematika ta'limi, integratsiya, ijodiy fikrlash, fanlararo yondashuv.

**STEAM-ПОДХОД В СПЕЦИАЛИЗИРОВАННЫХ НАЧАЛЬНЫХ КЛАССАХ И ЕГО
РОЛЬ В ОБУЧЕНИИ МАТЕМАТИКЕ**

Аннотация: В данной статье анализируются теоретические и методические основы применения подхода STEAM (Science, Technology, Engineering, Art, Mathematics) в специализированных начальных классах. В современном образовательном процессе важное значение имеет развитие не только теоретических знаний учащихся, но и их

практических навыков. В этом контексте подход STEAM выступает эффективным педагогическим инструментом в обучении математике, обеспечивая междисциплинарную интеграцию, а также способствуя развитию логического мышления, творческого подхода и навыков решения проблем у учащихся. В ходе исследования были использованы методы педагогического наблюдения, анализа научной литературы, сравнительного анализа, а также опытно-экспериментальные методы. Уроки математики, организованные на основе элементов STEAM, способствуют повышению познавательной активности учащихся, развитию их самостоятельного мышления и установлению связи математических знаний с практической деятельностью. Результаты исследования показали, что данный подход повышает интерес к математике и способствует формированию аналитического и креативного мышления у учащихся.

Ключевые слова: STEAM-образование, начальная школа, обучение математике, интеграция, творческое мышление, междисциплинарный подход.

INTRODUCTION

Primary education is considered one of the most important stages in which pupils' cognitive activity, thinking ability, and learning motivation are formed. In particular, the educational process in specialized primary classes is aimed at developing learners' abilities and intellectual potential more deeply. In such classes, one of the main pedagogical tasks in teaching mathematics is to improve pupils' logical thinking, analytical reasoning, and creative approach. Therefore, the use of innovative approaches in mathematics education, especially the implementation of the STEAM methodology, contributes significantly to increasing the effectiveness of education.

The STEAM approach is based on ensuring the interconnection and integration of different subjects within the educational process. This approach helps develop students' complex and interdisciplinary thinking through the integration of mathematics, natural sciences, technology, engineering, and art. In this process, learners not only acquire theoretical knowledge but also gain opportunities to apply it in real-life situations. As a result, the teaching process becomes more meaningful, engaging, and effective.

Mathematics education in primary grades plays an essential role in developing pupils' logical thinking, computational skills, and the ability to analyze problematic situations. The STEAM approach enables the integration of mathematics with other disciplines, thereby deepening learners' knowledge and directing them toward practical activities. For example, while studying geometric shapes, pupils may use construction sets and modeling activities, whereas measurement units can be taught through technological projects and experiments. Such activities not only develop students' creative thinking but also increase their interest in academic subjects.

For this reason, studying the pedagogical possibilities of the STEAM approach in organizing mathematics education in specialized primary classes has important scientific and practical significance. The purpose of this article is to analyze the theoretical foundations of applying the STEAM approach in specialized primary education and to determine its role in improving the effectiveness of mathematics teaching. The results of the research may contribute to the development of scientific and methodological recommendations for the wider implementation of innovative approaches in teaching mathematics within the primary education system.

RESEARCH SIGNIFICANCE

In the modern education system, developing students' logical, critical, and creative thinking skills is considered one of the most important tasks. Particularly in specialized primary classes, the use of innovative pedagogical approaches in teaching mathematics serves to improve the effectiveness of education. In this regard, the STEAM approach provides opportunities to ensure interdisciplinary integration, connect mathematical knowledge with practical activities, and develop students' problem-solving skills. Therefore, studying the organization of mathematics

lessons based on the STEAM approach in primary education has become an actual scientific and pedagogical issue.

RESEARCH OBJECTIVE

The purpose of this research is to study the theoretical and methodological foundations of the STEAM approach in specialized primary classes and to determine its role in improving the effectiveness of mathematics education. In addition, one of the important objectives of the research is to analyze the possibilities of developing students' logical thinking, creative reasoning, and problem-solving skills through the STEAM approach.

LITERATURE REVIEW AND METHODOLOGY

In the modern educational system, the STEAM approach is regarded as an important pedagogical concept that contributes to the development of students' interdisciplinary knowledge. In scientific literature, the theoretical foundations of this approach and its significance in the educational process have been widely discussed. In particular, the American researcher Georgette Yakman explains STEAM education as an educational model based on interdisciplinary integration and emphasizes that this approach contributes to the development of students' scientific thinking and creative activity [1]. According to her, the STEAM approach enables learners to integrate theoretical knowledge with practical activities.

The development of STEAM education and its role in the modern education system were also thoroughly examined in the studies of Rodger Bybee. According to the scholar, STEM and STEAM education help students develop problem-solving abilities and improve their critical and analytical thinking skills [2]. Moreover, this approach strengthens the connection between theory and practice within the educational process.

Scientific studies related to the methodology of teaching mathematics in primary education have also been extensively explored by Uzbek scholars. In particular, M.E. Jumayev emphasizes the importance of developing students' logical thinking, teaching them independent reasoning, and using visual materials and practical activities in the process of teaching mathematics in primary grades [3]. According to the scholar, the use of methods that ensure active participation of students in learning mathematical concepts increases the effectiveness of education.

Furthermore, N.Sh. Ibragimov notes in his studies the importance of using problem-based tasks in developing students' mathematical abilities. According to his views, complex tasks and creative assignments contribute to the development of students' logical and analytical thinking [4]. This is also consistent with the STEAM approach, which encourages learners toward independent inquiry and exploration.

In this research, several scientific methods were used to study the impact of the STEAM approach on mathematics education in specialized primary classes. Through the theoretical analysis method, scientific literature related to STEAM education, interdisciplinary integration, and mathematics teaching methodology was studied and generalized. Using the pedagogical observation method, the process of applying STEAM elements in primary mathematics lessons was analyzed. With the help of the comparative method, the effectiveness of traditional teaching methods and STEAM-based lessons was compared. In addition, an experimental method was also applied during the research process. Throughout the experiment, STEAM elements such as project-based assignments, working with construction kits, geometric modeling, and solving practical problems were implemented in mathematics lessons. These methods made it possible to identify changes in students' cognitive activity, logical thinking, and problem-solving skills.

DISCUSSION AND RESULTS

During the research process, the effectiveness of organizing mathematics lessons based on the STEAM approach in specialized primary classes was studied. Throughout the experimental work, interdisciplinary tasks, problem-based situations, practical projects, as well as construction and modeling elements were applied in mathematics lessons. The results demonstrated that lessons organized on the basis of the STEAM approach significantly increased students' learning activity. In particular, improvements were observed in learners' understanding of mathematical

concepts, logical thinking skills, and ability to work independently. In addition, students became more inclined to apply creative approaches in solving problems and to analyze problematic situations independently.

The use of technology and engineering elements in mathematics lessons also increased students' interest in academic subjects. Modeling activities in teaching geometric shapes and practical experiments in learning measurement units helped strengthen students' knowledge more effectively. As a result, learners developed skills for applying mathematical knowledge to real-life situations.

The obtained results indicate that the STEAM approach is an important pedagogical tool for effectively organizing mathematics education in primary classes. This approach develops students' complex thinking by integrating mathematical knowledge with other disciplines. Lessons organized on the basis of the STEAM methodology activate students' cognitive activity and engage them in research-oriented learning processes. Furthermore, the STEAM approach provides opportunities to combine theoretical knowledge with practical activities in teaching mathematics. This contributes to a deeper understanding of mathematical concepts and helps students develop the ability to apply them in real-life situations. Such an approach is especially important at the primary education stage, as it increases students' interest and learning motivation.

CONCLUSION

The results of the research showed that organizing mathematics education in specialized primary classes on the basis of the STEAM approach contributes to improving the effectiveness of the educational process. This approach ensures interdisciplinary integration, which helps students acquire mathematical knowledge more deeply and develop their logical thinking and creative reasoning skills. Mathematics lessons organized with STEAM elements increase students' cognitive activity and promote the formation of independent thinking and problem-solving abilities. Moreover, integrating mathematics with technology, engineering, and other disciplines expands students' opportunities to apply their knowledge in real-life situations. Therefore, the use of the STEAM approach in teaching mathematics within the primary education system can be considered pedagogically effective and plays an important role in developing students' modern competencies.

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