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### **Implementation of the Blended Learning Approach in the Conditions of the Learning Management System of the Higher Education Institution**

**Abstract. Introduction.** *The use of technology in the teaching and learning process has led to dramatic changes in the field of higher education in recent years. The adoption of blended learning strategies in higher education learning management systems (LMS) is one of the most notable advances in this field. By combining a traditional approach with online learning resources, blended learning provides students with a dynamic and adaptive learning environment.*

**Purpose.** *The article describes the implementation of the blended learning approach in the conditions of the learning management system of a higher education institution.*

**Results.** *Integrating blended learning into a higher education institution's learning management system (LMS) represents a transformative opportunity to improve the quality and effectiveness of education delivery. Through the use of both face-to-face learning and online learning resources, blended learning creates a dynamic and engaging environment that caters to the diverse needs and preferences of students. By incorporating digital technologies and multimedia resources into the curriculum, educators can create interactive and personalized learning programs that promote active participation and retention. This approach not only accommodates different learning styles, but also encourages independence and the development of critical thinking skills. In addition, the flexibility offered by blended learning allows students to access course materials at their convenience. Implementing blended learning in an LMS also promotes collaboration and communication between students and instructors. Online discussion forums, group projects, and virtual meetings facilitate interaction and knowledge sharing. In addition, blended learning allows instructors to use the data analytics and assessment tools available in the LMS to monitor student progress, identify areas for improvement, and provide targeted feedback. Before the implementation of the developed technology and after its completion, an experimental study was conducted, which included an analysis of the quality of knowledge. The obtained results before and after the experiment were checked using the Pearson statistical test.*

**Conclusions.** *In summary, the implementation of blended learning in the learning management system represents an advanced approach to education providing. Combining the best elements of traditional and online learning, blended learning empowers educators to create engaging, flexible, and personalized programs. A data-driven approach to teaching allows educators to adapt their instructional strategies to effectively meet the diverse needs of students.*

**Keywords:** *applicants of higher education; learning management system; blended learning approach; higher education institution.*

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### **Реалізація підходу змішаного навчання в умовах системи управління освітнім процесом закладу вищої освіти**

*Використання технологій у процесі викладання та навчання призвело до різких змін у сфері вищої освіти за останні роки. Прийняття стратегій змішаного навчання в системах управління освітнім процесом (LMS) закладів вищої освіти є одним із найбільш помітних досягнень у цій галузі. Завдяки поєднанню традиційного підходу та онлайн-навчальних ресурсів змішане навчання забезпечує здобувачам вищої освіти динамічне та адаптоване освітнє середовище.*

*У статті описано реалізацію підходу змішаного навчання в умовах системи управління освітнім процесом закладу вищої освіти.*

*Інтеграція змішаного підходу до навчання в систему управління освітнім процесом (LMS) закладу вищої освіти представляє трансформаційну можливість для підвищення якості та ефективності надання освіти. Завдяки використанню як очного навчання, так і навчальних онлайн-ресурсів змішане навчання створює динамічне та захоплююче середовище, яке задовольняє різноманітні потреби та вподобання здобувачів вищої освіти. Включаючи цифрові технології та мультимедійні ресурси в освітню програму, викладачі можуть створювати інтерактивні та персоналізовані програми, які сприяють активній участі та збереженню знань. Цей підхід не тільки враховує різні стилі навчання, але й заохочує самостійність та розвиток навичок критичного мислення. Крім того, гнучкість, яку пропонує змішане навчання, дозволяє здобувачам вищої освіти отримувати доступ до матеріалів курсу, коли їм зручно. Впровадження змішаного навчання в LMS також сприяє співпраці та спілкуванню між здобувачами вищої освіти та викладачами. Онлайн-дискусійні форуми, групові проекти та віртуальні зустрічі сприяють взаємодії та обміну знаннями. Крім того, змішане навчання дозволяє викладачам використовувати аналітику даних й інструменти оцінювання, доступні в LMS, для моніторингу прогресу здобувачів вищої освіти, визначення областей для вдосконалення та надання цільового зворотного зв'язку. Перед впровадженням розробленої технології та після її завершення було проведено експериментальне дослідження, яке включало аналіз якості знань. Отримані результати до та після експерименту перевіряли за допомогою статистичного критерію Пірсона.*

*Доведено, що впровадження змішаного навчання в системі управління освітнім процесом є передовим підходом до надання освіти. Поєднуючи найкращі елементи традиційного та онлайн-навчання, змішане навчання дає можливість викладачам створювати цікаві, гнучкі та персоналізовані програми. Керований даними підхід до викладання дозволяє викладачам адаптувати свої навчальні стратегії для ефективного задоволення різноманітних потреб здобувачів вищої освіти.*

**Ключові слова:** здобувачі вищої освіти; система управління освітнім процесом; змішаний підхід до навчання; заклад вищої освіти.

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**Formulation of the problem.** In recent years, the landscape of education has undergone significant transformations, driven by advancements in technology and evolving pedagogical approaches. One such approach that has gained prominence is blended learning, which integrates traditional face-to-face instruction with online learning activities. This hybrid model offers numerous benefits, including increased flexibility, personalized learning experiences, and enhanced student engagement.

The implementation of blended learning within the framework of a learning management system (LMS) presents a unique opportunity for higher education institutions to optimize their educational delivery methods. An LMS serves as a centralized platform for course materials, communication tools, assessments, and

student progress tracking. By leveraging the features and functionalities of an LMS, educators can design and deliver blended learning experiences that cater to diverse learning styles and preferences. Through a comprehensive understanding of the principles and practices of blended learning implementation, educators can foster innovation and enhance student learning outcomes in the digital age. The implementation of the blended learning approach within the learning management system (LMS) of a higher education institution presents both opportunities and challenges. Blended learning, which combines traditional face-to-face instruction with online learning activities, has gained popularity due to its potential to enhance learning outcomes, increase flexibility for students, and optimize resource utilization. However, integrating this approach

into the existing infrastructure of an institution's LMS requires careful consideration of various factors and may encounter several challenges.

One aspect of the problem is the design and development of blended learning courses that effectively leverage both online and offline components to create a cohesive learning experience. This involves selecting appropriate learning activities, resources, and assessment methods for each mode of instruction, as well as ensuring seamless integration with the LMS platform. Additionally, faculty members may require training and support to effectively facilitate blended learning environments and utilize LMS functionalities to their full potential.

Another challenge is the technical infrastructure and compatibility of the LMS with various online tools and resources necessary for blended learning delivery. Issues such as system reliability, scalability, user interface design, and data security need to be addressed to ensure smooth operation and user satisfaction. Furthermore, accessibility considerations must be taken into account to accommodate diverse learners with different needs and preferences. Furthermore, the institutional culture and policies may need to adapt to support the implementation of blended learning. This includes revisiting traditional teaching practices, assessment methods, and academic policies to align with the principles of blended learning and promote innovation in teaching and learning. Additionally, institutional leadership and support are crucial for fostering a culture of continuous improvement and providing resources for faculty development and technological infrastructure.

Overall, the formulation of the problem involves addressing the technical, pedagogical, and organizational challenges associated with implementing the blended learning approach within the learning management system of a higher education institution. Finding effective solutions to these challenges is essential for maximizing the potential benefits of blended learning and ensuring quality education delivery in the digital age.

**Analysis of recent research and publications.** Blended learning, combining traditional face-to-face instruction with online learning activities, has gained significant attention in higher education institutions. Implementing this approach within the framework of a learning management system (LMS) presents both opportunities and challenges. An analysis of research and publications in this area provides valuable insights into the effectiveness and best practices of blended learning in higher education settings [1], [2]. Studies examine various pedagogical approaches employed in blended learning, such as flipped classrooms, collaborative learning, and project-based learning. They investigate how these strategies are adapted for online and face-to-face components within the LMS [3].

Analysis of the technological tools and features available within the LMS, including discussion forums,

multimedia content, quizzes, and assignments. Researchers assess how these tools facilitate interaction, engagement, and assessment in a blended learning environment [4]. Research evaluates the impact of blended learning on student engagement, satisfaction, and academic performance. Studies may compare outcomes between blended and traditional courses, examining factors such as retention rates, grades, and student perceptions [5]. Publications discuss faculty training initiatives to effectively design and deliver blended courses. They explore strategies for integrating technology into teaching practices, managing course logistics within the LMS, and providing ongoing support to instructors [6].

Analysis of institutional policies, guidelines, and resources to support the implementation of blended learning. This includes considerations such as course scheduling, course design standards, and academic integrity policies specific to blended courses [7]. Identification of challenges encountered during the implementation of blended learning in LMS environments, such as technological barriers, student readiness, and faculty resistance. Researchers propose solutions and best practices to address these challenges and enhance the effectiveness of blended learning initiatives [8]. Key considerations for implementing blended learning within the LMS are examined, such as faculty training, technical support, and resource allocation. Best practices and strategies for designing effective blended courses are also explored, including the selection of appropriate online tools and technologies, instructional design principles, and pedagogical approaches [9].

Case studies and examples of successful implementations of blended learning within LMS platforms are presented, drawing on experiences from various higher education institutions. Challenges and barriers to implementation, such as resistance to change, technological limitations, and accessibility issues, are discussed, along with strategies for overcoming them [10], [11]. The analysis of research and publications provides a comprehensive understanding of the current state of blended learning implementation in higher education institutions using learning management systems. It offers insights into successful practices, areas for improvement, and directions for future research and development in this rapidly evolving field.

**Formulation of research goals.** Development and experimental verification of the implementation of the blended learning approach in the conditions of the learning management system of the higher education institution.

**Outline of the main research material.** The system of blended learning combines traditional face-to-face instruction with online learning components, offering a flexible and dynamic approach to education. Blended

learning integrates traditional classroom instruction with online learning activities, such as multimedia resources, virtual discussions, and interactive assignments [12]. This combination allows students to engage with course materials both in-person and remotely. One of the central features of blended learning is its flexibility. Students have the flexibility to access course materials and participate in learning activities at their own pace and convenience, whether it's in the physical classroom or through online platforms. This flexibility accommodates diverse learning styles and schedules [13]. Blended learning enables educators to personalize instruction to meet the individual needs and preferences of students. By leveraging technology and data analytics, instructors can tailor learning experiences, provide targeted support, and offer personalized feedback to enhance student learning outcomes. Blended learning incorporates a variety of interactive learning resources, including multimedia presentations, simulations, virtual labs, and online discussion forums. These resources foster active engagement, critical thinking, and collaborative learning among students [14].

Figure 1 presents implementation of the blended learning approach in the conditions of the learning management system of the higher education institution.

Blended learning creates hybrid learning environments where students interact with instructors and peers both in-person and online. This hybrid approach promotes social interaction, communication skills, and community building while leveraging the benefits of technology-enhanced learning. Blended learning enhances accessibility and inclusivity by providing alternative modes of instruction and accommodating diverse learning needs [15]. Students with disabilities, non-traditional learners, and those with geographical constraints can benefit from the flexibility and accessibility of blended learning. Blended learning enables educators to collect and analyze data on student performance, engagement, and progress. By leveraging data analytics and assessment tools, instructors can make informed decisions, track student learning outcomes, and continuously improve teaching practices. Blended learning combines synchronous (real-time) and asynchronous (self-paced) learning activities. While some interactions may occur in real-time during face-to-face sessions or virtual meetings, other activities can be completed independently at the student's own pace, providing flexibility and autonomy. Overall, the system of blended learning offers a versatile and innovative approach to education that leverages the strengths of both traditional and online learning modalities. By integrating technology, personalization, and flexibility, blended learning fosters an enriched and engaging learning experience that prepares students for success in the digital age [16].

Incorporating lectures into the Learning Management System (LMS) as part of a blended learning approach offers a versatile and effective method for delivering course content to students. Instructors can record their lectures using various tools such as video capture software or screen recording applications. These recordings can then be uploaded directly to the LMS platform, allowing students to access them at their convenience. Alternatively, instructors can conduct live virtual lectures using web conferencing tools integrated into the LMS. Students can join these sessions in real-time and participate in discussions, ask questions, and interact with the instructor and fellow classmates. Lecturers can organize lecture materials within the LMS, including slideshows, documents, readings, and supplementary resources. This ensures that all relevant materials are easily accessible to students in one centralized location. To enhance engagement and assess student understanding, instructors can incorporate interactive quizzes and polls into their lectures using built-in LMS features or third-party tools. This allows instructors to gauge student comprehension in real-time and adjust their teaching accordingly. After watching or attending lectures, students can participate in online discussion forums within the LMS to ask questions, share insights, and engage in academic discourse with their peers [17]. Instructors can moderate these discussions and provide feedback to facilitate deeper learning. Instructors can create assignments related to lecture content and enable students to submit their work directly through the LMS. This streamlines the grading process and provides students with timely feedback on their progress. LMS platforms often include analytics and tracking features that allow instructors to monitor student engagement with lecture materials. This data can inform instructional decisions and interventions to support student learning outcomes. Integrating lectures into the LMS as part of a blended learning approach offers numerous benefits, including increased accessibility, flexibility, and interactivity. By leveraging the features and tools available within the LMS, instructors can create engaging and effective learning experiences that meet the diverse needs of students in both face-to-face and online settings [18].

Incorporating practical classes into a Learning Management System (LMS) within a blended learning framework can significantly enhance the educational experience for students. Develop interactive modules within the LMS that simulate real-world scenarios relevant to the subject matter. These modules can include multimedia elements, simulations, case studies, and quizzes to engage students actively in the learning process. Creation virtual laboratory environments where students can conduct experiments or explore concepts in a safe and controlled online setting. This allows students to practice hands-on skills and gain practical experience

without the need for physical laboratory equipment. Record and upload video demonstrations of practical exercises or experiments conducted by instructors can be made available to students for review at their convenience, providing additional support and guidance outside of scheduled class time. Facilitation collaborative projects or group assignments through the LMS, where students can work together to solve problems, analyze data, or complete tasks related to the practical aspects of the course. Discussion forums and shared document repositories can be used to facilitate communication and collaboration among group members. Organization virtual field trips or tours using multimedia resources such as videos, interactive maps, and virtual reality simulations allows students to explore real-world environments relevant to the course material, enhancing their understanding and appreciation of the subject matter [19].

Implementation peer assessment activities within the LMS, where students can evaluate and provide feedback on each other's work or performances during practical exercises encourages active participation and fosters a collaborative learning community among students. Rubrics, self-assessment forms, and online quizzes can be used to assess student performance and track learning outcomes. Integration practical exercises and activities seamlessly with other course materials and resources available in the LMS, such as lecture notes, readings, and supplementary materials ensures that practical learning experiences are aligned with the overall course objectives and curriculum [20]. By incorporating practical classes into the LMS within a blended learning framework, educators can create engaging and interactive learning experiences that effectively complement traditional face-to-face instruction. This approach maximizes the benefits of both online and offline learning modalities, catering to the diverse needs and preferences of students while promoting active engagement and meaningful learning outcomes [21].

Implementing laboratory classes within a LMS as part of a blended learning approach offers a unique opportunity to enhance practical learning experiences while leveraging the advantages of online resources. By developing virtual laboratory simulations or interactive experiments, students can engage in hands-on learning activities within the LMS environment. These virtual labs can replicate real-world scenarios, allowing students to practice skills and conduct experiments remotely, regardless of their physical location. The LMS can serve as a centralized repository for laboratory manuals, instructional videos, data sets, and other resources related to laboratory classes. This ensures easy access to course materials for both students and instructors, facilitating self-paced learning and review. Utilizing the assessment tools available in the LMS, instructors can create quizzes, assignments, and lab reports to evaluate

students' understanding of laboratory concepts and techniques [22]. Online assessments can provide immediate feedback to students, enabling them to track their progress and identify areas for improvement. The LMS can facilitate collaborative learning experiences by integrating discussion forums, group projects, and peer review activities into laboratory classes. Students can collaborate with peers in real-time, share insights, and discuss experimental findings, enhancing their understanding of course concepts. Through the LMS, instructors can remotely monitor students' progress during laboratory sessions, provide guidance and support, and address any questions or concerns in real-time. This ensures that students receive personalized assistance and feedback, regardless of their physical location [23].

Integrating data analysis tools or software applications into the LMS allows students to analyze experimental data collected during laboratory sessions. This hands-on experience with data analysis enhances students' analytical skills and prepares them for future research or professional endeavors. By offering laboratory classes within the LMS, educational institutions can provide greater flexibility and accessibility to students, including those with scheduling constraints or mobility issues. Students can participate in laboratory activities at their convenience, fostering a more inclusive learning environment. Integrating laboratory classes into an LMS as part of a blended learning approach offers numerous benefits, including enhanced practical learning experiences, improved accessibility, and increased collaboration among students. By leveraging the capabilities of the LMS, educational institutions can create engaging and effective laboratory-based learning environments that prepare students for success in their academic and professional pursuits [24].

In a blended learning environment within LMS, the control of knowledge involves various strategies and tools to ensure effective learning outcomes. Educators design courses that integrate both online and face-to-face components within the LMS. They curate and organize learning materials, including multimedia resources, readings, assignments, quizzes, and discussions, to facilitate learning objectives and outcomes. LMS platforms offer diverse assessment tools, such as quizzes, exams, essays, and projects, to evaluate student understanding and progress. Educators can create assessments aligned with course objectives and standards, and use grading features within the LMS to provide timely feedback to students. The LMS provides tracking mechanisms that allow educators to monitor student participation, engagement, and performance. Through analytics dashboards and reports, instructors can identify areas where students may be struggling and intervene accordingly to provide support and additional resources. Collaboration and communication tools within the LMS, such as discussion forums, chat rooms, and video

conferencing, enable students to interact with peers and instructors. Educators moderate discussions, clarify concepts, and guide discussions to ensure meaningful learning experiences. Some LMS platforms incorporate adaptive learning technologies that personalize the learning experience based on individual student needs and preferences. These systems use data analytics to recommend learning resources, adjust pacing, and provide targeted interventions to optimize learning outcomes. Educators provide constructive feedback to

students on their assignments, assessments, and participation. Additionally, reflection activities within the LMS encourage students to critically evaluate their learning progress, identify strengths and areas for improvement, and set goals for future learning. Blended learning in an LMS involves seamlessly integrating online and face-to-face learning activities to reinforce concepts and enhance learning outcomes. Educators design activities that promote active learning, critical thinking, and real-world application of knowledge.

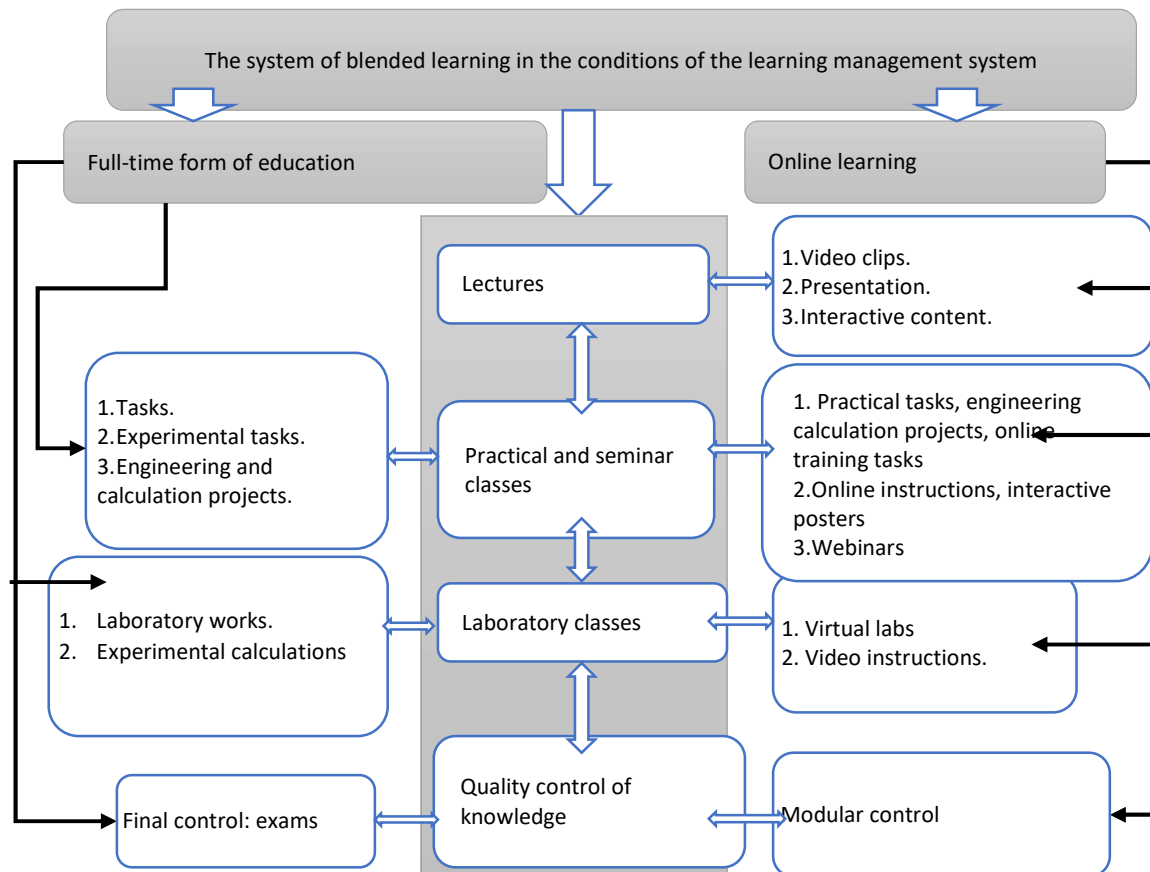


Figure 1 – Implementation of the blended learning approach in the conditions of the learning management system of the higher education institution

Source: authors' development

Effective control of knowledge in a blended learning system within an LMS requires thoughtful course design, utilization of assessment and evaluation tools, monitoring of student progress, facilitation of interaction and communication, incorporation of adaptive learning technologies, provision of feedback, and integration of diverse learning activities. By leveraging these strategies and tools, educators can create engaging and effective blended learning experiences that foster student success.

According to the implementation of the blended learning approach in the conditions of the learning management system of the higher education institution,

221 students took part in the experiment, of which 109 students were in the control group, and 112 were in the experimental group (Table 1). The control group studied according to the traditional scheme, and the experimental group used the proposed system of implementation of the blended learning approach in the conditions of the learning management system of the higher education institution [25].

It is presented the percentage and empirical frequencies in the experimental ( $n_i$ ) and control ( $n_{i1}$ ) groups before and after the experiment.

Table 1. Levels of quality of knowledge of higher education applicants in control and experimental groups at the beginning and at the end of the experiment

Level	Before the experiment				After the experiment			
	% (EG)	$n_i$ (EG)	% (CG)	$n_{i1}$ (CG)	% (EG)	$n_i$ (EG)	% (CG)	$n_{i1}$ (CG)
A	6.25	7	5.50	6	25.00	28	9.17	10
BC	41.07	46	38.53	42	60.71	68	42.20	46
DE	52.68	59	55.96	61	14.29	16	48.62	53
Total	100.0	112	100.00	109	100.00	112	100.00	109

Source: authors' development

It is calculated the empirical value of Pearson's criterion  $\chi^2$  at the beginning and at the end of the experiment in control and experimental groups.

$$\chi^2 = \sum_{x=1}^3 \frac{(n_i - n_{i1})^2}{n_{i1}} = 0.61 \quad (1)$$

Upon completion of the experiment in control and experimental groups

$$\chi^2 = \sum_{x=1}^3 \frac{(n_i - n_{i1})^2}{n_{i1}} = 68.75 \quad (2)$$

It is determined the degree of freedom ( $\nu=k-1$ ,  $k=3$ ). Critical value for  $\chi^2$  for levels of statistical significance  $p \leq 0.05$  (5.991) and  $p \leq 0.01$  (9.210).

The obtained empirical value of Pearson's criterion  $\chi^2$  at the end of the experiment is less than critical. That is,  $\chi^2_{emp.} < \chi^2_{crit.}$ , which means belonging to the zone of significance. Levels of implementation of the blended learning approach in the conditions of the learning management system of the higher education institution in control and experimental groups at the end of the experiment have significant differences. The result of the proposed system is the acquisition of quality knowledge and skills in the conditions of learning management system of higher educational institution.

**Conclusions.** The implementation of the blended learning approach within the learning management system (LMS) of a higher education institution offers numerous advantages and opportunities for both educators and learners. Through the combination of traditional face-to-face instruction with online learning components, such as multimedia resources, discussion forums, and interactive activities, blended learning enhances the overall educational experience.

One of the key benefits of blended learning is its flexibility, allowing students to access course materials

and engage in learning activities at their own pace and convenience. This flexibility is particularly valuable for non-traditional students who may have work or family commitments that limit their availability for traditional classroom attendance.

Additionally, blended learning promotes active learning and student-centered approaches by providing opportunities for collaborative activities, peer interaction, and self-directed learning. The incorporation of multimedia elements in online materials can also cater to diverse learning styles, enhancing comprehension and retention of course content.

Moreover, the integration of technology into the learning process fosters digital literacy skills among students, preparing them for the demands of the modern workforce. By navigating the LMS and utilizing various digital tools, students develop proficiency in information retrieval, communication, and critical thinking, which are essential in today's digital age.

Furthermore, the blended learning approach allows educators to personalize instruction and provide targeted support to individual students based on their learning needs and preferences. Through the LMS, instructors can track student progress, administer assessments, and offer timely feedback, facilitating a more responsive and adaptive teaching environment.

Overall, the implementation of blended learning within the learning management system of a higher education institution represents a strategic approach to enhancing teaching and learning outcomes. By harnessing the affordances of both traditional and online instructional modalities, blended learning optimizes educational delivery, promotes student engagement, and prepares learners for success in the 21st-century knowledge economy.

#### References:

1. Baas, Marjon, Van der Rijst, Roeland, Huizinga, Tjark, Van den Berg, Ellen, & Admiraal, Wilfried. (2022). Would you use them? A qualitative study on teachers' assessments of open educational resources in higher education. *The Internet and Higher Education*, 54, 100857. ISSN 1096-7516. doi:10.1016/j.iheduc.2022.100857. [in English]
2. Blau, I., Shamir-Inbal, T. & Avdiel, O. (2020). How does the pedagogical design of a technology-enhanced collaborative academic course promote digital literacies, self-regulation, and perceived learning of students? *The Internet and Higher Education*, 45, 100722. doi: 10.1016/j.iheduc.2019.100722 [in English]

3. Dotsenko, N. (2023). Interactive posters as a learning tool for practical tasks in the context of electrical engineering education. 2023 IEEE 5th International Conference on Modern Electrical and Energy System (MEES), Kremenchuk, Ukraine, 1-5. doi: 10.1109/MEES61502.2023.10402463. [in English]
4. Li, H., Majumdar, R., Chen, M.-R., & Ogata, H. (2021). Goal-oriented active learning (goal) system to promote reading engagement, self-directed learning behavior, and motivation in extensive reading. *Computers Education*, 171, 104239. [in English]
5. Mebert, L., Barnes, R., Dalley, J., Gawarecki, L., Ghazi-Nezami, F., Shafer, G., Slater, J. & Yezbick, E. (2020). Fostering student engagement through a real-world, collaborative project across disciplines and institutions. *Higher Education Pedagogies*, 5, 30-51. doi: 10.1080/23752696.2020.1750306 [in English]
6. Wang, J., Tigelaar, D. E. H. & Admiraal, W. (2021). Rural teachers' sharing of digital educational resources: From motivation to behavior. *Computers & Education*, 161, 104055 [in English]
7. Yi, X. (2020). A study on the cultivation model of intercultural communicative competence in foreign language teaching. 2020 International Conference on Information Science and Education (ICISE-IE), Sanya, China, 9-1. doi: 10.1109/ICISE51755.2020.00010. [in English]
8. Yu, Y. & Li, J. (2017). Research on the reform of mixed teaching mode in electrical specialty. *Revista de la Facultad de Ingenieria*, 32, 393-396 [in English]
9. Wu, T. (2018). Exploration and practice of talent training mode of mechanical and electrical specialty under the background of engineering education. *IPPTA: Quarterly Journal of Indian Pulp and Paper Technical Association*, 30, 444-450 [in English]
10. Titovskii, S. (2020). Virtualization And Problems Of Training It Specialists, European Proceedings of Social and Behavioural Sciences EpSBS [in English]
11. Hamade, R. F., Artail, H. A. & Jaber. M. Y. (2017). Evaluating the learning process of mechanical CAD students. *Computers & Education*, 49(3), 640-661. 10.1016/j.compedu.2005.11.009 [in English]
12. Manikandan, A. & Muthumeenakshi, M. (2018). Role of Engineering Education in Sustaining the Economic Development of India, *International Journal of Mechanical Engineering and Technology*, 9(3), 706-710 [in English]
13. Shamshina, I. (2018). Professional competences necessary for the bachelor-degree-holding engineer specialising in engineering industries. *Pacific Science Review*, 16, 2, 85-88. 10.1016/j.pscr.2014.08.018 [in English]
14. Al-Samarraie, & Saeed, H. N. (2018). A systematic review of cloud computing tools for collaborative learning: Opportunities and challenges to the blended-learning environment". *Computers & Education*. 124. 77-91. 10.1016/j.compedu.2018.05.016 [in English]
15. Jingwei, L. P., Antonenko, D. & Wang, J. (2019). Trends and issues in multimedia learning research in 1996-2016: A bibliometric analysis. *Educational Research Review*, 28, 100282. 10.1016/j.edurev.2019.100282 [in English].
16. Bogachkov, Yu. M. & Ukhan, P. S. (2023). Immersive synthetic learning space using VR elements. *Information technologies and learning tools*, 94, 2, 178-200 [in English].
17. Klochek, H., Hryhorii, D. & Baraniuk, O. (2019). Word and slide in a lecture: the problem of synergetic effect. *Information technologies and learning tools*, 72 (4), 26-40 doi.org/10.33407/itlt.v72i4.2480. [in English].
18. Fan, H., Zhou, B. & Wang, H. (2021). A probe into the high-tech equipment system of culture and tourism integration industry. 2021 International Conference on Culture-oriented Science & Technology (ICCST), Beijing, China, 575-579. doi: 10.1109/ICCST53801.2021.00125. [in English].
19. Limano, Ferric. (2023). New digital culture metaverse preparation digital society for virtual ecosystem. E3S Web of Conferences, 388. doi:10.1051/e3sconf/202338804057. [in English].
20. Luo, Y., Chen, J., Ren, S., Luo, L. & Chen, T. (2017). Study on deep learning political communication system in universities under the perspective of postmodern media. 2017 International Conference on Robots & Intelligent System (ICRIS), Huai An City, China, 312-316. doi: 10.1109/ICRIS.2017.85. [in English]
21. Wang, S., Zhong, Z. & Chen, L. (2019). The past, present, and future of media literacy education research theme: a network and cluster analysis of literature. 2019 International Joint Conference on Information, Media and Engineering (IJCIME), Osaka, Japan, 78-82. doi: 10.1109/IJCIME49369.2019.00025. [in English]
22. Zang, Yu. (2024). Embodiment of digital art elements in traditional cultural and creative product design based on virtual reality technology. *Applied Mathematics and Nonlinear Sciences*, 9, 10.2478/amns-2024-0103. [in English]
23. Hlynsky, Y. M., Fedasiuk, D. V. & Riazhska, V. A. (Глинський Ю.М., Федасюк Д.В., Рязьська В.А.). (2018). Development and usage of the electronic video resources for educational purposes. (Розроблення і використання електронних відеоресурсів навчального призначення). *Information technologies and learning tools (Інформаційні технології та засоби навчання)*, 58, 2, 67-78. 10.33407/itlt.v58i2.1580 [in Ukrainian]
24. Babenko, D., Dotsenko, N. & Gorbenko, O. (2023). Technology of Creation Term Papers in Electrical Engineering Disciplines in the Online Learning Environment. 2023 IEEE 5th International Conference on Modern Electrical and Energy System (MEES), Kremenchuk, Ukraine, 1-5. doi: 10.1109/MEES61502.2023.10402391. [in English]
25. Plackett, R. L. (1983). Karl Pearson and the Chi-Squared Test. *International Statistical Review. International Statistical Institute (ISI)*, 51 (1), 59-72. 10.2307/1402731. JSTOR 1402731 [in English]

