

Digital Standard for the Design of Inclusive and Effective Online Courses in Higher Education: An Integrative Literature Review

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This integrative literature review examines models and frameworks for digital education in higher education, synthesizing their key strengths and limitations. By analysing nine existing frameworks covering different aspects of digital education, including pedagogical approaches, technological solutions and assessment mechanisms, the study identifies gaps in the current literature. The findings show that while the individual models provide valuable insights, none of them independently offer a complete approach to the design, implementation and assessment of digital education. Therefore, this study proposes the development of an integrated digital standard that combines theoretical and practical perspectives to promote inclusive and effective online learning. Such a standard could increase the adaptability to students' needs, improve assessment mechanisms and increase the flexibility of digital learning environments. This study contributes to the development of sustainable and adaptable solutions for the future of digital education.

Keywords: innovative teaching methods, e-learning, sustainable education, effectiveness of online teaching, digital education

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Introduction

Digital education in higher education is evolving rapidly in response to global challenges such as climate change, digital transformation, and the increasing need for innovative teaching and learning strategies. To address these demands, universities play an important role in equipping students and educators with the necessary digital skills to navigate and contribute to a future shaped by technology (European Commission, 2022).

The European Union has identified digital transformation as a key priority, setting ambitious targets such as ensuring 80% of EU citizens have basic digital skills and developing 20 million digital experts by 2030 (European Education Area, 2021). Higher education institutions are integral to achieving

these goals by implementing digital literacy initiatives, fostering innovation, and developing digital education strategies (Falloon, 2020). Despite advancements, disparities in digital skills persist across the EU, posing a significant challenge to achieving equitable and inclusive education (European Commission, 2022).

Digital education encompasses various teaching and learning modalities that leverage technology to enhance and transform traditional methods. The term has evolved over decades, with e-learning emerging as a prominent concept integrating distance, online, and mobile learning (Kennedy et al., 2011). Wheeler (2012) suggested using 'digital education' to encompass the holistic use of technology for instructional purposes, a definition supported by subsequent literature (Blankenship & Baker, 2019).

In Slovenia, for instance, the adoption of digital education has lagged behind other European nations. A 2017 study revealed that only 70% of Slovenian higher education institutions used learning management systems (LMS), compared to 91% in other EU countries (Bregar & Puhek, 2017). This disparity highlights the need for strategic investment in digital education infrastructure and policies. The integration of LMS platforms like Moodle has facilitated blended and online learning, but challenges remain in scaling these solutions to meet broader institutional needs (Ličen, 2013; Radovan et al., 2018).

The COVID-19 pandemic has emphasised the critical importance of digital education, enabling educational institutions to swiftly adapt to remote learning. However, it has also exposed significant gaps in teacher and student readiness for this type of education (Yeo et al., 2021). While digital education offers numerous opportunities, its effective implementation requires addressing both its benefits and challenges.

On the positive side, digital education offers flexibility, accessibility and cost-effectiveness while promoting personalised and interactive learning environments (Agariya & Singh, 2012; Ali, 2016). Despite these benefits, it also brings challenges, such as reduced interpersonal interaction, more preparation time for teachers and the need for greater self-discipline from learners (Koch, 2014; Lawn et al., 2017). In addition, technical barriers, including inadequate equipment and unreliable internet connections, widen existing inequalities in access to digital education (Rouleau et al., 2017).

To address these challenges, the European Education Area has introduced the Digital Education Action Plan (2021–2027), which aims to improve the quality of teaching through the integration of digital technologies and to promote the digitalisation of educational practice (European Education Area, 2021). The plan prioritizes the development of digitally competent teachers

and the creation of secure, user-friendly platforms that meet ethical standards. In addition, it emphasises the design of inclusive courses that promote equality, equity and diversity and ensure accessibility for remote learners, individuals with disabilities and those with limited resources (Czerkowski & Lyman, 2016).

Instructional design plays a key role in creating effective digital learning programmes. Through systematic analysis, planning and implementation of instructional strategies, instructional design ensures that learning processes are engaging, accessible and aligned with defined outcomes (Nagpal & Kumar, 2020). Approaches such as learner-driven instructional models and frameworks that promote active engagement are particularly effective in improving student engagement and achievement (Leeds et al., 2013). These models also consider the cultural and political context of the regions in which the education is delivered, thus ensuring relevance and sustainability.

This integrative literature review examines existing models and frameworks for online learning in higher education. Its primary goal is to analyse their strengths and limitations, synthesizing insights to propose a digital standard for designing, implementing, and evaluating digital education. The focus is on fostering inclusivity and ensuring course effectiveness. This study addresses the research question: *What existing models and frameworks for digital education in higher education are identified in the literature, what are their strengths and weaknesses, and how can their synthesis contribute to the development of an innovative digital standard?*

Methods

This integrative literature review employed a rigorous methodology informed by the framework proposed by Whittemore and Knafl (2005), which accommodates diverse research designs, including qualitative, quantitative, and mixed-method studies. The review process was divided into three key stages: (1) conducting a systematic search of the literature; (2) performing an evaluation and thematic analysis of the data, involving data reduction, organization for clarity, and deriving validated conclusions; and (3) synthesizing and presenting the findings in a structured and coherent format.

To ensure transparency and robustness, the review adhered to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Page et al., 2021). These guidelines provided a systematic approach to selecting and excluding studies, employing a four-phase flowchart to manage the review process. Additionally, the PRISMA checklist, comprising 27 essential criteria, guided the thorough reporting of key sections, including

the title, abstract, introduction, methods, results, discussion, and acknowledgments.

Eligibility Criteria

To ensure a thorough analysis, eligibility criteria for this integrative review were established. Inclusion criteria required studies to be published as full-text, peer-reviewed articles in English between 2014 and 2024. The review included studies focusing on models, frameworks, or practices that inform the development, implementation, or evaluation of digital education in higher education, with an emphasis on fostering inclusivity and effectiveness.

Studies were excluded if they did not relate specifically to higher education, lacked a focus on digital education and were published prior to the year 2014. Additionally, non-peer-reviewed materials such as conference abstracts, editorials, letters, and commentaries were excluded.

Search Strategy

An integrative literature search was conducted in several electronic databases, including PubMed, Medline, CINAHL (Cumulative Index to Nursing and Allied Health Literature) and ScienceDirect. The search focussed on identifying studies examining models and frameworks for online learning in higher education. A combination of keywords and Boolean operators were used to refine the search and identify relevant studies. The search terms included: *((‘online learning’[Title/Abstract] OR ‘e-learning’[Title/Abstract] OR ‘digital education’[Title/Abstract]) AND (‘higher education’[Title/Abstract] OR ‘university’[Title/Abstract]) AND (‘framework’[Title/Abstract] OR ‘model’[Title/Abstract]) AND (‘effectiveness’[Title/Abstract] OR ‘evaluation’[Title/Abstract])) AND ((y_10[Filter]) AND (fft[Filter]) AND (english[Filter]))).*

Two researchers independently reviewed the titles and abstracts of all retrieved articles to assess their relevance. Studies that did not fulfil the inclusion criteria were excluded. After this initial review, a full-text screening was performed to further assess the eligibility of the remaining studies.

The search and selection process followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure a structured and transparent approach to identifying relevant literature (Figure 1).

The selection of studies began with a systematic search of several databases. A total of 329 records were identified, including 126 from PubMed, 43 from Medline and CINAHL and 160 from ScienceDirect. After removing 72 duplicate records, 257 studies remained for title and abstract screening.

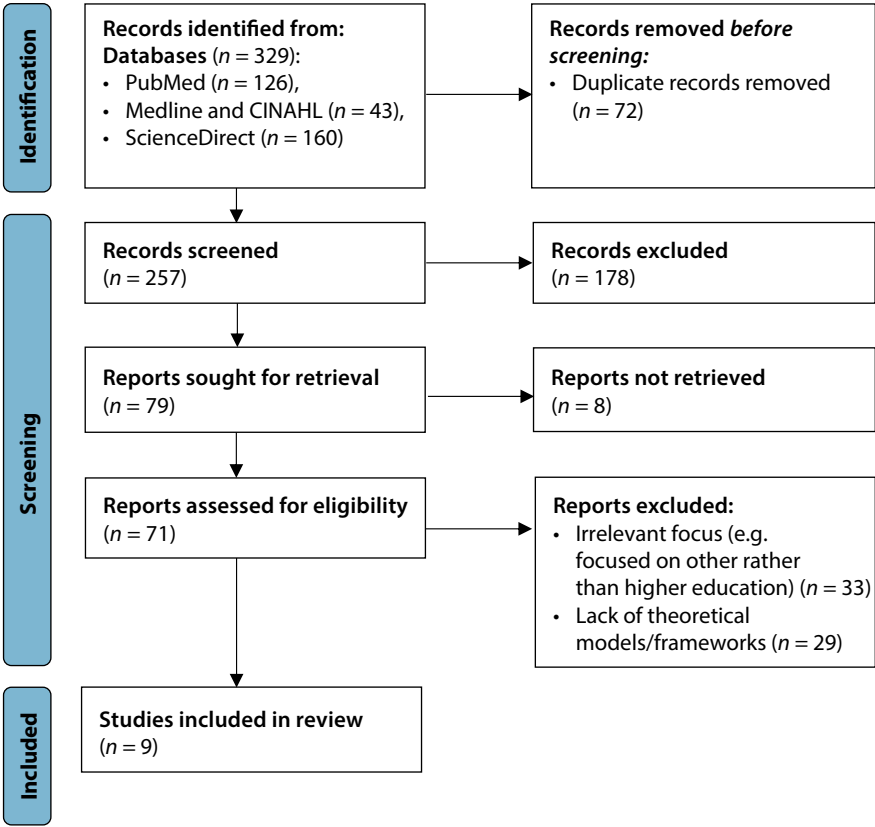


Figure.1 Literature Search Strategy Included in the Integrative Review

During the screening phase, 178 records were excluded because they did not fulfil the predefined inclusion criteria. The remaining 79 articles were used for the full-text search. However, 8 reports could not be retrieved and were excluded from further evaluation.

A total of 71 full-text articles were screened for eligibility. Of these, 33 studies were excluded due to an irrelevant focus (e.g. studies dealing with educational levels other than higher education), while 29 studies were excluded due to the lack of a theoretical model or framework. Following this rigorous selection process, 9 studies met all eligibility criteria and were included in the final analysis.

Quality Appraisal

To assess the methodological quality of the included studies, we applied the Critical Appraisal Skills Programme (Critical Appraisal Skills Programme, n.d.).

CASP provides a structured approach to determining the rigour, credibility and relevance of research findings.

The nine studies selected for synthesis underwent a systematic appraisal process. Each study was independently reviewed by the authors using the CASP checklist appropriate to their study design. This double-blind assessment was intended to minimise individual bias and ensure a thorough evaluation of study quality. Any discrepancies in the assessments were discussed at length, with final decisions made on the basis of consensus based on the evidence presented in each study. Following this critical appraisal, all nine studies met the quality criteria and were deemed suitable for inclusion in the study.

Data Extraction and Synthesis

A synthesis process was used to systematically analyse the models and frameworks identified in the selected studies. To ensure clarity and methodological consistency, the studies were first categorised according to their primary focus, i.e. whether they examined conceptual frameworks, implementation models or evaluation strategies for online learning in higher education.

For data extraction, each study was reviewed independently, using a customised data extraction form designed to capture key elements, including framework type, educational content and key findings. A narrative synthesis was conducted to integrate the findings of the different study types and enable a comparative analysis of the strengths and limitations of the existing models. This approach not only provided insights into the effectiveness and applicability of the different frameworks but also helped to identify common themes and emerging trends in the field of digital education.

Results

This review includes nine studies that present different models and frameworks for online learning in higher education. These studies include evaluation models (Campbell et al., 2019), frameworks for technology-enhanced learning (Choi-Lundberg et al., 2023), and pedagogical and theoretical constructs (Guàrdia et al., 2021; Kim & Gurvitch, 2020; Smith et al., 2017). They also examine quality measurement (Manian & Pius, 2023), integrative assessment (Marciniak, 2018), adaptive learning systems (Wang et al., 2015) and peer feedback models (Kerman et al., 2024). The selected studies provide insights into student engagement, instructional strategies, institutional assessment, quality assurance and technological integration in digital education (Table 1).

Table 1 Characteristics of Included Studies

Authors, Year	Framework type	Educational content	Key findings
Kerman et al., (2024)	Conceptual framework for online peer feedback	Higher education	Examines the key factors for online peer feedback, including student characteristics, learning environments and feedback processes, and proposes a guiding framework.
Choi-Lundberg et al. (2023)	Systematic review framework	Digital innovations in higher education	Identifies eight categories of digital technologies and emphasises the need for better evaluation and reporting standards.
Manian & Pius, (2023)	Quality measurement framework (DIGIQUAL)	Online higher education, focus on management courses	DIGIQUAL overcomes the limitations of existing models and provides a robust tool to assess the quality of online teaching, student satisfaction and engagement.
Guàrdia et al., (2021)	Transformative framework (Intelligent, Distributed, Engaging, Agile, Situated – IDEAS)	Higher education	Defines key trends in technology, pedagogy and organisation and provides a framework for next generation pedagogy.
Kim & Gurvitch, (2020)	Theoretical framework (Community of Inquiry)	Online education in higher education, focus on Kinesiology	Systematic review of 23 studies to identify effective online teaching strategies and student learning outcome variables.
Campbell et al. (2019)	Evaluation framework (Kirkpatrick's four-level model)	Online cancer education for nurses and allied health professionals	Finds online cancer education appealing but points to limited validated evaluations and assessments of clinical impact.
Marciniak (2018)	Integrative assessment model	Online higher education programmes	Develops a validated model that integrates programme quality assessment and continuous evaluation using 14 dimensions and 81 indicators.
Smith et al. (2017)	Theoretical framework (Community of Practice)	Online/blended learning in higher education and professional development	Reviews the application of Wenger's Communities of Practice framework and identifies key trends and research directions in the field of social learning
Wang et al. (2015)	Complex adaptive systems framework	Blended learning in higher education	Uses a systemic approach to blended learning and identifies research gaps and opportunities through a review of 87 empirical studies.

Table 2 Framework Synthesis

Framework component	Strength rating	Limitations rating	Integration potential
Online peer feedback framework (Kerman et al., 2024)	Medium – Focused on a specific aspect of online learning	Low – Limited to peer feedback	Medium – Can inform collaborative learning components
Digital technology categories (Choi-Lundberg et al., 2023)	Medium – Comprehensive overview of the technologies	Low – Limited evidence of impact	Medium – Provides a technological context for other frameworks
DIGIQUAL framework (Manian & Pius, 2023)	High – Focused on the perception of students	Medium – Limited to one institution	High – Can contribute to quality measurement in an integrated model
IDEAS framework (Guàrdia et al., 2021)	High – Comprehensive transformational approach	Medium – Limited empirical testing	High – Provides overarching principles for integration
Community of Inquiry (Kim & Gurvitch, 2020)	High – Well established in the literature on online learning	Medium – Potential for more sophisticated applications	High – Can provide theoretical basis for integrated model
Kirkpatrick's four-level model (Campbell et al., 2019)	High – Established evaluation framework	Medium – Weak evidence of effectiveness in the online context	High – Can be integrated with other quality measures
Integrative assessment model (Marciniak, 2018)	High – Comprehensive with expert validation	Medium – Complex with 81 indicators	Medium – Can provide detailed evaluation criteria
Community of Practice (Smith et al., 2017)	Medium – Proven theory	Medium – Unused in the online context	Medium – Can consider aspects of social learning
Complex adaptive systems framework (Wang et al., 2015)	High – Novel systems approach	Medium – Limited empirical testing	High – Can provide an overarching systems perspective

In order to effectively design, implement and evaluate digital education in higher education, various models and frameworks have been proposed in the literature. These frameworks address different aspects of digital education, including pedagogy, technology, assessment, and learner engagement. Table 2 provides a summary of the main frameworks identified in the literature and analyses their strengths, limitations and potential for integration (Table 2).

The analysis of nine key frameworks and/or models for digital education in higher education highlights their different contributions to the design, implementation and evaluation of digital learning environments. Each frame-

work offers valuable insights into specific aspects of digital education, but none fully addresses all the essential components required for an integrated digital standard. The synthesis of these frameworks could allow the development of a holistic and scalable approach that ensures effective and inclusive online learning experiences.

Pedagogical and Theoretical Foundations

The Community of Inquiry (Kim & Gurvitch, 2020) and Community of Practice (Smith et al., 2017) frameworks emphasise the importance of collaborative learning and social integration in digital education. These models provide an established theoretical basis for structuring online interactions and fostering deep, collaborative and community-orientated learning. However, their use in digital learning is still underutilised, particularly in large-scale online courses.

Assessment and Quality Assurance

Kirkpatrick's four-stage model (Campbell et al., 2019) and the DIGIQUAL framework (Manian & Pius, 2023) both focus on evaluating the effectiveness and quality of online learning experiences. Kirkpatrick's model provides a structured approach to assessing learning outcomes, yet its applicability in digital learning environments is weakly evidenced. DIGIQUAL, on the other hand, prioritizes student perceptions and the measurement of quality, but is limited by its development in a specific institutional context.

Technology and Digital Integration

The Digital Technology Categories framework (Choi-Lundberg et al., 2023) provides a structured classification of digital tools used in digital education and helps educators and instructional designers navigate the diverse landscape of educational technologies. Although this framework provides a thorough overview, it does not examine in depth the pedagogical effectiveness or long-term impact of these technologies on learning outcomes, leaving a gap in empirical validation.

The Complex Adaptive Systems (CAS) framework (Wang et al., 2015) conceptualises online learning environments as dynamic, interconnected systems in which multiple components, such as learners, teachers, content and technology, continuously interact and adapt. This systems-based approach recognises the complexity of digital education and the need for flexible, responsive design strategies. While the CAS framework is theoretically sound, it has limited empirical testing, so there are gaps in understanding its practical applicability and effectiveness in real educational contexts.

Assessment and Feedback Mechanisms

Effective assessment and feedback are critical components of online learning that ensure students receive meaningful evaluations that support their academic growth (Jensen et al., 2021). The Integrative Assessment Model (Marciniak, 2018) and the Online Peer Feedback Framework (Kerman et al., 2024) offer complementary approaches to assessment, each with their strengths and limitations.

Marciniak's Integrative Assessment Model (2018) provides a structured assessment system that integrates multiple dimensions of student performance. With its 81 indicators, it ensures a detailed and multidimensional assessment covering aspects such as learning outcomes, engagement and skills development. Nevertheless, the complexity of this model could pose a challenge for practical implementation as it requires significant resources, time and expertise to apply it effectively in different educational institutions.

In contrast, the Online Peer Feedback Framework promotes student engagement, self-regulation and collaborative learning by involving learners in the assessment process. This model fosters student ownership and encourages deeper critical thinking through the exchange of constructive feedback. In addition, variations in the quality of student feedback and potential biases in peer assessments could be raising concerns about consistency and reliability (Double et al., 2020).

Discussion

The integration of different models and frameworks for digital education reveals distinct but complementary perspectives on digital learning. Existing frameworks offer valuable insights into pedagogy, technology, and assessment, yet their isolated application limits their ability to address the evolving complexity of digital education. Synthesising these frameworks provides an appropriate foundation for designing inclusive, effective and scalable online learning environments.

A key strength of the existing models lies in their targeted focus on key aspects of digital education. Frameworks based on social learning theories emphasise the importance of interaction, collaboration and engagement in digital learning environments (Kim & Gurvitch, 2020; Smith et al., 2017). These models suggest that fostering meaningful peer interaction and learner autonomy improves student motivation and cognitive development. The role of structured peer feedback in the development of higher order thinking skills is particularly well documented (Kerman et al., 2024), reinforcing the value of collaborative assessment as a learning tool.

Assessment-orientated models provide structured approaches to evaluate the quality and effectiveness of digital education (Campbell et al., 2019; Manian & Pius, 2023). They ensure that online courses achieve defined learning objectives and improve student performance. Their empirical validation in fully digital learning environments, however, remains limited, raising concerns about their applicability to contemporary, technology-enhanced pedagogies. Furthermore, some models prioritise institutional assessment measures over student-centered assessment, overlooking formative learning processes that contribute to long-term knowledge retention (Morris et al., 2021).

Technological frameworks broaden the scope of digital learning by addressing the scalability and adaptability of digital education (Choi-Lundberg et al., 2023; Wang et al., 2015). They offer critical perspectives on how digital tools support learning, increase interactivity and improve accessibility. While these models recognise the dynamic nature of educational technology, they often focus on the logistics of implementation rather than pedagogical coherence (Chugh et al., 2023).

Assessment-centred models offer structured approaches to feedback and performance evaluation (Marciniak, 2018; Kerman et al., 2024). Peer-assessment models promote reflective learning and active student engagement, while integrative assessment models enable course evaluation. Their complexity can hinder practical implementation, as extensive indicators and metrics require significant institutional resources (Fleckney et al., 2025). Furthermore, these models often assume a uniform level of digital literacy among students, overlooking the diverse backgrounds and technological capabilities that exist across the higher education settings (Ortega-Ruipérez & Correa-Gorospe, 2024).

The synthesis of these models show the need for an integrated approach that combines pedagogical principles, technological innovation and systematic evaluation. While each of these models provides valuable insights, their limitations point out the need for a digital standard that aligns instructional design with learner needs, assessment strategies and scalable technological solutions.

The development of an innovative digital standard for digital education could combine a balanced approach that incorporates both theoretical and practical insights. The Community of Inquiry and Community of Practice frameworks provide theoretical foundations for collaborative and interactive learning and emphasise social and cognitive engagement. Kirkpatrick's model (Campbell et al., 2019) and DIGIQUAL (Manian & Pius, 2023) provide quality assurance mechanisms that ensure measurable learning outcomes and stu-

dent satisfaction. Technology-orientated models such as the Digital Technology Categories framework (Choi-Lundberg et al., 2023) and the Complex Adaptive Systems framework (Wang et al., 2015) enable scalability and adaptability, ensuring that digital learning environments remain flexible and responsive to technological advances. In addition, assessment-orientated frameworks such as the Integrative Assessment Model (Marciniak, 2018) and the Online Peer Feedback Framework (Kerman et al., 2024) ensure that assessment mechanisms effectively support both summative and formative assessment.

Future research should focus on the empirical validation of these frameworks in different institutional settings to assess their impact on learning outcomes. In addition, it is important to explore the potential of new technologies such as artificial intelligence (Akgun & Greenhow, 2022) and virtual reality (Almasri, 2024) within the proposed integrated model to improve the effectiveness and accessibility of digital education.

Study Limitations

Despite the integrated approach taken in this study, several limitations must be acknowledged. First, the synthesis of existing frameworks is based on the published literature, which may lead to publication bias. Studies with inconclusive or negative results regarding the effectiveness of specific online learning models may be underrepresented, leading to an overemphasis on positive results and well-established frameworks. In addition, most of the concepts studied originate from Western educational settings, which may limit the generalisability of the results to other cultural and institutional contexts, especially in regions with different technological infrastructures and pedagogical traditions.

Secondly, although the study integrates several models to propose an innovative digital standard, the empirical validation of this integration remains a challenge. The study primarily conducts a theoretical synthesis, which means that a practical implementation and field test are necessary to assess the feasibility and effectiveness of the proposed framework. Future research should investigate longitudinal studies or experimental applications of the synthesised model in different higher education settings to assess its impact on student engagement, learning outcomes and quality of teaching.

Finally, the study summarises frameworks that focus on structured design and evaluation criteria. The dynamic nature of digital education, including rapid advances in artificial intelligence, adaptive learning technologies and student-led learning models, suggests that a static framework can quickly become outdated. Therefore, the proposed digital standard should be seen as an

adaptive guide rather than a rigid framework that needs to be constantly updated and validated through new research and technological developments.

Conclusion

This study shows how important it is to develop a new and contemporary standard for digital education. Through the interplay of pedagogical, technological and assessment approaches, we can create a more flexible and inclusive framework that not only improves the learning experience but also enhances institutional effectiveness. Digital education should be viewed as a living and evolving system that adapts to technological advances and the ever-changing needs of learners. Future research will need to focus on empirical research to test and refine the standard and ensure its relevance in different educational contexts. As digital learning continues to evolve, continuous innovation and adaptation to new trends are key to maintaining its impact and accessibility. This holistic approach provides a solid foundation for improving the quality, inclusivity and long-term sustainability of digital education in higher education.

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Digitalni standard za oblikovanje vključujočih in učinkovitih spletnih tečajev v visokem šolstvu: integrativni pregled literature

Na podlagi integrativnega pregleda literature smo obravnavali modele in ogrodja za digitalno izobraževanje v visokem šolstvu ter sintetizirali njihove ključne prednosti in omejitve. V pregled smo vključili devet člankov, ki zajemajo različne vidike digitalnega izobraževanja, od pedagoških pristopov in tehnoloških rešitev do mehanizmov ocenjevanja. Na podlagi analize smo opozorili tudi na vrzeli, ki obstajajo v obstoječi literaturi. Rezultati kažejo, da posamezni modeli in okviri kljub pomembnim vpogledom samostojno ne zagotavljajo celostnega pristopa k oblikovanju, izvajanju in vrednotenju digitalnega izobraževanja. Zato na podlagi rezultatov predlagamo razvoj digitalnega standarda, ki bi združeval teoretične in praktične vidike ter spodbujal vključujoče in učinkovito digitalno izobraževanje. Takšen standard bi omogočil boljšo prilagoditev učnih vsebin potrebam študentov, izboljšal mehanizme ocenjevanja in povečal prilagodljivost digitalnih učnih okolij ter na ta način prispeval k oblikovanju trajnostnih in prilagodljivih rešitev za prihodnost digitalnega izobraževanja.

Ključne besede: inovativne metode poučevanja, e-izobraževanje, trajnostno izobraževanje, učinkovitost spletnega poučevanja, digitalno izobraževanje