Chapter 1
STEM Approach in Education:
The Use of Smart Tools in Professional Training Future Specialists

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ABSTRACT

The implementation of the STEM approach in the training of students enables the effective development of logical and critical thinking, teamwork the practical use

DOI: 10.4018/979-8-3373-7912-8.ch001

application of knowledge gained STEM disciplines. Using the example of the use of a smart RGB lamp, it is shown that this lamp allows for the visualization of various physical and biological processes, making it a useful tool in teaching and learning biophysics, robotics, and programming. In this chapter the practical application of this lamp in the educational process is demonstrated. The pedagogical effect of implementing and using the STEM project is shown. It is proven that such projects form part of the information-educational environment. The scientific and educational project demonstrates an interdisciplinary approach in education. The implementation of STEM methods and technologies in the educational process promotes the development of creativity, analytical thinking, and practical skills among students.

INTRODUCTION

In the modern world, where science becomes the foundation for solving global problems, the STEM approach (Science, Technology, Engineering, Mathematics) plays a leading role in training future specialists and is one of the breakthrough tools for educational transformation. Within STEM education, the algorithm for solving problems is built based on the need for integrative use of acquired knowledge.

STEM education, as a project-based form of organizing the educational process where students unite in groups to jointly solve practice-oriented learning tasks (the results of which can be used for the needs of educational institutions, enterprises, regions, etc.), has an interdisciplinary nature. At the same time, educational tasks are designed in such a way that their solutions require cross-disciplinary connections, covering academic subjects that are key to the training of an engineer or a specialist in applied scientific research: physics, chemistry, biology, modern technologies, and engineering disciplines (Sinyugina, Velichko & Belyaeva, 2021; Klepikova, Kormakova & Eroshenkova, 2020).

The goal of STEM education is to organize project-based learning that effectively fosters the development of creative skills, analytical thinking, interest in natural and exact sciences, teamwork skills, and the ability to work collaboratively with modern, including digital, technologies (Kormakova, Klepikova, Musaielian & Lapina, 2019).

As a rule, in educational practice, scientific knowledge from subjects like geography, history, etc., often remains outside the learning process. As a result, students (schoolchildren and university students) are not always able to correlate historical events with their geographical context. The autonomy of disciplines hinders the creation of a systematic worldview and perception of the surrounding world, science, and the education system itself. This, in turn, obstructs the solution of vital and professionally oriented tasks (Kormakova, Chernyavskikh, Trikula & Satler, 2023).