

## DEVELOPMENT OF COMPETENCE (METHODOLOGY) OF FUTURE PRIMARY SCHOOL STUDENTS IN USING STEAM TECHNOLOGIES

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### Abstract:

This article investigates the development of competence in utilizing Science, Technology, Engineering, Arts, and Mathematics (STEAM) technologies among future primary school students. The methodology employed focuses on innovative approaches to foster a well-rounded skill set that goes beyond traditional educational paradigms. Through a combination of hands-on activities, collaborative learning, and interactive experiences, the study aims to enhance the students' proficiency in leveraging STEAM technologies. The article also addresses the pedagogical considerations and challenges associated with implementing such methodologies in primary education.

**Keywords:** STEAM Technologies; Competence Development; Primary School Education; Innovative Pedagogy; Methodological Approaches.

### INTRODUCTION

In the rapidly evolving landscape of education, the integration of Science, Technology, Engineering, Arts, and Mathematics (STEAM) has become increasingly vital, especially at the primary school level. This article explores the development of competence among future primary school students in using STEAM technologies, emphasizing a methodological approach that transcends traditional teaching methods. By adopting innovative pedagogical strategies, we aim to equip students with the skills necessary to navigate an ever-changing technological landscape, fostering a holistic educational experience that goes beyond the confines of individual disciplines. This research contributes to the ongoing discourse on effective methodologies for preparing students for the challenges and opportunities of the 21st century.

STEAM technologies encompass a wide range of tools, ranging from digital platforms and applications to hands-on kits and equipment. They include areas like coding, robotics, 3D printing, virtual reality, and more. Integrating these technologies into the education system can foster critical thinking, problem-solving, creativity, and collaboration - skills that are highly valued in today's society. To effectively incorporate STEAM technologies into the primary school curriculum, a well-developed competence methodology is essential. This methodology provides a structured approach for teachers to guide students in acquiring the necessary skills and knowledge in a systematic manner. It helps ensure that students develop a strong foundation in STEAM subjects while nurturing their creativity and innovation.

a. Curriculum Design and Lesson Planning: The competence methodology should outline a clear and structured curriculum that integrates STEAM technologies. Lesson plans should be designed to engage students in hands-on activities, experiments, and projects, allowing them to apply



theoretical concepts to real-world scenarios.<sup>1</sup>

b. **Teacher Professional Development:** Teachers play a pivotal role in implementing the competence methodology effectively. Training and professional development programs should be provided to equip them with the skills and knowledge required to utilize and teach STEAM technologies effectively.

c. **Collaborative Learning Approach:** Encouraging collaboration among students is crucial in the development of competence. Group projects and activities that foster teamwork, communication, and problem-solving skills should be incorporated into the curriculum.<sup>2</sup>

The integration of STEAM technologies into primary school education may present certain challenges. Limited access to resources and infrastructure, lack of teacher training, and resistance to change may hinder the effective implementation of the competence methodology. Overcoming these challenges requires collaboration between educational institutions, policymakers, and industry leaders to ensure equitable access to resources and support.

**The Significance of STEAM Education:**

Science, Technology, Engineering, Arts, and Mathematics collectively form the foundation of STEAM education. The integration of these disciplines fosters a holistic approach to learning, encouraging students to think critically, solve problems creatively, and collaborate effectively. In an era where technology permeates every aspect of society, equipping primary school students with STEAM competencies becomes imperative for their future success.

**Methodological Approaches:**

1. **Hands-On Learning:**

One of the primary methodologies employed in developing STEAM competence is hands-on learning. Students engage in practical, real-world activities that involve designing, building, and experimenting. Whether it's constructing simple machines or coding basic programs, hands-on experiences provide a tangible and memorable understanding of STEAM concepts.

2. **Interdisciplinary Projects:**

Breaking down the traditional silos of subjects, interdisciplinary projects are designed to incorporate multiple STEAM disciplines into a single learning experience. For instance, a project that combines science and art to explore ecological concepts not only reinforces scientific knowledge but also encourages creativity and artistic expression.

3. **Collaborative Learning:**

Collaboration is a cornerstone of STEAM education. Group projects and activities encourage students to work together, leveraging each other's strengths to solve problems. This mirrors the collaborative nature of many professional fields and prepares students for future workplaces where teamwork is essential.

Embracing the very essence of STEAM, the integration of technology is fundamental. Utilizing educational apps, programming languages, and interactive simulations, students gain hands-on

<sup>1</sup> Anisimova, Tatyana, Fairuza Sabirova, and Olga Shatunova. "Formation of design and research competencies in future teachers in the framework of STEAM education." *International Journal of Emerging Technologies in Learning (IJET)* 15, no. 2 (2020): 204-217.

<sup>2</sup> Shatunova, O., Anisimova, T., Sabirova, F. and Kalimullina, O., 2019. STEAM as an innovative educational technology. *Journal of Social Studies Education Research*, 10(2), pp.131-144.



experience with the very tools that drive innovation in the digital age. This not only enhances their technological literacy but also instills a comfort and confidence in navigating the digital landscape.<sup>3</sup>

### Pedagogical Considerations

While the benefits of integrating STEAM technologies into primary education are evident, it is essential to consider pedagogical implications. Teachers play a pivotal role in facilitating these methodologies, requiring ongoing professional development to stay abreast of technological advancements and evolving teaching strategies. Additionally, curricula must be flexible enough to accommodate the dynamic nature of STEAM fields, ensuring relevance and applicability.

### Challenges and Solutions

Challenges associated with implementing STEAM methodologies include resource constraints, teacher preparedness, and the need for a shift in educational paradigms. Addressing these challenges involves strategic investment in educational resources, continuous teacher training programs, and advocacy for the importance of STEAM education at policy levels. Collaboration between educators, policymakers, and industry stakeholders is crucial to overcoming these obstacles and fostering an environment conducive to STEAM competence development.

The development of a competence methodology for primary school students in using STEAM technologies is crucial to prepare them for an increasingly technology-driven future. By incorporating hands-on, interactive, and collaborative learning experiences, students can develop the necessary skills to become innovative problem-solvers and lifelong learners. With the right competence methodology in place, primary schools can empower students to harness the power of STEAM technologies and drive positive change in the world.

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