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УМІННЯ МАЙБУТНІХ БАКАЛАВРІВ ОСВІТИ УПРАВЛЯТИ ОСВІТНІМ ПРОЦЕСОМ В УМОВАХ ЕЛЕКТРОННОГО НАВЧАННЯ: СУТНІСТЬ І СТРУКТУРА

Анотація. У статті обґрунтовано потребу в цілеспрямованому формуванні у майбутніх учителів умінь управляти освітнім процесом в умовах електронного навчання. Актуальність дослідження зумовлена тим, що поширення цифрових платформ, синхронних і асинхронних форматів, засобів навчальної аналітики та штучного інтелекту розширює професійні функції педагога. Учитель має не лише використовувати цифрові інструменти, а й проектувати структуру навчання, організовувати взаємодію, координувати діяльність здобувачів освіти, здійснювати моніторинг і своєчасно коригувати навчальний процес. Метою статті є теоретичне обґрунтування потреби у формуванні відповідних умінь, уточнення сутності управління освітнім процесом в умовах електронного навчання та визначення їх структури. Дослідження має теоретичний характер. Використано аналіз наукових праць, порівняння, узагальнення, систематизацію та абстрагування. Управління освітнім процесом в умовах електронного навчання визначено як цілеспрямовану діяльність учителя з проектування, організації, координації, моніторингу та коригування навчальної діяльності здобувачів освіти у цифровому середовищі. Доведено, що така діяльність не зводиться до адміністрування цифрової платформи, а передбачає узгодження цілей, змісту, цифрових ресурсів, форм взаємодії, оцінювання та підтримки. Визначено структуру умінь майбутнього вчителя, до якої входять проектувально-організаційні, комунікаційно-координаційні, моніторингово-аналітичні, оцінювально-регулятивні, етико-безпекові та рефлексивні умінь. Обґрунтовано взаємозв'язок цих груп і їх циклічне виявлення у професійній діяльності педагога. Результати дослідження можуть бути використані для оновлення змісту професійної підготовки бакалаврів освіти, розроблення діагностичних матеріалів і подальшої емпіричної перевірки сформованості відповідних умінь.

Ключові слова: електронне навчання; майбутні вчителі; бакалаври освіти; управління освітнім процесом; цифрове середовище; цифрова компетентність; педагогічна взаємодія; навчальна аналітика; штучний інтелект; професійна підготовка.

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BACHELOR OF EDUCATION STUDENTS' SKILLS IN MANAGING IN THE E-LEARNING EDUCATIONAL PROCESS: ESSENCE AND STRUCTURE

Abstract. The article substantiates the need to purposefully develop bachelor of education students' (teachers') skills for managing the e-learning educational process. The relevance of the study is determined by the expansion of teachers' professional functions caused by the widespread use of digital platforms, synchronous and asynchronous learning formats, learning analytics, and artificial intelligence. A teacher is expected not only to use digital tools but also to design the learning structure, organize interactions, coordinate learners' activities, monitor their progress, and adjust the educational process in a timely manner. The purpose of the article is to provide a theoretical justification for the development of these skills, clarify the meaning of educational process management in e-learning, and determine their structure. The study is theoretical and employs the analysis of scholarly literature, comparison, generalization, systematization, and abstraction. Educational process management in e-learning is a purposeful teacher activity aimed at designing, organizing, coordinating, monitoring, and adjusting learners' activities in a digital environment. It is argued that this activity is not limited to the administration of a digital platform. It requires aligning learning objectives, content, digital resources, forms of interaction, assessment, and learner support. The structure of future teachers' skills has been identified. It includes design and organizational skills, communication and coordination skills, monitoring and analytical skills, assessment and regulation skills, ethical and safety-related skills, and reflective skills. The interrelationship between these groups and their cyclical manifestation in teachers' professional activity has been substantiated. The findings indicate that digital competence is a necessary but insufficient condition for effective e-learning management. The results may be used to update bachelor-level teacher education programs, develop diagnostic tools, and conduct further empirical research on the formation of the identified skills.

Keywords: e-learning; future teachers; bachelor of education; educational process management; digital environment; digital competence; pedagogical interaction; learning analytics; artificial intelligence; teacher education.

Statement of the Problem. The spread of e-learning has changed not only the means of delivering educational information but also the ways in which the educational process is organized. A teacher working in a digital educational environment must design the sequence of synchronous and asynchronous activities, organize communication, coordinate learners' activities, support learners' motivation, monitor task

completion, analyze digital traces of learning, and adjust the learning process in a timely manner. Under these conditions, teaching acquires clear managerial features. It involves setting goals, planning, allocating time and resources, organizing interactions, monitoring results, making decisions, and regulating participants' activities in the educational process. A contradiction arises between the objective expansion of teachers' managerial functions in e-learning and the insufficient focus in bachelor-level teacher education on developing the relevant skills. Addressing this contradiction requires a theoretical justification of pre-service teachers' readiness to manage e-learning, the identification of its components and indicators, the development of a pedagogical model, and an evaluation of its effectiveness in the professional education of Bachelor of Education students (pre-service teachers).

Analysis of Current Research. The problem of managing the educational process in e-learning is presented in scholarly literature through several interrelated research areas. In studies on the digital transformation of education, e-learning is viewed as part of broader organizational changes. These changes involve not only the introduction of digital platforms but also revisions to educational strategies, communication methods, the distribution of responsibilities, teacher support, and quality assurance procedures. Alenezi [3] associates the digitalization of higher education institutions with changes in educational, organizational, and institutional models. Fernández et al. [9] take a similar position and report that many digital initiatives in higher education institutions are implemented in isolation, without a common strategy or a clear connection to educational goals.

A separate group of studies focuses on learning management systems. LMS platforms support the placement of materials, submission of assignments, communication, assessment, and the recording of learning activities. However, their potential is often used only partially. Simon et al. [13] found that lecturers and learners frequently use LMS platforms mainly to access files and submit completed work, while tools for collaboration, discussion, and analytics remain underused. Considerable research attention is also given to teachers' digital competence. After reviewing the findings of 56 studies, Basilotta-Gómez-Pablos et al. [4] identified a dominance of research assessing digital competence through teachers' self-evaluation. The researchers emphasize the need for practice-oriented and personalized professional education programs.

The traditional understanding of digital competence is gradually expanding. In the HeDiCom framework, teachers' digital competencies include digital educational practice, preparing learners for life and professional activity in a digital society, teachers' own digital literacy, and their professional development [15]. The authors include the ability to align learning objectives, content, activities, resources, technologies, and assessment within digital educational practice. This understanding brings digital competence closer to the ability to manage the educational process.

The pedagogical dimension of e-learning is widely represented in studies of online interaction. Law et al. [10] found that the main difficulties in the transition to online learning were interaction between teachers and learners and interaction within the learning group. Miao and Ma [11] found that online interaction influences engagement indirectly by fostering social presence. Vo and Ho [17] demonstrated that the clarity of an online course structure and the perceived value of tasks indirectly affect all major forms of engagement.

The development of artificial intelligence expands the possibilities for managing the educational process. In their systematic review, Crompton and Burke [7] grouped AI use in higher education into five areas: assessment, prediction, AI assistants, intelligent tutoring systems, and learner management. At the same time, only 11% of the reviewed studies focused on managers, whereas most examined learners. This indicates an uneven distribution of research attention across different participants in digital learning.

The professional preparation of teachers for digital learning is most often examined through professional development programs for practicing school teachers and university lecturers. By synthesizing research findings on online professional development, Stavermann [14] identified its positive effects on teachers' competence, practice, motivation, and self-efficacy. At the same time, the effectiveness of such programs depended on synchronous interaction, collaboration, and systematic support.

The literature analysis reveals a gap between research on digital competence and on learning management. The first group mainly focuses on the knowledge, skills, and attitudes required to use technologies. The second examines institutional strategy, digital leadership, quality assurance, and organizational readiness. Between these two levels, insufficient attention is given to the work of teachers who make daily local managerial decisions for a particular class, course, or learning module, as well as to the preparation of Bachelor of Education students to perform these functions.

Purpose and Research Methods. The purpose of the study is to provide a theoretical justification for preparing Bachelor of Education students purposefully to manage the educational process in e-learning, to clarify the nature of this activity, and to determine the structure of the skills required by pre-service teachers to perform it.

The study is theoretical. A set of theoretical methods was applied. The analysis of scholarly literature examined current approaches to e-learning, the digital transformation of education, teachers' professional digital competence, the use of learning management systems, the organization of online interaction, learning

analytics, assessment, and academic integrity. Comparison was used to examine different approaches to teachers' digital competence, technology integration, and learning management. Generalization and systematization were applied to organize the problems that arise in e-learning. Abstraction was used to move beyond specific digital platforms and services and to identify the relatively stable managerial actions teachers perform.

Research Results. The analysis provided grounds for viewing the management of the educational process in e-learning as a purposeful teacher activity aimed at designing, organizing, coordinating, monitoring, and adjusting learners' educational activities in a digital educational environment. This activity includes setting goals, selecting digital tools, allocating learning time, organizing synchronous and asynchronous work, supporting interaction, assessing outcomes, analyzing learning activity, and making decisions about the further course of learning.

The proposed definition clearly distinguishes e-learning management from the technical administration of a digital platform. Administration includes setting up access, uploading materials, creating assignments, and maintaining an electronic gradebook. Management has a broader meaning because it connects technical operations with pedagogical goals, group characteristics, expected outcomes, and specific learning conditions. A teacher does not simply post assignments; they determine their place within the course's overall logic, their scope, deadlines, the format for presenting results, forms of support, and assessment criteria.

It is also appropriate to distinguish between the institutional and pedagogical levels of e-learning management. At the institutional level, a digital strategy, a common platform, requirements for electronic courses, data protection rules, quality assurance procedures, and a teacher support system are defined. At the pedagogical level, the teacher designs and implements a specific educational process. This level is directly related to the professional preparation of Bachelor of Education students.

The analysis shows that teachers' managerial functions in e-learning form an interconnected sequence. First, the teacher diagnoses the work conditions, including learners' technical opportunities, their readiness for independent activity, previous experience with digital tools, and possible limitations. Next, the learning goals and outcomes are defined, followed by the design of the course or module structure. The following stage is the organization of activities, during which the sequence of tasks, communication rules, deadlines, interaction forms, and assessment methods are established. During learning, the teacher coordinates the group's activities, monitors progress, provides support, and adjusts the initial plan.

E-learning management is cyclical. Monitoring results return the teacher to previous decisions and provide grounds for clarifying goals, changing the task structure, adjusting the pace, or selecting other means of interaction. Therefore, the proposed approach does not involve a rigid linear sequence. It is based on continuous comparison between the planned and the actual learning paths.

Based on the generalization of managerial actions, the skills required by pre-service teachers were identified. It includes design and organizational skills, communication and coordination skills, monitoring and analytical skills, assessment and regulation skills, ethical and safety-related skills, and reflective skills.

Design and organizational skills are demonstrated through the ability to define e-learning goals, design the structure of a course, distribute material between synchronous and asynchronous activities, establish a logical sequence of tasks, and select digital tools for pedagogical purposes. This group also includes the ability to predict learning workload, set realistic deadlines, and develop alternative scenarios in the event of technical or organizational difficulties.

Communication and coordination skills include establishing clear rules of interaction, organizing individual and group work, selecting communication channels, regulating message frequency, and providing timely feedback. Pre-service teachers should be able to coordinate learners' activities so that the digital environment does not create information overload or make it difficult to understand and complete learning tasks.

Monitoring and analytical skills involve collecting and interpreting data on learning activities. Teachers should analyze not only grades but also the regularity of logins, the timely completion of tasks, participation in discussions, requests for assistance, and the nature of common errors. Digital data should not be interpreted in isolation. They should be compared with the quality of completed work, individual circumstances, and the results of direct interaction with learners.

Assessment and regulation skills involve selecting assessment methods that align with the learning format, ensuring transparency in the criteria, and using assessment results to guide further activity. Teachers should be able to determine when automated testing is appropriate and when extended responses, project tasks, peer assessment, or oral explanations are required. This group also includes the ability to change the learning scenario when data indicate overload, low activity, or insufficient understanding of the material.

Ethical and safety-related skills include protecting personal data, respecting copyright, ensuring academic integrity, and using artificial intelligence responsibly. Pre-service teachers should be able to explain to learners the limits of acceptable use of digital tools, establish rules for working with generative AI, define

requirements for acknowledging digital assistance, and select assessment formats that reduce the risk of superficial or academically dishonest task completion.

Reflective skills are demonstrated in the ability to analyze one's own decisions, relate them to outcomes, identify mistakes in course organization, and explain the reasons for the changes made. Reflection is required not only after completing the entire course but also throughout its implementation. Teachers should regularly assess whether the selected structure supports goal achievement, whether instructions are clear, whether communication channels overlap, and whether learners receive the necessary support.

The identified skill groups are not isolated. Design depends on the results of previous diagnoses; the organization of interaction influences engagement; monitoring data determines subsequent regulatory decisions; and ethical requirements should be considered at all stages. Therefore, these skills should be developed within an integrated model rather than as a set of separate digital skills.

Therefore, the study's result is a theoretically justified structure of the skills required by Bachelor of Education students to manage the educational process in e-learning.

Discussion of the Results. The findings confirm that preparing pre-service teachers for e-learning should be understood more broadly than just the development of digital competence. The ability to work with a platform, create electronic materials, conduct video lessons, or use online services is necessary but insufficient. The effectiveness of e-learning depends on whether a teacher can connect digital tools with goals, content, forms of interaction, assessment methods, and the characteristics of a particular group. The proposed skills structure enables moving from a general description of digital readiness to specific professional actions. Design and organizational skills support the construction of the learning process, communication and coordination skills support interaction, monitoring and analytical skills support the collection and interpretation of data, assessment and regulation skills support corrective decision-making, ethical and safety-related skills support compliance with relevant standards, and reflective skills support the analysis of one's own professional activity. This structure reflects the actual cyclical nature of a teacher's work in e-learning.

The findings are also consistent with the TPACK framework, which holds that effective technology integration requires a combination of content, pedagogical, and technological knowledge [1]. At the same time, the structure of skills identified in this study extends beyond this combination. It includes time management, group coordination, communication management, activity monitoring, risk analysis, and adjustment of the learning scenario. The TPACK framework explains how technology should be aligned with content and teaching methods, whereas the skill groups identified in this study specify the professional actions required to manage the e-learning course.

The relationship between the pedagogical and managerial components of teachers' professional activity requires particular attention. The term "management" is sometimes associated mainly with the administrative work of a leader of an educational institution. However, within a particular class, course, or learning module, a teacher also performs managerial functions. The teacher plans, organizes, coordinates, monitors, analyses, and adjusts activities. These functions become more visible in e-learning because a significant part of the process occurs without participants' direct physical presence.

At the same time, pedagogical management should not be equated with strict control. Its purpose is not to increase supervision but to create conditions for organized, clear, and independent learner activity. Effective management should reduce uncertainty, ensure predictability, provide timely support, and gradually develop learners' capacity for self-regulation. Therefore, the teacher should combine organizational guidance with a certain degree of learner freedom in choosing the pace of work, the way tasks are completed, and the format in which results are presented.

This conclusion is consistent with research on learner engagement. Vermeulen and Volman [16], Vo and Ho [17], Miao and Ma [11], and Akram and Li [2] show that learners' activity depends on course clarity, the perceived value of tasks, social presence, teacher support, and the quality of relationships. Therefore, engagement cannot be explained only by learners' motivation. It is shaped to a considerable extent by the organization of learning.

From this perspective, low participation in an electronic course should not automatically be interpreted as a sign of unwillingness to learn. It may result from unclear instructions, overload, duplication of communication channels, technical difficulties, a mismatch between tasks and learners' level of preparation, or the absence of timely feedback. Pre-service teachers should be able to distinguish between these causes and should not limit themselves to formal control of task completion.

An important result is the inclusion of monitoring and analytical skills in the structure of professional preparation. Modern LMS platforms collect a considerable amount of data on user activity, but access to such data does not guarantee its pedagogically appropriate use. Indicators such as login frequency, number of views, or time spent on a task can be useful, but they do not provide a complete picture of learning. A learner may enter the course frequently without performing meaningful work or may rarely use the platform while working with previously downloaded materials.

Therefore, it is necessary to develop pre-service teachers' critical approach to digital indicators. Data should be compared with the quality of completed work, participation in discussions, the nature of errors, individual circumstances, and the results of direct communication. This approach reduces the risk of incorrect conclusions and disproportionate pedagogical decisions.

The inclusion of ethical and safety-related skills is linked to the growing use of artificial intelligence and automated analysis systems. Studies by Nguyen et al. [12], Chan [5], Chan and Hu [6], and Dwivedi et al. [8] show that AI creates opportunities for personalization, automated feedback, and learning support, while also creating risks related to privacy, autonomy, fairness, and academic integrity.

In preparing pre-service teachers, it is not enough to teach them to use generative AI to create materials or assignments. They need to develop the ability to assess the reliability of outputs, identify bias, protect personal data, and establish clear rules for learners' use of AI. A teacher should determine which tasks allow AI to be used as a support tool and which tasks would lose their assessment purpose if AI were used.

Conclusions. E-learning changes not only the technological tools teachers use but also the logic of organizing the educational process. In a digital educational environment, teachers must plan interconnected synchronous and asynchronous activities, establish communication rules, coordinate learners' work, manage the learning workload, analyze activity data, and adjust the learning process in a timely manner. This gives teachers' professional activity a clear managerial character.

The analysis showed that current studies provide a detailed examination of specific e-learning issues, including the use of LMS platforms, teachers' digital competence, the organization of online interaction, support for learner engagement, and the ethical aspects of the use of artificial intelligence. However, these issues are often considered separately.

In this study, the management of the educational process in e-learning is defined as a teacher's purposeful activity aimed at designing, organizing, coordinating, monitoring, and adjusting learners' educational activities in a digital environment. This understanding goes beyond platform administration. It includes aligning goals, content, digital resources, forms of interaction, assessment, support, and analytics.

Based on the theoretical analysis, the skills required to manage e-learning were identified. It includes design and organizational skills, communication and coordination skills, monitoring and analytical skills, assessment and regulation skills, ethical and safety-related skills, and reflective skills. Their combination enables teachers to organize a complete learning cycle rather than only conduct separate online lessons.

The study's limitation is its theoretical and design-oriented nature. The proposed skills structure requires empirical testing in a real educational context. Further research should focus on developing diagnostic tools, conducting a pedagogical experiment, and identifying skill development levels. It is also necessary to clarify the content of professional preparation for Bachelor of Education students in different teacher education specializations. The integration of generative artificial intelligence into e-learning requires separate investigation, particularly regarding its limits, quality control methods, and new assessment approaches.

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