THE USE OF E-LEARNING AND TEACHER SATISFACTION IN UNIVERSITY EDUCATION: A LITERATURE REVIEW

EL USO DEL E-LEARNING Y LA SATISFACCIÓN DOCENTE EN LA EDUCACIÓN UNIVERSITARIA: UNA REVISIÓN BIBLIOGRÁFICA

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ABSTRACT

This article addresses the importance of e-learning in higher education and its relationship with teacher satisfaction, a key aspect for ensuring educational quality and the professional well-being of faculty. The main objective was to conduct a systematic literature review integrating international evidence on how the adoption of digital tools and advanced technologies, including artificial intelligence, impacts the teaching experience and pedagogical effectiveness. The methodology employed was a qualitative-descriptive approach, searching for studies published between 2014 and 2025 in recognized academic databases, applying rigorous inclusion criteria focused on e-learning, digital competencies, and teacher satisfaction. The selected studies were analyzed using thematic categorization, organizing the findings into factors related to the use of e-learning, determinants of professional satisfaction, and the interaction between technology and perceived educational effectiveness. Among the main findings, it is highlighted that teacher satisfaction depends on perceived autonomy, technological preparedness, workload, interaction with students, and institutional support. Furthermore, the review demonstrates that the relationship between e-learning and satisfaction is bidirectional: the effective adoption of technologies reinforces teacher motivation and well-being, while a positive attitude toward online teaching promotes the creative implementation of digital platforms. Finally, the review highlights the need for comprehensive institutional policies that strengthen digital skills, provide pedagogical support, and continuously evaluate satisfaction, thereby consolidating effective learning environments adapted to the digital age.

Keywords:

E-learning, teacher satisfaction, university education, digital skills, educational technologies.

RESUMEN

Este artículo aborda la importancia del aprendizaje electrónico (e-learning) en la educación superior y su relación con la satisfacción docente, un aspecto clave para garantizar la calidad educativa y el bienestar profesional del profesorado. El objetivo principal es realizar una revisión sistemática de la literatura que integrara la evidencia internacional sobre cómo la adopción de herramientas digitales y tecnologías avanzadas, incluyendo la inteligencia artificial, impacta en la experiencia docente y la eficacia pedagógica. La metodología empleada es de enfoque cualitativo-descriptivo, mediante la búsqueda de estudios publicados entre 2014 y 2025 en reconocidas bases de datos académicas, aplica rigurosos criterios de inclusión centrados en el e-learning, las competencias digitales y la satisfacción del profesorado. Los estudios seleccionados se analizan mediante categorización temática, organiza los hallazgos en factores relativos al uso del e-learning, determinantes de la satisfacción profesional y la interacción entre la tecnología y la efectividad educativa percibida. Entre los principales hallazgos, se destaca que la satisfacción docente depende de la autonomía percibida, la preparación tecnológica, la carga de trabajo, la interacción con los estudiantes y el apoyo institucional. Además, la revisión demuestra que la relación entre el e-learning y la satisfacción es bidireccional: la adopción efectiva de tecnologías refuerza la motivación y el bienestar del profesorado, mientras que una actitud positiva hacia la enseñanza en línea promueve

la implementación creativa de las plataformas digitales. Finalmente, la revisión subraya la necesidad de políticas institucionales integrales que fortalezcan las competencias digitales, proporcionen apoyo pedagógico y evalúen continuamente la satisfacción, consolidando así entornos de aprendizaje efectivos y adaptados a la era digital.

Palabras clave:

E-learning, satisfacción docente, educación universitaria, competencias digitales, tecnologías educativas.

INTRODUCTION

University education is undergoing a profound transformation, driven by technological advances, the globalization of knowledge, and the need to adapt to more flexible, accessible, and inclusive learning environments. In this context, e-learning has emerged as a central strategy in higher education, offering new forms of interaction between teachers and students, as well as tools to improve the planning, monitoring, and evaluation of learning.

Its relevance has increased significantly in recent years, especially in the face of unforeseen situations such as the COVID-19 pandemic, which forced universities to migrate rapidly and massively to virtual platforms, highlighting the need to study how these tools impact the educational experience of all actors involved, particularly the satisfaction of the teaching staff (United Nations Educational, Scientific and Cultural Organization, 2025). Teacher satisfaction is understood as a key component of educational quality, since motivated, competent teachers with positive perceptions of technological tools tend to generate more effective and enriching learning environments for students.

Several international studies highlight the importance of researching teacher satisfaction in e-learning environments. Al- Samarraie et al. (2018) conducted a comprehensive study on the continuity of e-learning in higher education, noting that teacher satisfaction is influenced by individual factors such as technological self-efficacy, perceived control over the teaching process, and digital skills, as well as by organizational factors, including institutional support, available training, and technological infrastructure. Their research demonstrates that a successful virtual learning environment depends not only on the availability of digital platforms but also on how these platforms are integrated with the university's human resources and academic policies.

In addition, Du et al. (2023) analyzed the satisfaction and performance of university faculty during online teaching forced by the pandemic, finding that perceived autonomy, prior preparation for the use of educational technologies, and workload management significantly influence faculty satisfaction levels. This study underscores that institutional support policies and ongoing professional development are essential to ensure that faculty can adapt to virtual environments without compromising their professional well-being or the quality of education.

At the regional level, research such as that by Jiang et al. (2021) has shown that teacher satisfaction in virtual environments can vary significantly across cultural and geographical contexts. Their comparative study of universities in eastern and western China during the pandemic demonstrated that differences in technological infrastructure, access to resources, and educational policies directly impacted teachers' perceptions of online teaching. This finding highlights the importance of considering contextual particularities when analyzing the implementation of e-learning and its effects on the teaching experience, suggesting that there is no universal model applicable to all institutions. Therefore, research on teacher satisfaction should address both general factors, such as digital skills and institutional support, and the specific elements of each region or university.

In parallel, the incorporation of artificial intelligence (AI) in higher education has begun to significantly transform teaching and learning processes. The United Nations The Educational, Scientific and Cultural Organization (2025) emphasizes that AI offers opportunities to personalize learning, optimize assessment and strengthen the skills of both teachers and students.

Likewise, León-González & Pire-Rojas (2025) highlight that the integration of artificial intelligence and advances in neuroscience allows for a more comprehensive approach to university education, capable of fostering cognitive, digital, and emotional competencies simultaneously. These technological innovations not only expand the pedagogical possibilities of e-learning but also pose new challenges for teachers, who must adapt to advanced tools without compromising their professional satisfaction or their teaching performance.

In this context, teacher satisfaction emerges as a key indicator of e-learning effectiveness. Several studies indicate that factors such as perceived interaction with students, clarity of educational objectives, workload, autonomy in teaching, and institutional support are determinants of how teachers experience online education (Al- Samarraie et al., 2018; Du et al., 2023; Jiang et al., 2021).

Understanding these factors is essential not only to improve the teaching experience, but also to ensure that students receive a quality education, since teacher motivation and satisfaction directly impact the dynamics of the virtual classroom and learning outcomes.

Given this context, this article aims to conduct a literature review on the use of e-learning and its relationship to teacher satisfaction in higher education, integrating international evidence and recent perspectives on the topic. The review identifies the factors that determine teacher satisfaction, emerging trends in the adoption of educational technologies, and the challenges teachers face in virtual

environments, in order to offer a comprehensive overview that can serve as a reference for researchers, teachers, and educational policymakers. Furthermore, this analysis seeks to contribute to the academic debate on how to optimize e-learning in higher education, ensuring the holistic development of students and the professional well-being of teachers.

METHODOLOGY

This study is part of a systematic literature review aimed at analyzing the relationship between the use of e-learning and teacher satisfaction in higher education. A qualitative-descriptive approach was adopted, as the main objective was to synthesize the existing evidence on the factors that influence teachers' perceptions of online teaching and the elements that determine their professional satisfaction. The information search was conducted in recognized academic databases, including Scopus and Web of Science. Science, PubMed, ScienceDirect, SpringerLink, and specialized journals in education, educational technology, and applied psychology, in order to ensure coverage of relevant international and regional studies.

Strict inclusion criteria were defined: articles published between 2014 and 2025 that specifically addressed e-learning, university teaching, teacher satisfaction, or teachers' digital competencies, and that presented empirical data, systematic reviews, or comparative studies of virtual environments. Research focused exclusively on students or educational levels other than university was excluded, as were studies without full-text access or peer review. The final selection included research that allowed for the examination of variables such as teacher self-efficacy, teacher-student interaction, perceived autonomy, institutional support, technological training, and the impact of advanced tools such as artificial intelligence on teaching.

The compilation and analysis of the studies was carried out through critical reading and thematic categorization. The findings were organized around three main axes: (1) factors related to teachers' use of e-learning; (2) determinants of professional satisfaction in virtual environments; and (3) the interaction between technology use and perceived educational effectiveness. For each study, the variables analyzed, the methodology used, the geographic and academic context, and the results relevant to understanding how teacher satisfaction and performance are shaped in digital environments were recorded. This methodology allowed for the integration of evidence from different regions, disciplines, and teaching modalities, providing a comprehensive overview of the phenomenon studied and facilitating the identification of trends, challenges, and best practices in the implementation of e-learning in higher education.

DEVELOPMENT

E-learning, understood as education mediated by digital technologies that enable teaching and learning in virtual environments, has significantly transformed university education. Its adoption has been driven by the need to make educational processes more flexible, expand access to education, and improve the efficiency of academic management. Virtual platforms, digital classrooms, remote laboratories, and learning management systems have become essential tools for teaching, especially in the face of contingency scenarios such as the COVID-19 pandemic (Du et al., 2023). Several studies have shown that e-learning facilitates educational continuity, promotes new forms of teacher-student interaction, and offers possibilities for personalization and monitoring of academic performance.

The incorporation of artificial intelligence, according to the La United Nations The Educational, Scientific and Cultural Organization (2025) states that e-learning allows content to be adapted to each student's learning pace and style, optimizing the educational experience and supporting the development of digital skills. However, the success of e-learning depends on multiple factors, including technological infrastructure, teacher training, content quality, and institutional support.

For its part, teacher satisfaction is a central component of educational quality, reflecting teachers' perceptions of their professional experience, motivation, sense of accomplishment, and overall well-being in educational practice. Satisfied teachers tend to show greater commitment, creativity, and willingness to innovate, which positively impacts student learning outcomes (Al- Samarraie et al., 2018). Teacher satisfaction in university settings is influenced by factors such as autonomy in teaching, clarity of pedagogical objectives, interaction with students, workload, and institutional support (Du et al., 2023). Furthermore, it has been noted that the implementation of educational technologies without adequate support can generate stress, frustration, and decreased teacher motivation, highlighting the importance of ongoing training and support strategies (Jiang et al., 2021).

Measuring teacher satisfaction in e-learning environments has been addressed through various instruments and scales that evaluate dimensions such as the perception of digital competence, the quality of online interactions, workload, perceived autonomy, institutional recognition, and overall satisfaction with virtual teaching.

Studies such as those by Al- Samarraie et al. (2018); and Du et al. (2023) have used standardized questionnaires and regression models to identify factors that predict faculty satisfaction, enabling universities to design more precise strategies for improving the faculty experience. These measurements are fundamental for establishing quality indicators and guiding the implementation of educational policies aimed at strengthening teaching in digital environments.

Cazan & Maican (2022) highlight that the factors determining e-learning use and teacher satisfaction are multiple and closely interrelated. Their study shows that the availability of technological resources, ongoing training, and the perception of institutional support significantly influence teachers' motivation and commitment to teaching in virtual environments. Furthermore, they emphasize that teacher satisfaction depends not only on the ease of use of the platforms but also on the perceived pedagogical effectiveness of these tools, which directly impacts the quality of interaction with students. Therefore, coherently integrating these elements into institutional policies can enhance the effective adoption of e-learning and improve the overall educational experience.

Following this line of thought, Angelova (2021) provides evidence on how the satisfaction of future teachers in online science courses can develop progressively as students acquire skills in using digital platforms and virtual teaching methods. Her research shows that teacher satisfaction is closely linked to confidence in their own technological abilities and their perceived control over the teaching process, reinforcing the idea that preparation and self-efficacy are key elements for e-learning success. This finding complements the approach of Cazan & Maican (2022), emphasizing that ongoing professional development is essential for maintaining high levels of teacher satisfaction.

On the other hand, Sharif Nia et al. (2023) highlight that active student participation acts as a critical mediator between teacher satisfaction and academic effectiveness in online learning environments. Their results suggest that teacher satisfaction cannot be assessed in isolation but must be considered alongside student engagement and commitment, since the dynamic interaction between both groups enhances the effectiveness of online learning. Thus, a direct link is established between teaching quality, teacher motivation, and student experience, underscoring the collaborative nature of e-learning in university contexts.

In line with the above, Prifti (2022) emphasizes that teachers' self-efficacy is a significant predictor of satisfaction in hybrid and blended courses Their study shows that teachers who are confident in their ability to use digital tools and design virtual activities report greater satisfaction, which, in turn, impacts students' positive perception of the courses. This directly connects with Angelova 's (2021) contributions, reinforcing that the development of technological and pedagogical skills is key to the effectiveness of online teaching.

Similarly, Khan & Setiawan (2019) highlight that the use of e-learning not only improves students' perceptions of higher education but also fosters critical thinking and analytical skills, elements that indirectly impact teacher satisfaction. Their study demonstrates that the implementation of appropriate and well-structured digital tools contributes to creating more effective learning environments, which increases faculty motivation and commitment to online teaching. In this sense, teacher satisfaction emerges as an indicator of institutional success and technological integration in higher education.

Additionally, Marasi et al. (2022) show that teacher satisfaction in the United States during online teaching is influenced by factors such as perceived autonomy, institutional support, and technological readiness. Their findings demonstrate that, although teachers value the flexibility offered by e-learning, workloads and a lack of adequate training can reduce their perceived effectiveness and satisfaction, highlighting the need for policies that strengthen teacher training and support.

Along the same lines, Ullah et al. (2023) suggest that the effective use of e-learning is reflected not only in teachers' commitment to virtual platforms but also in students' academic performance. Their research indicates that when teachers perceive clear benefits in their students' learning, their level of satisfaction increases, reinforcing the idea that the impact of e-learning should be evaluated from a comprehensive perspective that includes both teachers and students.

On the other hand, Boyraz & Rüzgar (2024) emphasize the relevance of digital skills to teacher satisfaction, showing that teachers with strong skills in using educational technologies report higher levels of satisfaction and confidence when teaching online courses. This perspective connects with the findings of Angelova (2021); and Prifti (2022), who underscore that technical preparedness is an essential component for optimizing the teaching experience and, at the same time, improving learning outcomes.

Similarly, Put (2020) analyzes participant satisfaction in e-learning courses from the perspective of teachers, highlighting that the perception of pedagogical effectiveness, the clarity of objectives, and the quality of the content are crucial determinants. His findings show that, to guarantee teacher satisfaction, it is necessary to design courses that integrate clear objectives, interactive activities, and constant feedback, which improves teacher motivation and engagement.

Furthermore, Cofini et al. (2022) provide evidence on how teacher satisfaction is influenced by stress factors, quality of life, and coping strategies in online learning environments. Their study of Italian university students during the pandemic shows that a balanced digital teaching environment, with institutional support and adequate planning, significantly contributes to teacher well-being, reinforcing the relationship between satisfaction and pedagogical effectiveness.

For their part, Elshami et al. (2021) highlight that the transition to online teaching has generated challenges and opportunities for teacher satisfaction, noting that the perception of interaction with students, the ease of use of the

platforms, and prior training are key determinants. Their results reinforce the idea that teacher satisfaction is a critical factor in ensuring educational quality in virtual environments and in sustaining teacher motivation.

Goh et al. (2020) complement these contributions by analyzing the reasons why university professors use e-learning systems, identifying motivational and practical factors that include improved teaching, time management, and resource optimization. Their research shows that professors seek platforms that allow them to increase pedagogical effectiveness, reinforcing the relationship between e-learning use and professional satisfaction.

Finally, recent studies such as those by Acosta-Servín et al. (2025); Alqahtani et al. (2022); Cole et al. (2014); and Yılmaz (2023) show that teacher satisfaction is enhanced by the combination of digital skills, effective interaction with students, and high-quality instructional design. These studies emphasize that the effective integration of e-learning and teacher skills development not only improves satisfaction but also contributes to strengthening university teaching and the holistic development of students.

These studies demonstrate that the integration of e-learning and teacher satisfaction reveals a complex and bidirectional relationship. On the one hand, the effective adoption of digital tools can boost teacher motivation and satisfaction by offering flexibility, innovative resources, and professional development opportunities (Al- Samarraie et al., 2018). On the other hand, teachers' positive perceptions of their professional experience directly influence their willingness to use educational technologies, the creativity of their online activities, and their commitment to student follow-up.

Research has shown that teachers who perceive a high level of institutional support, ongoing training, and recognition for their work experience greater satisfaction when implementing e-learning, which in turn improves the quality of teacher-student interaction and academic outcomes (Du et al., 2023; Jiang et al., 2021). Integrating artificial intelligence into virtual platforms can strengthen this relationship by facilitating assessment, personalized feedback, and learning monitoring, thus reducing the teacher's administrative burden and allowing them to focus on higher-value pedagogical aspects (United Nations Educational, Scientific and Cultural Organization, 2025).

The use of e-learning and teacher satisfaction cannot be considered in isolation. The effectiveness of university education in digital environments depends on the teacher's technological competence, their perception of autonomy and institutional support, and the opportunities that virtual platforms offer to enrich teaching. Understanding this relationship is essential for designing educational policies, teacher training programs, and institutional strategies that promote effective learning environments capable of guaranteeing educational quality and the professional well-being of teachers, especially in a context marked by digital transformation and continuous educational innovation.

A review of international studies shows that the implementation of e-learning, accompanied by systematic measurements of teacher satisfaction, contributes not only to the strengthening of university teaching, but also to the integral development of students and the consolidation of higher education in the digital age.

CONCLUSIONS

The literature review conducted reveals that the relationship between the use of e-learning and teacher satisfaction in higher education is complex, multidimensional, and strongly influenced by individual, institutional, and technological factors. On the one hand, e-learning is consolidating itself as a strategic resource for making education more flexible, facilitating interaction with students, and optimizing teaching and assessment processes, especially in contingency contexts such as the COVID-19 pandemic. The incorporation of advanced technologies, including artificial intelligence, allows for the personalization of content and a reduction in administrative burden, which has a positive impact on the teaching experience and pedagogical effectiveness.

On the other hand, teacher satisfaction is influenced by the perception of autonomy, technological preparedness, workload, the quality of interaction with students, and available institutional support. Reviewed studies show that teachers with strong digital skills, access to continuing education, and institutional recognition report higher levels of satisfaction and motivation, which translates into better learning outcomes and the consolidation of innovative teaching practices .

Furthermore, evidence suggests that teacher satisfaction and e-learning use are closely linked in a bidirectional way: the effective use of digital tools reinforces teachers' perceived competence and professional well-being, while motivation and a positive attitude toward online teaching encourage the creative and committed adoption of these technologies. Active student participation, clear educational objectives, and pedagogical interaction are key mediators in this relationship, demonstrating that teacher satisfaction cannot be analyzed in isolation.

Finally, this review highlights the need for institutional policies that integrate teacher training in digital skills, pedagogical support, systematic satisfaction assessment, and the incorporation of technological innovations, thereby enhancing educational quality and professional well-being. It concludes that strengthening teacher satisfaction in e-learning environments is an essential component for

ensuring the effectiveness of university education, faculty motivation, and the comprehensive development of students, thus consolidating a higher education model adapted to the digital age and the contemporary challenges of teaching.

REFERENCES

Acosta-Servín, S., Veytia-Bucheli, M. G., & Cáceres-Mesa, M. L. (2025). ***Innovar en la práctica docente. Desarrollo de competencias digitales en la Licenciatura*.** Sophia Editions.

Alqahtani, M. A., Alamri, M. M., Sayaf, A. M., & Al-Rahmi, W. M. (2022). Exploring student satisfaction and acceptance of e-learning technologies in Saudi higher education. ***Frontiers in Psychology, 13***, 939336. https://doi.org/10.3389/fpsyg.2022.939336

Al-Samarraie, H., Teng, B. K., Alzahrani, A. I., & Alalwan, N. (2018). E-learning continuance satisfaction in higher education: A unified perspective from instructors and students. ***Studies in Higher Education, 43***, 2003–2019. http://dx.doi.org/10.1080/03075079.2017.1298088

Angelova, S. (2021). Development of student teachers' satisfaction with e-learning science courses. ***AIP Conference Proceedings, 2333***(1), 050011. https://doi.org/10.1063/5.0042071

Boyraz, S., & Rüzgar, M. E. (2024). What digital competency tells us about e-learning satisfaction of pre-service teachers. ***European Journal of Education, 59***(4), e12766. https://doi.org/10.1111/ejed.12766

Cazan, A.-M., & Maican, C.-I. (2022). Factors determining the use of e-learning and teaching satisfaction: Factores determinantes en el uso del e-learning y la satisfacción docente. ***Comunicar, 31***(74). https://doi.org/10.3916/C74-2023-07

Cofini, V., Perilli, E., Moretti, A., Bianchini, V., Perazzini, M., Muselli, M., Lanzi, S., Tobia, L., Fabiani, L., & Necozione, S. (2022). E-learning satisfaction, stress, quality of life, and coping: A cross-sectional study in Italian university students a year after the COVID-19 pandemic began. ***International Journal of Environmental Research and Public Health, 19***(13), 8214. https://doi.org/10.3390/ijerph19138214

Cole, M. T., Shelley, D. J., & Swartz, L. B. (2014). Online instruction, e-learning, and student satisfaction: A three year study. ***The International Review of Research in Open and Distributed Learning***, ***15***(6). https://doi.org/10.19173/irrodl.v15i6.1748

Du, W., Liang, R., Zhang, J., & Wang, L. (2023). Factors influencing teachers' satisfaction and performance with online teaching in universities during the COVID-19. ***Frontiers in Psychology, 14***, 1120662. https://doi.org/10.3389/fpsyg.2023.1120662

Elshami, W., Taha, M. H., Abuzaid, M., Saravanan, C., Al Kawas, S., & Abdalla, M. E. (2021). Satisfaction with online learning in the new normal: Perspective of students and faculty at medical and health sciences colleges. ***Medical Education Online, 26***(1), 1920090. https://doi.org/10.1080/10872981.2021.1920090

Goh, C. F., Hii, P. K., Tan, O. K., & Rasli, A. (2020). Why do university teachers use e-learning systems? ***International Review of Research in Open and Distributed Learning, 21***(2). https://www.irrodl.org/index.php/irrodl/article/view/3720/5303

Jiang, H., Islam, A. Y. M. A., Gu, X., & Spector, J. M. (2021). Online learning satisfaction in higher education during the COVID-19 pandemic: A regional comparison between Eastern and Western Chinese universities. ***Education and information technologies***, ***26***(6), 6747–6769. https://doi.org/10.1007/s10639-021-10519-x

Khan, M. L. H., & Setiawan, A. (2019). The impact of e-learning on higher education perception, skills, critical thinking and satisfaction. ***Journal of Physics: Conference Series, 1375***(1), 012084. https://doi.org/10.1088/1742-6596/1375/1/012084

León-González, J. L., & Pire-Rojas, A. (Comp). (2025). ***Investigación, neurociencia e inteligencia artificial: Hacia una formación universitaria integral***. Sophia Editions.

Marasi, S., Jones, B., & Parker, J. M. (2022). Faculty satisfaction with online teaching: A comprehensive study with American faculty. ***Studies in Higher Education, 47***(3), 513–525. https://doi.org/10.1080/03075079.2020.1767050

Prifti, R. (2022). Self-efficacy and student satisfaction in the context of blended learning courses. ***Open Learning: The Journal of Open, Distance and e-Learning, 37***, 111–125. https://doi.org/10.1080/02680513.2020.1755642

Put, D. (2020). E-learning courses satisfaction in higher education from participants' perspective. ***Horyzonty Wychowania, 19***(51), 23–32. https://doi.org/10.35765/hw.1898

Sharif Nia, H., Marôco, J., She, L., Khoshnavay Fomani, F., Rahmatpour, P., Stepanovic Ilic, I., Mohammad Ibrahim, M., Muhammad Ibrahim, F., Narula, S., Esposito, G., Gorgulu, O., Naghavi, N., Pahlevan Sharif, S., Allen, K. A., Kaveh, O., & Reardon, J. (2023). Student satisfaction and academic efficacy during online learning with the mediating effect of student engagement: A multi-country study. ***PloS one***, ***18***(10), e0285315. https://doi.org/10.1371/journal.pone.0285315

Ullah, M. S., Hoque, M. R., Aziz, M. A., & Islam, M. (2023). Analyzing students' e-learning usage and post-usage outcomes in higher education. ***Computers and Education Open, 5***, 100146. https://doi.org/10.1016/j.caeo.2023.100146

United Nations Educational, Scientific and Cultural Organization. (2025). ***Artificial intelligence in education: UNESCO advances key competencies for teachers and learners***. UNESCO. https://www.unesco.org/en/articles/artificial-intelligence-education-unesco-advances-key-competencies-teachers-and-learners

Yılmaz, A. B. (2023). The relationship between satisfaction, interaction, e-learning readiness, and academic achievement in online learning. ***Open Praxis, 15***(3), 199–213. https://doi.org/10.55982/openpraxis.15.3.578

Conflicts of Interest:

The author declares no conflicts of interest.

Author Contributions:

Arif Asadov: Conceptualization, data curation, formal analysis, investigation, methodology, supervision, validation, visualization, original draft writing, and writing, review, and editing.

Ethical statement:

The study was based on the analysis of documentary sources and publicly available data, and therefore did not involve the direct participation of human subjects. No personally identifiable information was handled.