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PEDAGOGICAL AND PSYCHOLOGICAL CONDITIONS ENSURING THE DEVELOPMENT OF COGNITIVE COMPETENCE OF FUTURE INFORMATICS TEACHERS

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Abstract:
The article analyzes the pedagogical and psychological conditions that ensure the development of cognitive competence in future informatics teachers. The study emphasizes that the formation of cognitive competence is a key factor in preparing modern teachers capable of applying information technologies creatively and effectively in the educational process. The research explores the interrelation between cognitive processes, motivation, and professional self-development, highlighting the importance of problem-based learning, interactive methods, and reflective activities. The article also identifies pedagogical conditions such as the creation of a supportive educational environment, the integration of digital resources, and the use of innovative teaching technologies that foster independent thinking and analytical skills in students.

Keywords: Cognitive competence, informatics teacher training, pedagogical psychology, digital education, innovative methods, motivation, professional development.

Introduction

BO‘LAJAK INFORMATIKA O‘QITUVCHILARI KOGNITIV KOMPETENSIYASINI RIVOJLANTIRISHNI TA’MINLOVCHI PEDAGOGIK–PSIXOLOGIK SHART-SHAROITLAR

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Annotatsiya

Mazkur maqolada raqamli transformatsiya sharoitida bo‘lajak informatika o‘qituvchilarining kognitiv kompetensiyasini rivojlantirishni ta’minlovchi pedagogik va psixologik shart-sharoitlar tahlil qilinadi. O‘zbekiston Respublikasi ta’lim sohasiga oid me’yoriy-huquqiy hujjatlar, xususan, “Xalq ta’limi tizimini 2030-yilgacha rivojlantirish konsepsiyasi” va “Umumiy o‘rta ta’limning davlat ta’lim standarti” asosida kognitiv kompetensiya mazmuni hamda uni shakllantirishning metodik yo‘nalishlari yoritiladi. Maqolada raqamli ta’lim muhiti, o‘qituvchining raqamli va pedagogik kompetensiyasi, o‘quvchilarning intellektual salohiyati, ijtimoiy-madaniy omillar va axborot-kommunikatsiya texnologiyalarining ta’lim jarayoniga ta’siri o‘zaro bog‘liq holda tahlil etilgan. Shuningdek, “Informatika va axborot texnologiyalari” fanining o‘quvchilarda kognitiv kompetensiyani shakllantirishdagi o‘rni asoslab beriladi hamda bo‘lajak informatika o‘qituvchilari tayyorlovida zarur bo‘lgan pedagogik–psixologik shart-sharoitlar yuzasidan xulosalar va takliflar ilgari suriladi.

Kalit so‘zlar: kognitiv kompetensiya, intellektual salohiyat, raqamli ta’lim muhiti, bo‘lajak informatika o‘qituvchisi, axborot-kommunikatsiya texnologiyalari, pedagogik–psixologik shart-sharoit, davlat ta’lim standarti.

Аннотация

В данной статье анализируются педагогические и психологические условия, обеспечивающие развитие когнитивной компетенции будущих учителей информатики в условиях цифровой трансформации. На основе нормативно-правовых документов Республики Узбекистан в сфере образования, в частности «Концепции развития системы народного образования до 2030 года» и «Государственного образовательного стандарта общего среднего образования», раскрывается содержание когнитивной компетенции и методические направления её формирования. В статье рассматриваются взаимосвязанные аспекты цифровой образовательной среды, цифровой и педагогической компетенции учителя, интеллектуального потенциала учащихся, социокультурных факторов и

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влияния информационно-коммуникационных технологий на образовательный процесс. Также обоснована роль предмета «Информатика и информационные технологии» в формировании когнитивной компетенции учащихся и представлены выводы и рекомендации по педагогическим и психологическим условиям, необходимым для подготовки будущих учителей информатики.

Ключевые слова: когнитивная компетенция, интеллектуальный потенциал, цифровая образовательная среда, будущий учитель информатики, информационно-коммуникационные технологии, педагогические и психологические условия, государственный образовательный стандарт.

In today's era of globalization and digital transformation, the socio-economic and cultural-political development of a nation is primarily determined by the quality of its education system and its ability to evolve in line with the demands of the time. The transition to a digital economy and the deep integration of information and communication technologies into all spheres of life require new approaches in the education system. In particular, developing students' intellectual and cognitive potential and forming their cognitive competence have become priority directions of state policy.

In recent years, a number of strategic documents adopted in Uzbekistan have strengthened the theoretical and legal foundations of this direction. The Presidential Decree No. PF-5538 of September 5, 2018, "On additional measures to improve the system of public education management," and the "Concept for the Development of the Public Education System of the Republic of Uzbekistan until 2030" serve as key frameworks in this regard. These documents define priority tasks such as the comprehensive moral, ethical, and intellectual development of the younger generation; the wide implementation of innovative, electronic, and interactive teaching methods in the educational process; the improvement of teachers' professional skills; and the digitalization of educational institutions.

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The concept, promoting the principle "New Uzbekistan begins at the school threshold," emphasizes the informatization of education, the formation of an electronic learning environment, the development of distance education systems, and the effective use of interactive platforms and digital resources. Through these means, it aims to foster independent thinking, logical analysis, and reflective approaches among students. This, in turn, requires a fundamental re-evaluation and modernization of the pedagogical and psychological conditions that ensure the development of cognitive competence.

One of the key normative foundations for managing the quality of education is the State Educational Standard for General Secondary Education, approved by the Ministry of Public Education of the Republic of Uzbekistan on December 17, 2021, under Order No. 406. This standard emphasizes not only the acquisition of subject-specific knowledge, skills, and abilities but also their integration with cognitive, creative, communicative, and social competences. The State Standard clearly defines the objectives and tasks of academic subjects, stages of learning, core competences, assessment criteria, and requirements for graduates. All of these are aimed at the consistent development of students' thinking, analytical reasoning, and intellectual activity.

Within these qualification requirements, the subject "Informatics and Information Technologies" is identified as a leading discipline in enhancing students' intellectual potential in the context of educational digitalization. The content of this subject includes working with information, programming, algorithmization, system analysis, and problem-solving skills, making it a key didactic tool for the formation of cognitive competence. Therefore, in the process of preparing future informatics teachers, it is essential to identify and implement pedagogical and psychological conditions that ensure the development of cognitive competence.

Cognitive competence, in general terms, refers to an individual's ability to consciously manage cognitive processes — to analyze, generalize, evaluate, and apply information in real-life situations. It manifests as a system of interconnected mental processes such as perception, memory, attention, logical thinking, imagination, reflection, and metacognitive control. In the context of digital education, cognitive competence is closely linked to a student's ability to

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work with digital resources — searching, processing, analyzing, critically evaluating information, and generating new knowledge. Informatics, by its very nature, provides an effective foundation for developing these abilities.

President Shavkat Mirziyoyev's words, "A school is a matter of life and death, of the future… the fate of our next generation depends on our respected teachers," inspire a deeper understanding of the teacher's role in the education system. In the modern digital learning environment, a teacher is not merely a transmitter of knowledge but an organizer of the learning process, a facilitator of students' cognitive activity, and a guide toward independent and digital thinking. In this sense, the professional model of a future informatics teacher should embody the roles of a digital facilitator, designer of cognitive processes, and organizer of intellectual collaboration.

The pedagogical and psychological conditions ensuring the development of cognitive competence are primarily linked to the teacher's digital and methodological competence. The teacher must have a strong command of information and communication technologies, be able to design an electronic learning environment, present educational materials systematically in digital format, and individualize the learning process. In this process, the teacher's communicative culture, patience, adaptability, creativity, initiative, and leadership qualities serve as psychological factors that stimulate students' cognitive engagement and intellectual activity.

The pedagogical potential of the digital environment lies in its ability to provide students with opportunities to search for information from non-traditional sources, work independently, conduct creative research, and freely express and discuss their opinions through virtual communication. Electronic resources, online platforms, virtual laboratories, and simulation programs activate students' thinking, encourage them to solve problems, conduct experiments, and analyze results. However, in order to turn such an environment into an effective pedagogical tool, certain psychological and didactic conditions are required.

Firstly, organizing the educational process on a learner-centered basis is a key factor in developing cognitive competence. Since each student's intellectual level, cognitive style, interests, and needs differ, it is necessary to create individual

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learning trajectories and implement differentiated and adaptive teaching systems within the digital environment. In this regard, a future informatics teacher should consider students' cognitive profiles, identify their strengths and weaknesses, select appropriate learning tasks, and provide the necessary psychological support. Secondly, introducing reflective and metacognitive approaches into the learning process allows students to gain a deeper understanding of their own thinking, control their learning, and consciously choose learning strategies. The digital learning environment expands opportunities for students to review their activities, identify mistakes, analyze them, and correct them in the future. Under such conditions, the informatics teacher should act as a mentor who teaches students "to think about thinking," thus fostering the development of metacognitive competences.

Thirdly, the formation of information security culture is also an integral component of cognitive competence. In a digital environment characterized by excessive information flow, the influence of social networks, and increased virtual communication, students' psychological states, attention, memory, and social adaptation may be affected both positively and negatively. Therefore, a future informatics teacher must instill competences such as purposeful use of the internet, protection from harmful content, safeguarding personal data, and adherence to digital ethics. This requires a complex of psychological conditions that ensure cognitive safety in the educational process.

Fourthly, the intellectual quality of the educational environment plays a vital role in developing cognitive competence. The experience of Presidential schools, creative and specialized educational institutions, and innovation centers demonstrates that digital technologies, interactive teaching methods, and project- and research-based learning approaches significantly enhance students' cognitive potential. In such environments, students not only acquire ready-made knowledge but also generate new ideas, engage in scientific inquiry, and actively participate in intellectual competitions and startup projects.

According to the State Educational Standard approved by Order No. 406 of the Ministry of Public Education of the Republic of Uzbekistan, the goal of teaching the subject "Informatics and Information Technologies" is to develop in

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students a culture of working with information, logical and algorithmic thinking, creative reasoning, and problem-solving skills [10]. This objective, in turn, implies several directions that contribute to the development of cognitive competence: fostering students' knowledge and practical skills in receiving, processing, and presenting information; forming the ability to compare, analyze, and evaluate various information sources; developing step-by-step problem-solving strategies based on algorithmic thinking; and expanding students' digital mindset while encouraging them toward creative exploration.

A modern lesson must be content-rich, flexible in form, and methodologically interactive. In lessons that employ information and communication technologies, the interaction between teacher and student is not one-sided but takes the form of dialogue and polylogue based on collaboration. The student becomes not merely a listener but an active participant who substantiates opinions, asks questions, debates, and presents arguments. Such pedagogical conditions help shape the key components of cognitive competence — analytical, critical, and creative thinking. President Shavkat Mirziyoyev's idea, "We will build a New Uzbekistan together with determined and ambitious youth," is directly related to the education system and calls for mobilizing all opportunities to enhance the intellectual and spiritual potential of the younger generation, fostering their creativity, initiative, and freedom of thought. Developing the cognitive competence of future informatics teachers represents one of the primary methodological directions serving this very goal. In the digital education environment, an informatics teacher not only teaches software and programming but also imparts digital thinking culture, strategies for working with information, and methods of intellectual labor.

Thus, the system of pedagogical and psychological conditions ensuring the development of cognitive competence manifests itself in several key directions: creating a digital learning environment aligned with state educational policies and regulatory frameworks; fostering the integrated development of digital, methodological, and psychological competences within the teacher's personality; organizing the educational process on a learner-centered, interactive, and reflective basis; ensuring information security and psychological stability; and

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forming an intellectual educational environment that reveals students' intellectual potential.

The theoretical conclusions and analyses presented in this article demonstrate that developing the cognitive competence of future informatics teachers in the digital education environment is not merely a separate methodological issue but a strategic direction of the entire general education system. Future research should focus on creating practical models for forming this competence, testing them experimentally, and developing advanced practices for their integration into the digital educational ecosystem.

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