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METHODOLOGY FOR USING CLUSTER TECHNOLOGIES IN DEVELOPING THE PROFESSIONAL COMPETENCIES OF FUTURE TEACHERS

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Annotation. This article covers the methodological foundations of the use of cluster technologies in the process of developing professional competencies of future teachers. Didactic capabilities of cluster technologies in accordance with the requirements of modern education, their role in the formation of the personality of the future educator, have been scientifically-theoretically and practically analyzed. The educational process, organized on the basis of cluster Technologies, has shown the effective development of professional, communicative and reflexive competencies of future teachers.

Keywords: professional competence, future teacher, cluster technology, innovative education, transformation, pedagogical technology.

Introduction. In the context of contemporary globalization and digital transformation, one of the key objectives facing the education system is the preparation of competitive, creative, and highly professionally competent teaching personnel. In particular, the development of professional competencies in future teachers is considered one of the priority directions of higher pedagogical education.

The term "competence" in English lexicographically denotes "ability", while in a broader sense it reflects an individual's potential and capabilities. Based on the analysis of psychological research findings and scholarly perspectives, it becomes possible to clarify the essence of the concept of competence. From a psychological standpoint, competence implies a specialist's ability to behave appropriately in unfamiliar situations, to construct meaningful communication, to find innovative solutions to misunderstandings arising in interpersonal relations, to work with ambiguous and contradictory information, and to maintain an active and adaptive position in complex and dynamically developing processes. Competence requires a specialist to continuously develop and improve knowledge, master new information, deeply understand social relations, seek out everyday informational resources, and effectively apply them in professional practice. In essence, a professionally competent specialist is one who deeply perceives the demands of the era, strives for new knowledge, acquires and processes it, and applies it efficiently in practice.

The educational reforms being implemented in the education system of the Republic of Uzbekistan, along with state educational standards based on a competency-based approach, require future teachers not only to possess theoretical knowledge, but also to be able to apply it in practical activities, make independent decisions, and demonstrate innovative thinking. From this perspective, the effective use of pedagogical technologies in the educational process becomes particularly important. Cluster technologies are recognized as one of the innovative methods that enable the activation of learners' thinking, systematization of knowledge, and establishment of logical interconnections. Especially in the process of training future teachers, the use of cluster technologies contributes to the comprehensive development of their professional competencies.

The purpose of this article is to substantiate, both theoretically and practically, the methodology of using cluster technologies in developing the professional competencies of

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future teachers. The rapid development of modern society, science, and technology places fundamentally new demands on the education system. Today, education is no longer limited to the mere transmission of knowledge; rather, it aims at the holistic development of the individual and the preparation of independently thinking, innovatively oriented teachers. In this regard, the development of professional competencies of future teachers remains one of the most pressing tasks of higher pedagogical education.

Educational reforms carried out in the Republic of Uzbekistan, as well as the Law "On Education" and state educational standards, identify the competency-based approach as a key methodological principle. This approach requires future teachers, alongside theoretical knowledge, to acquire professional competencies such as applying knowledge in practice, analyzing pedagogical situations, and independently solving professional problems.

At the present stage, the cluster model stands out in the formation of teachers' methodological training due to its integrative nature. It simultaneously unites several components—knowledge, skills, motivation, reflection, and innovative activity—within a single system. Therefore, this model serves as a methodological foundation that activates interaction between teacher and learner and ensures the effective organization of the teaching process. For instance, when a teacher participates in activities such as independently solving methodological tasks, finding solutions to pedagogical problems, and designing lesson plans using cluster maps, they not only acquire knowledge but also deepen their professional reflection. The cluster model not only renews educational content but also transforms the organizational mechanisms of the pedagogical process. Within this model, the teacher shifts from being a passive recipient of knowledge to an active creator of knowledge. Consequently, when methodological training of future teachers is implemented through a cluster-based approach, their abilities for independent work, creativity, collaboration, analysis, and evaluation develop significantly. Numerous international practices exist regarding the implementation of the cluster model in education. In particular, its effectiveness has been demonstrated in teacher retraining systems, professional development centers, and pedagogical faculties of universities in European and Asian countries. The advantage of the cluster approach lies in its ability to shape each learner's individual growth trajectory and to develop pedagogical thinking through logical, systematic, and reflective analysis. Moreover, educational processes organized on the basis of the cluster model encourage future teachers to master methodological innovations, design modern lesson structures, and deeply comprehend the competency-based approach. As teachers learn to independently develop methodological solutions, the quality of education, personal initiative, and level of creative activity increase. In this sense, forming methodological training based on the cluster model constitutes a fundamental foundation for the professional self-development of the modern teacher. Currently, directions for the gradual implementation of cluster model elements are also being identified within the education system of Uzbekistan.

In modern pedagogical practice, it is not possible to fully describe all aspects of the emergence of the concepts "competence" and "competency," nor to provide a detailed classification of them within the scope of this article. However, it is important to determine the main directions: a) clarifying the content of the most significant competencies recognized for graduates of higher education institutions;

b) identifying the main ways and means of developing professional competence in modern higher education, which include: – variability of problem-based situational tasks offered to students, taking into account their level of professional orientation, preparedness, individual characteristics, personal interests, and abilities (variability according to complexity and degree of independence); – development of students' independence through the integration of

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collective (group-based) and individual forms of work; – encouragement of mutual assessment, self-control, and analytical evaluation of completed tasks and levels of professional training; – broad involvement of students in various forms of creative activity and self-governance;
– active participation of students in spiritual and cultural events organized at the institutional and national levels.

Only when a higher education institution functions not merely as an information source, but as an intermediary between students and national as well as universal spiritual and cultural values, can the educational process become a real condition for developing professional competence—both as a form of life activity encompassing personal interests, creativity, communication, learning, and knowledge acquisition, and as a means of mastering the current state and historical development of culture.

In pedagogical science, psychological-pedagogical competence is understood as a teacher's ability to achieve the highest results in the teaching and learning process, characterized by high professional potential, communicative ability, and positive personal qualities. The following forms of competence required of future teachers can be distinguished: continuous enrichment of professional knowledge; readiness to improve acquired skills; awareness of current developments; active use of digital and information-communication technologies in the educational process; initiative; critical thinking; collaboration; and deep professional expertise.

Accordingly, the criteria for assessing future teachers' professional expertise and abilities include:
Subject-matter competence—comprehensive knowledge of one's specialization and the ability to engage in continuous self-development;
Methodological competence—the ability to convey knowledge to learners in an accessible manner while effectively using diverse teaching methods and technologies;
Social competence—the ability to establish effective communication with learners during lessons, foster mutual understanding, and create a healthy moral environment;
Professional competence—the acquisition of knowledge, skills, and abilities necessary for professional activity and the capacity to apply them at a high practical level.

Cluster technology is one of the effective methods in the educational process that facilitates the systematization of learning materials, identification of logical connections between concepts, and development of students' independent thinking. Its application is particularly relevant in shaping the professional competencies of future teachers.

The aim of this study is to scientifically substantiate the methodology of using cluster technologies in the development of professional competencies of future teachers.

Research methodology. The study is conducted based on competency-based, systemic, and activity-oriented approaches. Throughout the research process, a комплекс use of theoretical and empirical methods is employed. In particular, the analysis of pedagogical and psychological literature is carried out to examine and generalize existing scientific views related to the research problem.

As empirical research methods, observation, interviews, questionnaires, and pedagogical experimental testing are applied. The experimental work is conducted with the participation of students studying in the pedagogy specialization at a higher education institution. Within the research framework, lectures and practical classes based on cluster technologies are developed and implemented into the educational process.

During the classes, students are involved in both individual and group activities, where they are assigned tasks such as representing learning material through clusters, identifying key

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concepts, and establishing interconnections between them. Throughout the experimental process, students' activities are systematically observed, and the obtained results are analyzed.

Expected Research Outcomes. The results of the experimental work are expected to demonstrate the following outcomes:

- In the experimental group, all components of professional competence (cognitive, activity-based, and personal-reflective) will develop significantly;

-The cluster model will have a positive impact on students': systematic perception of the subject matter, understanding of interdisciplinary connections, independent and creative thinking;

-According to the results of the final assessment: the level of high competence in the experimental group will be significantly higher compared to the control group; indicators of medium and low competence levels will decrease;

-Students' motivation toward learning and interest in professional activity will increase.

The results of statistical analysis are expected to confirm the effectiveness of the educational process organized on the basis of the cluster model. The cluster model is considered an effective methodological tool for developing the professional competencies of future teachers in teaching the subject of General Pedagogy. This model: integrates theoretical knowledge with practical activity; develops students' reflection and self-assessment skills; transforms the educational process into an interactive and collaborative environment.

The findings are consistent with previous pedagogical research and once again confirm the advantages of the cluster model within the framework of the competency-based approach. Therefore, the widespread implementation of this methodology in teaching pedagogical disciplines is recommended.

Conclusion. In conclusion, in the process of providing education and upbringing focused on the individual, not only the orientation of education toward the learner but also the teacher's psychological readiness for pedagogical activity is of great importance. In such cases, special attention must be paid to the level of the teacher's professional competence. The adoption of a competency-based approach as a conceptual foundation of educational reforms and its implementation within the education system require significant changes in educational goals, content, forms and methods of instruction, pedagogical and information technologies, assessment methods, as well as in the roles of teachers and learners.

The use of cluster technologies serves as an effective pedagogical tool for developing the professional competencies of future teachers. This technology corresponds to the requirements of the competency-based approach and contributes to the development of students' independent and critical thinking. In this regard, it is recommended to systematically integrate cluster technologies into the educational process of higher pedagogical education institutions.

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