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STEM TECHNOLOGY AS A MEANS OF DEVELOPING STUDENTS' CREATIVE ACTIVITY

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ABSTRACT

This article analyzes an innovative approach to organizing the educational process aimed at the formation of scientific and technical competence using STEM technologies. The essence of STEM education is considered, the advantages and disadvantages of STEM technology, which are aimed at combining interdisciplinary practice-oriented approaches to the study of both individual disciplines and modern methods and tools of scientific and technical and technological research.

Keywords: STEM technology, creative activity, creativity, creative thinking, design method.

STEM TEXNOLOGIYASI TALABALARNING IJODIY FAOLIYATINI RIVOJLANTIRISH VOSITASI SIFATIDA

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ANNOTATSIYA

Ushbu maqola STEM texnologiyalaridan foydalangan holda ilmiy va texnik kompetentsiyani shakllantirishga yo‘naltirilgan ta'lim jarayonini tashkil etishga innovatsion yondashuvni tahlil qiladi. STEM o‘qitishning mohiyati, STEM texnologiyasining ham individual fanlarni, ham ilmiy va texnik va texnologik tadqiqotlarning zamonaviy usullari va vositalarini o‘rganishga fanlararo amaliyotga yo‘naltirilgan yondashuvlarni birlashtirishdan iborat bo‘lgan afzalliklari va kamchiliklari haqida fikr yuritiladi.

Kalit so‘zlar: STEM texnologiyasi, ijodiy faoliyat, ijodkorlik, ijodiy fikrlash, dizayn usuli.

STEM-ТЕХНОЛОГИИ КАК ИНСТРУМЕНТ РАЗВИТИЯ ТВОРЧЕСКОЙ ДЕЯТЕЛЬНОСТИ СТУДЕНТОВ

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АННОТАЦИЯ

В данной статье анализируется инновационный подход к организации образовательного процесса, направленный на формирование научно-технической компетентности с использованием STEM-технологий. Обсуждаются сущность STEM-образования, преимущества и недостатки STEM-технологии, заключающейся в сочетании междисциплинарных практико-ориентированных подходов к изучению как отдельных предметов, так и современных методов и инструментов научно-технических и технологических исследований.

Ключевые слова: STEM-технология, творческая деятельность, творчество, креативное мышление, метод проектирования.

INTRODUCTION

At the beginning of this century, the US National Science Foundation created the STEM (Science, Technology, Engineering, Mathematics) education system to represent a new educational direction designed to eliminate the shortage of technical specialists in the country. STEM is an educational model that combines natural and engineering sciences into a single, interconnected system.

STEM prepares personnel who have mastered science, technology, engineering, and mathematics in an interconnected manner, who can apply what they have learned in practice, who have computer skills, and who are able to work well in a team and take independent initiatives.

The importance of STEM disciplines is that many of the professions that we currently have may be performed by robots that work automatically in the near future or become completely unnecessary. And STEM prepares personnel suitable for this future.

In STEM professions, mastering each discipline is important. For example, an architect must be well versed in mathematics and science to design a 10-story building. Then, he or she will need to use engineering and technology to create a model of the building.

The STEM education system is a bit more difficult and demanding than other areas. The reason is that if you do not master all 4 subjects at the same time, it is difficult to achieve the expected result. For example, if you want to create a robot, and you do not have all the necessary skills, how can you create a robot that can perform the tasks you have in mind? But despite the difficulties, studying STEM subjects is still interesting.

The main idea of STEM technology in pedagogy is to build academic subjects (courses) on an interdisciplinary basis (integrated education according to specific topics, not individual subjects), to comprehensively form the main professional and socio-personal competencies of students [1, p.52].

In our article, we proceed from the fact that STEM technology is a category that determines the direction of the pedagogical process (technology) relevant for the formation and development of the mental, cognitive and creative qualities of young people, the level of which determines competitiveness in the modern labor market.

MATERIALS AND RESEARCH METHODS

Today, the need to create psychological and pedagogical research and diagnostic methods, tools for determining the abilities and readiness of students for STEM professions is especially urgent. Special education vocational programs, competitions, tournaments, and olympiads require planning a strategy for developing the interests and practical skills of students inclined to STEM, the tasks of which should be developed by teachers together with selected field specialists.

The physical and mathematical content is the main one in STEM-oriented training. Its implementation involves the use of the engineering research method (engineering design), which includes the following stages: identifying the essence of the problem, preliminary research, determining requirements, brainstorming, developing and testing a prototype, evaluating the result, making changes and presenting the result. Unlike the scientific research method, thanks to this approach, students acquire knowledge that can be used to solve various problems, which are an intermediate result of education in the process of achieving a specific educational goal. In this regard, we define the goal of this work - studying STEM science as a way to help today's children, adolescents and students become tomorrow's innovative specialists, enthusiastic, creative and reliable communicators of the team, society, country. Creativity itself does not guarantee creative success. To achieve them, an "engine" is needed, a "motivational basis" is needed that will launch the thinking mechanism. This foundation can be STEM technologies, which combine creative and imaginative thinking, artistic taste and aesthetic education, ideas and close interdisciplinary connections. Such an education system will teach you to live in a real, rapidly changing world, to respond to the problems of modernity, to think critically, to be a creative person.

Creativity is an intensified activity aimed at the search for novelty, and within the framework of this approach, the main pedagogical idea of STEM technologies is to organize an educational process that contributes to the development of the creative potential and creative thinking of a person as a future specialist. Creative thinking, in our understanding, is, first of all, a departure from the template, from a given standard, a combination of incongruous, which is a sign of originality. Therefore, an important condition for activating creative thinking is freedom, incompleteness of thinking, the ability to cross the boundaries of stereotypes. Creativity and innovation go hand in hand. "Creative thinking" can breathe new life into any scientific and technological project, demonstrate its undiscovered potential. In addition, those who are able to go beyond technical skills and think outside the box can invent something completely new in many other areas of human life.

Pedagogical research and existing practice prove that the ideal model of STEM education has its own specific features that should be taken into account in the educational process - from planning a specific lesson to interacting with teachers of relevant subjects. Thus, lessons should have signs of problem-based learning, the principles of which are the identification of problems with a real context, the solution of which involves interdisciplinary interaction, the predominant use of inductive research methods, teamwork, etc. In addition, STEM education forms a certain set of personal qualities consisting of such components as critical thinking, creative problem-solving skills, and teamwork. Undoubtedly, the introduction and development of STEM education requires the training of appropriate pedagogical personnel,

legal and information support at various levels, and the creation of communities that unite not only specialists, but also interested representatives of different segments of the population and professions [2].

RESEARCH RESULTS AND ANALYSIS

Learning in the STEM context teaches critical thinking, increases general scientific literacy, and creates a new generation of innovators and inventors. For example, in addition to physics and mathematics, students learn robotics, programming, and designing and programming their own robots [3]. In each lesson, students plan, develop, and design modern industrial models, try to propose their own models, analyze, draw conclusions, and relate them to real-life situations and their own experiences. This gives them the opportunity to become more confident in their abilities, learn to achieve their goals, overcome obstacles, and check their work many times, but not stop at obstacles.

Working in groups, students freely express their thoughts, defend them, learn to correctly formulate and present their work. The more they are engaged in practical work, the more they reveal their abilities and show greater interest in technical sciences. This allows them to choose the right future profession, learn to understand complex terminology, and prepare for an adequate perception of life [4].

CONCLUSION

Thus, this teaching technology is designed to form professional (subject) and social competencies of modern youth, which allows you to be in demand due to the ability to comprehensively solve specific problems, think critically and creatively, find non-standard solutions, and implement innovative activities. Today, the problem of studying creativity from the category of understudied is included in the category of those available for analysis in the natural sciences, acquires scientific objectivity and research value. Creativity is a phenomenon that mainly belongs to specific subjects and is associated with the specific characteristics of the human psyche, thinking and higher nervous activity, and the laws of mental labor. Several aspects are identified in the problem of creativity: this is the creative process, the creative personality, creativity, and the creative climate [5].

In conclusion, we note that the scientific and practical potential of STEM technologies is very large, but their simultaneous introduction into the educational system with different levels of design methods will help develop new technologies, innovative thinking, creative abilities of students, and create a need for well-trained technical personnel. The interconnection and close interaction of many areas of knowledge allow students to better understand the complex and extremely interesting world around them with its diversity[6].

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