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PRACTICAL FOUNDATIONS FOR IMPLEMENTING STEAM TECHNOLOGY IN PRIMARY SCHOOL NATURAL SCIENCE LESSONS

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ABSTRACT: This article examines the practical and methodological foundations of implementing STEAM (Science, Technology, Engineering, Arts, Mathematics) educational technology in teaching natural sciences (Natural Science) in primary grades. The article analyzes the methodology of designing practical projects and lesson models aimed at developing students' critical thinking, creativity and engineering skills, in contrast to the traditional teaching system.
Keywords: STEAM education, natural sciences, primary grade, integration, practical approach, project-based education.

АННОТАЦИЯ: В данной статье рассматриваются практические и методологические основы внедрения образовательных технологий STEAM (наука, технология, инженерия, искусство, математика) в преподавании естественных наук в начальных классах. В статье анализируется методология разработки практических проектов и моделей уроков, направленных на развитие критического мышления, креативности и инженерных навыков учащихся, в отличие от традиционной системы обучения.
Ключевые слова: STEAM-образование, естественные науки, начальная школа, интеграция, практический подход, проектное образование.

INTRODUCTION

As we all know, in order to raise the quality of education in our country to a new level, on September 5, 2018, the Decree of the President of the Republic of Uzbekistan “On additional measures to improve the public education management system” No. PF-5538 was adopted. One of the expected results of the implementation of this Concept is the introduction of general education programs and new state educational standards that meet the requirements of a modern innovative economy, taking into account the special emphasis on the development of STEAM subjects and the competences and skills of critical thinking, independent search and analysis of information. It is clear that our president is paying great attention to the field of education. Introducing the STEAM education system to secondary schools will greatly help increase the cognitive abilities of students. In today's rapidly developing age of digital technologies, the education system is tasked with providing students not only with theoretical knowledge, but also with forming life skills (21st century skills). Primary school students perceive the world around them as a whole. Therefore, teaching natural sciences separately, in isolation, does not give the expected results.

The STEAM (Science, Technology, Engineering, Art, Mathematics) approach is the most perfect tool for ensuring interdisciplinary integration. The purpose of this article is to demonstrate a practical model for the correct and systematic integration of STEAM technology into the teaching process in elementary school "Natural Science" lessons and to develop methodological recommendations for teachers.

METHODS. During the study, the following scientific and methodological methods were used, taking into account the age and psychological characteristics of primary school students:

Systematic and comparative analysis: Foreign and national methodological literature on the STEAM approach was analyzed.

Integrated design method: Natural science topics were interconnected with elements of technology, engineering and mathematics.

The "5E" lesson model (Engage, Explore, Explain, Elaborate, Evaluate): was chosen as the main structure for introducing STEAM projects into the lesson plan.

As a practical basis, a strategy was established to find solutions by creating problem situations (Problem-based learning) rather than giving students ready-made formulas in organizing lessons.

DISCUSSION

STEAM technology, unlike education, provides for the acquisition of knowledge not in isolation, but in a balanced manner. The student develops non-standard thinking, multiple solutions to problems, and creativity, which will be very useful in his future career.

What is the STEAM education system? S-science (natural sciences) T-technology (technology) E-engineering (engineering) A-art (art) M-mathematics (mathematics) Do not forget that these areas are becoming the most popular in the modern world. Therefore, today the STEAM system is developing as one of the main trends.

The direction of STEAM education and the use of a practical approach are also based on the integration of all five areas into a single educational system. The difference between STEAM educational technology and other technologies is that children simultaneously combine intellectual activity with practical activity in order to successfully master various topics. In this case, they follow the expression "mind and hand". They quickly learn and master the knowledge they have gained by seeing it in practical activities. This new approach to education is the logical result of combining theory and practice. STEAM was developed in America. As a result of the methodological analysis, 3 main practical stages of teaching natural sciences in primary grades based on STEAM and a ready-made lesson model were developed.

Scheme for implementing STEAM projects in the lesson:

Problem Solving (Science): A natural phenomenon or problem is studied.

Solution & Design (Engineering & Art): A visual and constructive solution to the problem is drawn and created. Math & Tech:

Measurements are taken, using numerical tools if necessary.



This practical model shows that the student does not just memorize the topic, but understands the laws of nature by making a device with his own hands.

RESULTS

The obtained practical results and lesson models show that the use of STEAM technology in primary grades eliminates a number of shortcomings in traditional education:

From abstraction to concreteness: Students see natural processes (for example, wind power, light refraction) not through dry text, but through engineering models.

Increased motivation: The combination of art and technology dramatically reduces the boredom rate in the lesson.

Methodological recommendations and limitations: When implementing STEAM in practice, teachers should correctly distribute the lesson time. It can be difficult to create both a project and explain the theory in a 45-minute lesson. Therefore, it is advisable to organize such lessons in the form of 2-hour integrated lessons or in group classes.

CONCLUSION

The practical foundations of using STEAM technology in primary school science lessons take students' logical, spatial and creative thinking to a new level. Even without experiments, it can be concluded that demonstrating intersubject connections in the lesson through practical projects (school filter, sundial model, making a simple compass, etc.) is the most effective strategy for improving the quality of education. The "5E" and STEAM integration model developed for teachers guarantees the effectiveness of the lesson.

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