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DEVELOPMENT OF INDEPENDENT LEARNING COMPETENCE OF FUTURE TEACHERS THROUGH CLOUD TECHNOLOGIES (A CASE STUDY OF HIGHER EDUCATION INSTITUTIONS)

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Abstract. This article substantiates the pedagogical necessity of developing independent learning competence of future teachers in a cloud technology environment. The study identifies key pedagogical conditions for organizing effective independent learning, presents a methodological model, and analyzes the levels of formation of independent learning competencies within the educational process. Particular attention is given to the integration of cloud-based tools and digital platforms in enhancing students' autonomous learning activities. Furthermore, the effectiveness of interactive and learner-centered methods, including problem-based tasks and collaborative learning strategies, is justified in fostering professionally oriented competencies among future teachers.

Keywords: cloud technologies, independent learning, future teachers, pedagogical methodology, digital learning environment, professional competence, interactive methods, learner autonomy, higher education institutions.

INTRODUCTION

Information activity constitutes an essential component of modern pedagogical practice, particularly in the context of rapidly evolving digital and cloud technologies. The increasing integration of cloud-based environments into education requires future teachers to possess advanced competencies in managing, processing, and applying digital information effectively. In this regard, contemporary education systems assign higher education institutions the task of preparing future teachers who are capable of identifying emerging pedagogical challenges and addressing them through the rational use of cloud technologies and digital tools.

Future teachers should be proficient in utilizing cloud-based platforms for collecting, storing, and processing educational information, as well as in applying modern digital tools to support teaching and learning processes. They are also expected to demonstrate the ability to independently acquire new knowledge through digital environments, adapt to continuously evolving technologies, and effectively integrate these tools into their pedagogical practice to solve professional tasks.

Given that the competence-based approach serves as a fundamental principle of modern educational standards, one of the key strategies for addressing these challenges is the development of independent learning competence within a cloud technology environment. The professional effectiveness and competitiveness of future teachers largely depend on their ability to function autonomously in a digital learning context, which necessitates a high level of digital and informational competence.

Taking into account the demands of contemporary education and digital transformation, it is pedagogically justified to explore effective methods and conditions for enhancing the independent learning activities of future teachers through cloud technologies. The integration of digital and cloud-based tools into teacher education represents a holistic unity of content, structural, and methodological components of the educational process, thereby contributing to the development of independent, self-directed, and professionally competent educators.

MATERIALS AND METHODS

The features of training future teachers in the context of digital and cloud-based technologies have been widely examined in the works of a number of scholars. In particular, studies by B.A.Bekzatova, N.V.Makarova, A.G.Stepanova, N.V.Filimonova, S.A.Chevereva, O.V.Yudina and others highlight various aspects of integrating information technologies into the educational process. A considerable body of research is also devoted to improving teacher education through diverse pedagogical approaches, methods, and instructional tools (A.V.Bereberdin, E.Y.Gaidarenko, L.P.Grishchenko, M.L.Gruzdeva, A.V.Goferberg, A.A.Evseeva, A.Y.Orshansky, Z.A.Kolmakova, T.D.Morozovskaya, T.V.Plekhanova, E.M.Shevchenko, and others).

In these studies, the authors substantiate the objectives of education in accordance with contemporary societal demands, justify the selection of educational content, and identify effective teaching methods, organizational forms, and instructional tools. Building on these foundations, modern research increasingly emphasizes the role of cloud technologies as a key factor in enhancing the effectiveness of independent learning activities of future teachers, ensuring flexibility, accessibility, and learner-centeredness in higher education environments.

RESULTS AND DISCUSSION

Based on the analysis of modern educational standards in teacher education, a set of key professional competencies of future teachers can be identified. These include the ability to make informed pedagogical decisions in dynamic and uncertain educational contexts; the capacity to effectively use regulatory and instructional materials in professional practice; awareness of contemporary trends in education and digital learning environments; and the ability to manage learning processes, plan instructional activities, and improve the effectiveness of teaching. In addition, future teachers are expected to demonstrate proficiency in the use of modern cloud technologies, digital communication tools, and educational platforms, as well as the ability to independently acquire and apply new knowledge within a rapidly evolving technological landscape [1].

The analysis of accumulated scientific and pedagogical research on independent learning competence and digital literacy enables the systematization of its structural features and functional characteristics. In this regard, particular importance is attached to identifying the theoretical foundations, pedagogical conditions, and methodological tools that ensure the effective development of independent learning activities of future teachers in a cloud technology environment.

Independent learning competence can be structured into several interrelated components: motivational, cognitive, activity-based, and personal. The motivational component reflects the learner's internal readiness and willingness to engage in continuous self-directed learning through digital and cloud-based technologies. The cognitive component involves knowledge of methods for searching, processing, and critically analyzing educational information. The activity-based component is expressed through the practical ability to use cloud platforms and digital tools to organize and manage learning tasks. The personal component encompasses reflection, self-assessment, and the ability to evaluate one's own learning outcomes.

The development of these components is facilitated through the integration of cloud technologies into the educational process. In particular, the motivational component is strengthened when students recognize the practical value of independently acquired knowledge. The cognitive component is enhanced through direct engagement with digital resources and cloud-based tools. The activity-based component develops through practical tasks that require the application of cloud technologies in solving educational problems. Finally, the personal component is formed through

reflective activities, self-monitoring, and the evaluation of learning outcomes within a digital learning environment [4].

The components of independent learning competence of future teachers are effectively formed through the use of cloud technologies within functional learning tasks that reflect real pedagogical activities. Such tasks should incorporate the objectives of teacher education, the content of instruction, and the system of professional requirements for future educators. This approach significantly reduces the gap between theoretical learning and real teaching practice, ensuring the practical orientation of the educational process.

The process of developing independent learning competence in a cloud technology environment can be optimized under a set of interrelated pedagogical conditions. These include: organizational and activity-based conditions, which provide opportunities for the effective use of cloud-based tools and digital resources; design and methodological conditions, which ensure the teacher's readiness to integrate cloud technologies and appropriate instructional strategies into the learning process; and psychological-pedagogical (motivational) conditions aimed at fostering students' positive attitudes toward self-directed learning, continuous professional development, and the use of digital technologies [4].

Based on these considerations, a model of professional competence of future teachers can be developed, encompassing cognitive, functional, behavioral, and ethical components. Cognitive competencies relate to the acquisition and understanding of knowledge within digital and cloud-based environments. Functional competencies reflect the ability to apply this knowledge in practical teaching contexts using modern technologies. Behavioral competencies are associated with stable personal characteristics that influence teaching performance, including adaptability and collaboration in digital environments. Ethical competencies involve professional values and the ability to make responsible decisions in pedagogical situations.

A key indicator of professional readiness is the ability of future teachers to apply acquired knowledge and skills in real educational contexts. Therefore, higher education institutions must continuously update the set of competencies required of graduates, aligning them with contemporary educational demands and digital transformation processes. In this regard, cloud-based learning environments and interactive digital tools play a crucial role in enhancing and individualizing the development of professional and independent learning competencies. While e-learning courses with multimedia and interactive features significantly contribute to this process, particular attention should be given to innovative forms of learning that specifically support the development of independent learning activities of future teachers within cloud technology environments.

One of the effective means of developing the professional and independent learning competencies of future teachers in a cloud technology environment is the use of interactive and simulation-based learning methods, including educational games. These approaches contribute to the formation of practice-oriented competencies through active engagement in simulated pedagogical situations. In this context, game-based learning can be considered a simplified model of real educational practice, as it enables learners to rehearse various aspects of teaching activity within a controlled and flexible digital environment.

The application of cloud technologies enhances the effectiveness of such methods by providing access to collaborative platforms, virtual classrooms, and interactive tools that support real-time participation and feedback. Engaging in non-standard, problem-based tasks within game scenarios motivates students to seek additional knowledge independently, thereby strengthening their learner autonomy. Consequently, game-based methods function as an important tool for fostering intrinsic

motivation for learning, which should be carefully considered by educators when designing instructional scenarios.

Educational games can be classified into various types, including didactic, simulation-based, interactive, research-oriented, role-playing, and problem-solving formats. Their implementation contributes to the development of logical thinking, critical reflection, and self-assessment of learning outcomes. Moreover, such methods promote sustained interest in the teaching profession and enhance the ability of future teachers to make informed decisions in dynamic and uncertain educational contexts. Through the integration of cloud technologies, these approaches also facilitate the modeling of real teaching situations, enabling learners to develop practical skills necessary for effective pedagogical activity.

Based on the research conducted, a set of methodological recommendations has been developed to design educational game scenarios aimed at enhancing the independent learning competence of future teachers in a cloud technology environment:

1. Future teachers should be clearly informed about the set of professional and independent learning competencies defined by educational standards, with particular emphasis on digital and cloud-based learning skills.
2. The subject matter of the game should reflect the core elements of pedagogical activity, serving as a structured model that simulates real teaching situations within a cloud-based learning environment.
3. The roles and functions assigned to participants should correspond to authentic pedagogical responsibilities, accurately representing specific aspects of teaching practice and collaborative interaction in digital contexts.
4. The rules of the game should reproduce the key characteristics of real educational processes and phenomena while acknowledging that both the simulation model and the game environment represent a simplified version of reality. In this regard, cloud technologies can support the creation of flexible and interactive learning scenarios.
5. The assessment system should ensure, on the one hand, the evaluation of decisions and actions in accordance with pedagogical standards and professional requirements, and on the other hand, the assessment of students' independent learning competence, including their ability to use cloud technologies effectively.

An analysis of the application of game-based learning technologies within a competency-based approach in teacher education demonstrates their significant potential for enhancing students' engagement and improving the effectiveness of independent learning in a cloud technology environment. Such approaches enable learners to acquire knowledge more deeply through the simulation of real pedagogical situations, thereby bridging the gap between theoretical preparation and practical teaching experience.

During the implementation of educational games, future teachers develop the ability to make responsible decisions in complex and dynamic learning contexts, which contributes to their readiness for professional activity. Within game scenarios, students may assume active roles (such as a teacher, lesson designer, or facilitator) or reflective roles (such as an observer or evaluator), which allows them to analyze educational processes, monitor outcomes, and develop critical and reflective thinking skills.

When game-based methods are systematically integrated across different disciplines, and supported by cloud technologies, students can be encouraged to independently design and simulate educational scenarios. This includes formulating learning objectives, defining tasks, establishing rules, and organizing collaborative activities within digital platforms. Such practices significantly

contribute to the development of learner autonomy, creativity, and independent learning competence of future teachers in a cloud-based educational environment.

CONCLUSION

Thus, appropriately designed and methodologically grounded educational games serve as an effective and essential tool for the development of independent learning competence of future teachers in a cloud technology environment. They contribute to deeper and more meaningful assimilation of knowledge, promote active engagement in the learning process, and foster sustained interest in pedagogical activity and professional self-development.

Moreover, the integration of game-based learning with cloud technologies enhances learner autonomy, supports collaborative interaction, and enables flexible access to educational resources. As a result, such approaches play a significant role in improving the effectiveness of independent learning and in preparing future teachers for successful professional practice in a digital educational environment.

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