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Method Of Using The Steam Approach In Teaching Biology

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Abstract. This article discusses the theoretical and practical foundations of using the STEAM approach in teaching biology. The article examines in detail the relevance of this approach, methods that can be used in biology lessons, project-based learning methods, and innovative solutions aimed at solving problems.
Keywords. STEAM, biology education, interdisciplinary integration, innovative pedagogy, practical education, 21st century skills, problem-based learning, environmental education, technology and engineering, art and creativity, mathematical analysis, environmental problems, project-based learning.

Biologiya Fanini O'qitishda Steam Yondashuvidan Foydalanish Metodikasi

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Namangan viloyati pedagogik mahorat markazi “Aniq va tabiiy fanlar metodikasi” kafedrasi katta o’qituvchisi.

Annotatsiya. Ushbu maqola biologiya fanini o‘qitishda STEAM yondashuvidan foydalanishning nazariy va amaliy asoslarini yoritadi. Maqolada ushbu yondashuvning dolzarbligi, biologiya darslarida qo‘llanilishi mumkin bo‘lgan metodlar, loyiha asosida o‘qitish usullari hamda muammolarni hal qilishga yo‘naltirilgan innovatsion yechimlar batafsil ko‘rib chiqilgan.
Kalit so‘zlar. STEAM, biologiya ta’limi, fanlararo integratsiya, innovatsion pedagogika, amaliy ta’lim, XXI asr ko‘nikmalari, muammoli ta’lim, ekologik ta’lim, texnologiya va muhandislik, san’at va ijodkorlik, matematik tahlil, ekologik muammolar, loyiha asosida o‘qitish.

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Методика Использования Подхода Steam В Преподавании Биологии

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Аннотация. В этой статье рассматриваются теоретические и практические основы использования подхода STEAM в преподавании биологии. В статье подробно рассмотрены актуальность данного подхода, методы, которые можно использовать на уроках биологии, проектные методы обучения, а также инновационные решения, направленные на решение проблем.

Ключевые слова. STEAM, биологическое образование, междисциплинарная интеграция, инновационная педагогика, прикладное обучение, навыки 21 века, проблемное обучение, экологическое образование, технологии и инженерия, искусство и творчество, математический анализ, экологические проблемы, проектное обучение.

Introduction

In the modern education system, the main task is not only to provide students with knowledge, but also to develop their creative and critical thinking skills, and to direct them to solve life problems. In this regard, the STEAM (Science, Technology, Engineering, Arts, Mathematics) approach to teaching biology is of great importance. This approach provides students with comprehensive and life-changing knowledge by combining the theoretical foundations of biology with technology, engineering, arts, and mathematics. The STEAM approach, while ensuring interdisciplinary integration, shows the application of biology in real life and develops students' practical skills in understanding and solving environmental problems. This article discusses the relevance, methodology, and recommendations for using the STEAM approach in teaching biology in the educational process.

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Main part

Materials and methods. The STEAM approach aims to integrate disciplines and actively educate students through practice and creativity. In biology, this approach allows us to study natural processes from a technological and engineering perspective, analyze them based on artistic and mathematical models. The relevance of the STEAM approach in teaching biology is associated with the need for interdisciplinary integration, an innovative approach, and the formation of 21st century skills in students in the modern education system. Below we can list several factors that justify its relevance:

1. Development of 21st century skills. Critical thinking and problem solving: The STEAM approach helps students analyze biological processes and solve real-life problems.

For example, working on a project on ecosystem protection provides an opportunity to identify environmental problems and develop solutions to them. Technological literacy: Modern biological research is closely related to technology, and the STEAM approach teaches students to use technological tools (e.g., microscopes, laboratory equipment, biotechnology software).

2. **The need for interdisciplinary integration**. Biology should not be limited to natural sciences, but should also include engineering, art, and mathematics.

• For example, the topic of genetic engineering helps students understand the study of genetic materials and artificial modifications.

• Connection with mathematics: Working with statistical data in the study of populations is taught.

3. Practice-oriented education. Through the STEAM approach, biological knowledge is applied in practical activities:

• Solving life problems: For example, developing biological methods for cleaning polluted water.

• Innovative projects: Projects in biology develop not only theoretical knowledge, but also creative and engineering skills.

4. The role of STEAM in solving environmental problems. Solving modern environmental problems (atmospheric pollution, soil degradation, loss of biodiversity) requires the integration of biology with other disciplines. The STEAM approach provides students with the following opportunities:

• Learning Ecotechnologies: Understanding the biological foundations of developing green technologies.

• Education through Ecoarts: Using art to communicate environmental issues to the public.

5. Adaptation to the demands of the labor market. Today, many industries require new directions related to biology:

• Biotechnology and pharmaceuticals: The STEAM approach develops the skills necessary for these industries in students.

• Ecology and Engineering: By combining biology with engineering, education is provided aimed at creating modern technologies.

6. Improving the quality of education. STEAM makes biology more interesting and understandable for students:

• Visualization and Creativity: Depicting complex biological processes using art.

• Creating an active learning environment: Students learn to collaborate and think creatively by working in groups.

Results

STEAM approach in biology: Increases students' interest in biology; Develops interdisciplinary and practical skills required in the 21st century; Provides innovative teaching methods focused on solving real-life problems.

Widespread implementation of this approach in the education system will take biology teaching to a new level.

Using the STEAM (Science, Technology, Engineering, Arts, Mathematics) approach in teaching biology is an effective methodology aimed at developing students' creative thinking skills, applying knowledge to solve real-life problems, and ensuring interdisciplinary integration.

Methods used in the STEAM approach

a) Project-based learning. Students prepare projects on a biological topic. For example:

• Topic: Ecosystem conservation technologies.

• Execution: Designing innovative wastewater treatment methods or irrigation systems for plants using technology.

b) Experimentation. Students conduct independent research using scientific methods. For example:

• Creating 3D models to study the DNA molecule.

• Studying the effect of light on plant growth (with an engineering approach).

c) Interdisciplinary integration. Connecting biology with other disciplines:

• Mathematics: Counting populations and statistically analyzing data.

• Art: Creating aesthetic images of plant cells.

• Technology: Modeling environmental problems using software.

Tools used in the STEAM approach

• Technological tools: Microscopes, 3D printers, computer programs (e.g. MATLAB or Python).

• Creative materials: Drawing tools, construction kits for making biological models.

• Mathematical modeling: Developing formulas that predict plant growth.

Advantages of the STEAM approach

• Develops students' logical and creative thinking.

• Shows the application of scientific knowledge in real life.

• Makes the learning process interesting by combining disciplines.

Conclusion

The STEAM approach to teaching biology is a relevant methodology of modern education, which develops students' interdisciplinary knowledge integration, problem-solving skills, and creative thinking abilities. This approach serves to teach biology not only as a theoretical subject, but also as a practical subject focused on analyzing real-life problems and developing solutions.

The use of technology, engineering, art, and mathematics in biology lessons through STEAM allows for interesting and effective learning. This increases students' interest in the learning process, equips them with the skills required in the 21st century, and directs them to solve real-life problems.

Thus, the STEAM approach is an effective method for further enriching the biology teaching process and preparing students for the demands of the modern world.

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