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Training Future Primary School Teachers In Stem

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Abstract: This article discusses the theoretical and methodological foundations of training future primary school teachers based on the STEM (Science, Technology, Engineering, Mathematics) approach. The content of STEM education, its importance in primary education, and its role in the formation of problem-solving, project work, technological literacy, and a creative approach in teachers are analyzed. The study shows mechanisms for developing the necessary competencies in future teachers in designing integrated lessons, working with practical tasks, using digital tools, and applying innovative methods.

Keywords: STEM education, primary education, future teacher, integration, problem-solving, project work, digital technologies, pedagogical innovation, competency-based approach.

Introduction: The modern educational process is closely connected with global changes, scientific and technological progress and digital transformation, requiring new approaches from the system of training pedagogical personnel. Especially in primary education, students' scientific and technical thinking, problem-solving skills, creativity and readiness for practical work are considered the main components of modern competencies. Therefore, the issue of training future primary school teachers based on the STEM (Science, Technology, Engineering, and Mathematics) approach is becoming one of the relevant scientific and methodological directions today.

STEM education involves combining theoretical knowledge with practical activities, developing students' analytical and creative thinking through tasks aimed at solving real-life problems. To form such competencies, a future teacher must have not only scientific knowledge, but also the skills to organize project activities, create problem situations, design integrative lessons, and effectively use technology and digital tools.

Educational standards, state policy, and international research confirm the need for the widespread introduction of STEM elements in primary education. This requires equipping teachers in higher pedagogical educational institutions with modern scientific and technological achievements, the foundations of engineering thinking, and integrative methods. The methodological training of future teachers in STEM will serve as an important factor in developing interest, creativity, and independent thinking in primary school students in the future.

METHOD

The STEM (Science, Technology, Engineering, Mathematics) approach is one of the main directions of the modern educational concept, which includes interdisciplinary integration, problem-solving, a constructive approach and preparation for practical activities. In STEM theory, the student is not a passive possessor of knowledge, but an active, research-oriented, creatively thinking subject. Therefore, scientific theories such as constructivism, a competency-based approach, active learning and technological integration serve as a methodological basis in the training of future primary school teachers.

The importance of STEM education for future primary school teachers. A primary school teacher must have a broad knowledge base, be able to see inter-disciplinary connections, and be able to form scientific and technical thinking in students. The STEM approach develops the following skills in future teachers:

-modeling problem situations and developing a strategy for solving them;

-logical and systematic thinking, determining cause and effect;

-technical and technological literacy, effective use of

digital tools;

-creative approach, project creation and its implementation in practice;

-lesson design based on interdisciplinary integration.

These competencies are important in increasing the activity of students in the modern educational process, teaching them to think flexibly in real life situations.

The STEM-based training of future teachers includes several methodological areas:

1.Integrative lesson design. Lessons that combine mathematics, science, technology, art, and information technology help students connect their knowledge with real-life contexts. For example:

Learning the topic of “Symmetry in Nature” in conjunction with mathematics and art.

Integrating “Units of Measurement” with technology and engineering activities.

2.Project-based and practical activities. STEM projects encourage future teachers to think creatively and analytically. For example:

Creating simple mechanical devices;

Research projects on environmental problems;

Creating digital models that are relevant to students.

3.Use of digital tools. Technologies that are an integral part of STEM require future teachers to know the following tools: simulators and virtual laboratories, graphic editors and modeling programs, interactive platforms (Kahoot, PhET, GeoGebra, etc.). These tools enliven the learning process and make abstract concepts understandable.

4.Problem-based and research-oriented methods. In STEM-based activities, the teacher creates a problem question, and the student independently seeks a solution through research activities. Such a process also strengthens the future teacher's creative approach to his methodology. Benefits of using STEM elements in pedagogical practice The STEM approach develops the skills of future teachers in:

-non-traditional organization of the lesson,

-development of creative didactic materials,

-working with small groups,

-providing knowledge based on experience and observations.

The implementation of STEM projects in the process of pedagogical practice increases students' interest, increases their motivation, and ensures the provision of knowledge related to real life.

CONCLUSION

Preparing future primary school teachers on the basis of STEM is one of the priority areas of the modern education system, playing an important role in integrating the content of primary education, forming scientific and technical thinking in students, and developing digital literacy. The results of the study show that the systematic and systematic introduction of STEM components into the educational process in pedagogical higher educational institutions contributes to the formation of future teachers' competencies at a qualitatively new level. In particular, the development of skills in working with problem situations, organizing project activities, using technological tools, and building lessons based on an integrative approach will allow for a more effective organization of the educational process of primary school students in the future. Therefore, the application of the STEM approach to the educational process ensures the unity of theory and practice of education develops competencies such as experience-based thinking, observation, analysis, and modeling in students. This, in turn, serves to form a competitive, innovative-thinking generation in the future labor market.

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