

## METHODOLOGY FOR DEVELOPING STUDENTS' TECHNICAL CREATIVITY BASED ON THE STEAM APPROACH

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### **Abstract**

This article explores the methodology for developing students' technical creativity based on the STEAM approach to teaching physics.

**Key words:** STEAM, integrated approach, technology, engineering, art, mathematics, research and experimentation, collaboration.

### **Аннотация**

В данной статье исследуется методика развития технического творчества студентов на основе STEAM-подхода при преподавании физики.

**Ключевые слова:** STEAM, интегрированный подход, технология, инженерия, искусство, математика, исследования и эксперименты, коллаборация.

Developing students' technical creativity is an important task in the educational environment. One effective method for this development is the use of a STEAM approach, which combines knowledge and skills from various fields of science, technology, engineering, art and mathematics.

Physics teaching can be a great starting point for taking a STEAM approach. This subject provides a unique opportunity to combine theoretical knowledge with practical skills, analysis and creativity.

The first step in applying a STEAM approach to teaching physics is to create an environment that encourages students to actively interact with the material. The teacher can use various methods such as conducting experiments, demonstrating experiments, using interactive presentations, videos and other teaching aids.

The second step is to establish connections between physics and other sciences and fields of knowledge. For example, you can teach lessons that combine physics and chemistry so that students see the relationships between these subjects. You can also conduct lessons where students will apply knowledge of physics to solve engineering and technical problems.

The third step is to stimulate students' creative thinking. The teacher may offer assignments that require the application of physics knowledge to create new and

original projects. For example, students may design and build prototypes of devices using physical principles or create computer models to study various phenomena.

The fourth step is evaluation and feedback. The teacher must evaluate not only the acquired knowledge and skills of students, but also their creative potential and ability to apply acquired knowledge in real situations. It is also important to provide students with feedback on their work and support them in developing technical creativity.

Thus, the methodology for developing students' technical creativity based on the STEAM approach to teaching physics allows us to combine theoretical knowledge and practical skills, as well as stimulate creative thinking. This methodology promotes the development of integral competencies needed in the modern world and prepares students to solve complex engineering and technical problems.

The STEAM approach is an integrated approach to learning that integrates science, technology, engineering, art and mathematics. When applied to physics teaching, the STEAM approach encourages students to think creatively, problem solve, communicate effectively, and collaborate. Below is a methodology for using the STEAM approach when teaching physics:

1. Real-life examples and problems: Instead of presenting only abstract concepts and formulas, teachers can use real-life examples and problems to show how physics is applied in practice. For example, one might consider the application of Newton's laws in sporting events or in industry.

2. Research and Experimentation: Students are given the opportunity to conduct their own scientific research and experiments to study physical phenomena. This teaches them skills in observation, hypothesis formulation, data collection and analysis, and critical thinking.

3. Project assignments: To apply the acquired knowledge of physics in practice, students may be offered project assignments. For example, they might design and build a machine that works based on physical laws, or create a model of alternative energy.

4. Collaboration and Teamwork: Students can be divided into groups so they can work together on projects or solve problems. This develops communication, leadership and collaboration skills as students are required to share ideas and solve problems together.

5. Technology and Tools: Teachers can introduce technology and modern tools to help students learn physics more effectively. For example, you can use computer simulations, virtual labs, or even 3D printing to create physical models.

6. Art and Design: It is possible to incorporate elements of art and design into the study of physics. For example, students can create images or models that illustrate physics concepts or use a variety of creative methods to present their research or projects.

Using a STEAM approach to teaching physics helps students better understand and apply physics concepts and laws in practice, and develops their critical and creative thinking.

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