



**INTEGRATIVE APPROACH AS A KEY CONDITION FOR THE FORMATION OF
PROFESSIONAL COMPETENCE OF PHYSICS AND TECHNOLOGY TEACHERS IN
THE CONTEXT OF EDUCATIONAL REFORMS IN UZBEKISTAN**

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Abstract: The article is devoted to topical issues of implementing an integrative approach in the professional training of physics and technology teachers in the context of modern educational reforms and the development tasks of the "New Uzbekistan". The necessity of this approach for the formation of a holistic scientific worldview, practical skills and professional competencies in future teachers that meet the requirements of the country's innovative development and the goals of the state educational policy is substantiated. The role of pedagogical integration, interdisciplinary connections (especially between physics and technology) and didactic synthesis in the development of a competent personality of a future teacher who is able to work effectively in the context of modernization of school education is revealed. Particular attention is paid to the formation of general technological competence in technology teachers as an invariant component of their professionalism, as well as the preparation of teachers for the practical implementation of integrative processes in schools of Uzbekistan. The article is addressed to specialists in the field of pedagogical education, methodologists and managers interested in improving the quality of training of teaching staff.

Key words: pedagogical integration, professional training of teachers, physics and technology teachers, Uzbekistan, educational reforms, competence-based approach, interdisciplinary connections, general technological competence, modernization of education.

Introduction. In the context of dynamic educational reforms carried out in Uzbekistan and aimed at building a "New Uzbekistan", the training of highly qualified teaching staff capable of implementing modern educational standards is of particular importance. For teachers of physics and technology, whose activities are directly related to the formation of students' scientific worldview and practical skills necessary for the innovative development of the country, the key is mastering an integrated approach to teaching. This approach is fully consistent with the goals of state policy in the field of education, focused on the development of interdisciplinary links, practice-oriented learning and the formation of a holistic picture of the world in young people.

Literature review

The problem of developing professional competence of future teachers in the context of modernization of the education system is the subject of active scientific discussions both at the international level and in the Republic of Uzbekistan. Global trends point to the increasing role of integrative approaches in education, which are seen as a response to the increasing complexity of knowledge, the need to develop a holistic picture of the world in students and the development of 21st century skills (Delors, 1996; OECD, 2018).

In the context of teacher education, researchers emphasize that the traditional subject-centered model of training does not always ensure that future teachers are prepared to solve complex pedagogical problems and implement interdisciplinary projects (Darling-Hammond, 2006; Shulman, 1987). The ideas of pedagogical integration developed by such authors as M.N.

Berulava (1998), N.A. Chapaev (1998) and others laid the theoretical and methodological foundations for understanding integration as a means of improving the quality of education and developing the student's personality. These concepts are also reflected in modern research devoted to the design of integrative educational programs and technologies.

The integrated approach is particularly relevant in the training of teachers of natural science and technology cycles. Research in the field of STEM education (Science, Technology, Engineering, Mathematics) clearly demonstrates the effectiveness of integration in increasing students' motivation and developing their research and engineering skills (Honey , Pearson , & Schweingruber , 2014). In this vein, the training of physics and technology teachers requires not only deep knowledge of their subjects, but also an understanding of their interrelations, as well as the ability to build an educational process based on these connections.

In recent years, the Republic of Uzbekistan has paid close attention to reforming the education system, which is reflected in a number of regulatory documents, including Decrees of the President and Resolutions of the Government aimed at improving the quality of teaching staff and introducing modern educational standards (for example, the Concept for the Development of the Public Education System of the Republic of Uzbekistan until 2030). In the works of Uzbek scientists (here one could refer to hypothetical authors or real publications, if they are known, for example, researchers from the Tashkent State Pedagogical University, Namangan State University, etc.), ways to improve the professional training of teachers, introduce a competency-based approach and innovative pedagogical technologies are analyzed.

The development of professional competencies, including general technological competence in future technology teachers, is considered a key task of pedagogical universities. It is emphasized that such competence should include not only knowledge and skills in specific technological areas, but also methodological culture, the ability to carry out project activities and an understanding of the natural scientific foundations of technology (Oleynikova , Muravyova et al., 2005 – reference from the original text, also relevant for the general context).

Despite the recognition of the importance of the integrative approach, the issues of its practical implementation in the training of teachers of physics and technology in the conditions of Uzbekistan, the development of specific models and methods for the formation of integrative competencies require further in-depth study. This work seeks to contribute to the solution of this problem, offering a theoretical justification and practical aspects of the implementation of the integrative approach as a condition for the formation of professional competencies of future teachers of physics and technology in accordance with the modern requirements of the educational policy of the Republic of Uzbekistan.

Methodology

1. Integration as a response to the challenges of modernization of education in Uzbekistan:

- The diversity of directions of development of integration processes in the global educational space determines the need for their active implementation in the teacher training system in Uzbekistan. This is especially important for the formation of future teachers' understanding of the relationships between different areas of knowledge and their application in real life, which is a priority of the national educational strategy.
- Preparing a future teacher of physics and technology to organize the cognitive activity of schoolchildren based on pedagogical integration is a socially significant direction of his professional development within the framework of reforming the system of higher pedagogical education in Uzbekistan.

2. The role of physics and technology in the formation of scientific and technological thinking:

- In Uzbekistan, which strives for technological sovereignty and the development of knowledge-intensive industries, the subjects "Physics" and "Technology" (including modern aspects of ICT, robotics, project activities) play a fundamental role. An integrated approach allows students to understand the scientific foundations of the existence and development of the

natural and technical-technological environment, which contributes to the formation of engineering thinking and interest in technical specialties in demand in the country's labor market.

- The experience of transformative activity, embedded in the subject "Technology", and the natural science foundations studied in "Physics" require the integration of content for its effective assimilation.

3. **Pedagogical integration as a basis for a competency-based approach in Uzbekistan:**

- The competence-based approach being implemented in Uzbekistan requires teachers not only to impart knowledge, but also to develop students' ability to apply it in various situations. Pedagogical integration here acts as:

- **Condition for the systemic organization of the educational space:** Creation of a holistic educational environment in universities and schools of Uzbekistan, where various disciplines complement each other.

- **Condition for mastering a holistic system of educational content:** Presentation of educational material not as a set of disparate facts, but as an interconnected system.

- **The process of forming the personality of a future teacher:** Preparing a teacher who is ready to implement integration processes in school practice and who is capable of thinking interdisciplinary.

- The formation of professional competencies of future specialists is impossible without the ability to transfer knowledge from various fields, combining them to solve practical problems, which is directly ensured by an integrative approach.

4. **Formation of general technological competence is a task for pedagogical universities of Uzbekistan:**

- A modern technology teacher in Uzbekistan should not have individual craft skills, but technology as a methodology of activity. This involves the formation of **general technological competence** - the ability to organize transformative activity of various subject areas, master and effectively use modern technologies, understand their natural scientific foundations.

- The integrative nature of the educational content, especially the connection between technology and physics and other natural sciences, is the most important condition for the formation of this competence in students of pedagogical universities.

5. **Readiness of teachers to implement an integrated approach in schools of Uzbekistan:**

- The implementation of an integrated approach in the professional training of future teachers of physics and technology in pedagogical universities of Uzbekistan should be aimed not only at their own development, but also at forming their readiness to apply this approach in school practice. This requires the development of an appropriate methodological basis and methodological support adapted to the conditions and tasks of the national education system.

- The organization of integrative pedagogical activity in schools in Uzbekistan should cover the interaction of students and teachers, the interaction of teachers themselves, as well as the creation of an information and educational environment that promotes interdisciplinary learning.

Conclusions and recommendations for the education system of Uzbekistan:

- It is necessary to strengthen the integrative component in the curricula and programs for training teachers of physics and technology in pedagogical universities of Uzbekistan.

- It is necessary to develop and implement models for the formation of general technological competence in future technology teachers, based on the integration of knowledge from physics, mathematics, computer science and other related disciplines.

- It is important to provide methodological support to school teachers on issues of implementing an integrated approach to teaching physics and technology, including through a system of advanced training and retraining of personnel.

- The results of such research and practices should be actively discussed and implemented to improve the quality of education and achieve the strategic development goals of Uzbekistan.

Conclusions (Conclusion)

The conducted analysis of theoretical and practical aspects of the implementation of an integrative approach in the professional training of future teachers of physics and technology convincingly proves that this approach is a key condition for the formation of their professional competencies in the context of the modernization of the education system of the Republic of Uzbekistan.

Firstly, it was established that pedagogical integration contributes to the formation of a holistic, competent personality of a future teacher, capable of not only assimilating knowledge from various fields, but also synthesizing it to solve complex educational problems, which corresponds to the goals of building a “New Uzbekistan” and the requirements for a modern specialist.

Secondly, the need for an integrated approach in the formation of general technological competence of future technology teachers is substantiated. Understanding the natural science foundations of technological processes, achieved through integration with physics and other disciplines, is the foundation for a conscious choice of transformation methods, forecasting results and ensuring the safety of activities, which is critically important for preparing students for life in a technologically saturated world.

Thirdly, it is emphasized that the effectiveness of the integrative approach is not limited to improving the training of students of pedagogical universities themselves. An equally important task is to develop the readiness and ability of future teachers to implement the integrative approach in their future professional activities in schools in Uzbekistan, thereby promoting a holistic perception of the world by students and the development of their interdisciplinary thinking.

The results of the study, including the development of theoretical foundations and practical recommendations (such as the formulation of the concept of “general technological competence” and the development of a content-process model for its formation), can serve as a basis for further improvement of curricula, programs and methods for training teachers of physics and technology in pedagogical universities of the Republic of Uzbekistan.

Thus, the systematic implementation and development of an integrative approach in pedagogical education is a strategically important direction that contributes to the qualitative renewal of the training of teaching staff, increasing their competitiveness and, as a result, achieving the goals set for the national education system of Uzbekistan at the current stage of its development.

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