How is digitalization influencing transformative learning in sports and nursing? : Systematic Review
Cómo influye la digitalización en el aprendizaje transformador en el deporte y la enfermería? : Revisión sistemática

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Abstract

Background: This systematic review aims to assess the current impact of digitalization on transformative learning in the fields of sports and nursing. Specifically, the review evaluates the effectiveness of digital interventions in improving learning outcomes, synthesizes existing evidence on the integration of digital skills in nursing education and the application of digital technologies in sports medicine, and identifies gaps or limitations in the current literature. Additionally, this review addresses ethical considerations and challenges associated with digital innovation in both sports and nursing, emphasizing the importance of maintaining ethical integrity and enhancing the efficacy of practices in these fields. Method: The systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Qualitative assessment tools were utilized to evaluate the methodological rigor and identify potential biases in the included studies. Results: Findings indicate that digitalization is significantly influencing transformative learning in both sports and nursing. Key trends include the integration of digital tools in sports education and sports medicine, with a notable impact on skill acquisition and performance improvement. Conclusion: The review highlights how advancements in digital technologies contribute to more efficient training methods and personalized learning experiences for athletes and healthcare professionals. The ethical challenges and opportunities of digital technology integration are critically assessed, underscoring the need for responsible implementation to ensure patient safety, equitable access, and ethical practice in digital innovation.

Keywords

Humans; digital technology; patient safety; education; nursing; sports medicine; delivery of health care; athletes.

Resumen

Antecedentes: Esta revisión sistemática tiene como objetivo evaluar el impacto actual de la digitalización en el aprendizaje transformador en los campos del deporte y la enfermería. En concreto, la revisión evalúa la efectividad de las intervenciones digitales para mejorar los resultados de aprendizaje, sintetiza la evidencia existente sobre la integración de habilidades digitales en la educación en enfermería y la aplicación de tecnologías digitales en la medicina deportiva, e identifica vacíos o limitaciones en la literatura actual. Además, esta revisión aborda las consideraciones éticas y los desafíos asociados con la innovación digital en el deporte y la enfermería, enfatizando la importancia de mantener la integridad ética y mejorar la eficacia de las prácticas en estos campos. Método: La revisión sistemática se llevó a cabo de acuerdo con las pautas del PRISMA (Elementos de Información Preferidos para Revisiones Sistemáticas y Metaanálisis). Se utilizaron herramientas de evaluación cualitativa para evaluar el rigor metodológico e identificar posibles sesgos en los estudios incluidos. Resultados: Los hallazgos indican que la digitalización está influyendo significativamente en el aprendizaje transformador tanto en el deporte como en la enfermería. Las principales tendencias incluyen la integración de herramientas digitales en la educación deportiva y la medicina deportiva, con un impacto notable en la adquisición de habilidades y la mejora del rendimiento. Conclusión: La revisión destaca cómo los avances en tecnologías digitales contribuyen a métodos de entrenamiento más eficientes y a experiencias de aprendizaje personalizadas para deportistas y profesionales de la salud. Se evalúan críticamente los desafíos y las oportunidades de la integración de tecnologías digitales, subrayando la necesidad de una implementación responsable para garantizar la seguridad del paciente, el acceso equitativo y la práctica ética en la innovación digital.

Palabras clave

Humanos; tecnología digital; seguridad del paciente; educación; enfermería; medicina deportiva; prestación de atención médica; atletas

Introduction

Digitalization has rapidly transformed educational and professional practices, impacting various fields, including nursing and sports. This digital shift, especially evident in nursing education and sports medicine, has introduced new methodologies for skill acquisition, clinical decision-making, and athletic performance enhancement (Yusuf et al., 2024; Zheng & Mason, 2022). The integration of digital skills within nursing curricula and the adoption of technology-driven approaches in sports medicine have not only optimized learning outcomes but also redefined performance standards in both fields (Aditya et al., 2024). However, as these advancements progress, critical ethical challenges arise, particularly concerning data privacy, security, and equitable access, all of which demand careful ethical scrutiny to guide responsible digital implementation (Feng et al., 2023).

While previous studies have largely focused on the positive impacts of digitalization—such as enhanced learning and improved clinical or athletic results—research on the ethical implications of digital integration remains limited (Roth et al., 2023). Important ethical issues, including privacy concerns, potential inequities in access to digital resources, and the safe management of personal data, are often overlooked, creating a significant gap in the literature (Razeeni et al., 2021). Addressing these ethical dimensions is crucial to ensure that digitalization in nursing and sports does not compromise ethical standards, thereby fostering equitable and secure practices within these sectors (DeLuca, 2019).

This systematic review seeks to bridge this gap by examining existing literature on digitalization's impact within nursing education and sports medicine, focusing particularly on the ethical challenges involved. By synthesizing recent findings, this review will provide a comprehensive understanding of the benefits and potential risks associated with digital technology in these fields. Moreover, the review aims to inform evidence-based policymaking and practice, supporting the responsible and sustainable integration of digital technologies in both nursing and sports, with the goal of advancing educational quality, clinical efficacy, and ethical integrity (Kuchyn et al., 2023; Erdilek et al., 2023).

In doing so, this review intends to offer a foundation for future research that addresses both the opportunities and challenges of digitalization, guiding ethical decision-making, and ultimately contributing to the development of sound practices in these rapidly evolving domains (Xu & Ullah, 2023).

Method

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines

Study Design

Selection Criteria

The selection criteria for inclusion and exclusion in a study might include:
The selection criteria for inclusion and exclusion in this systematic review were meticulously defined to ensure the relevance, validity, and quality of the included studies.

Inclusion Criteria:

Theme Relevance: Articles must directly address the relationship between sports education and public health advocacy.
Appropriateness of Content: Articles should provide substantial information regarding the role of sport in achieving public health outcomes, challenges encountered in integrating sport education into public health advocacy, the contribution of sport education to public health advocacy, and best practices for implementing sport education programs within public health advocacy initiatives.
Novelty: The articles should present new information or the latest research findings in the field.
Accuracy and Credibility: Only articles from reputable sources containing accurate information were considered.
Readability and Relevance: Articles should be written clearly and be understandable to readers without specialized backgrounds in this field.

Exclusion Criteria:

Irrelevant Content: Articles lacking a direct connection to the relationship between sports education and public health advocacy were excluded.

Invalid Content: Articles containing invalid, biased, or unreliable information were excluded to maintain the integrity of the review.

Outdated Information: Articles presenting outdated information or not reflecting the latest research or developments in the field were excluded to ensure currency and relevance.

Inaccessibility: Articles that were not freely accessible or only available through paid subscriptions were excluded to promote accessibility and transparency.

Not Fit for Purpose: Articles that did not make a significant contribution to understanding the role of sports education in public health advocacy or failed to address relevant challenges or best practices were excluded to maintain the focus and quality of the review.

By strictly adhering to these inclusion and exclusion criteria, the systematic review aimed to select articles that added significant value to the understanding of the topic under investigation while maintaining methodological rigor and integrity.

Search Strategy

The search strategy adopted in this systematic review aimed to meticulously locate pertinent articles concerning the nexus between sports education and public health advocacy. It involved several key steps: initially, identifying relevant keywords encompassing terms such as "Sports Education," "Public Health Advocacy," "Lessons," and "Integration." These keywords were then combined using logical operators like "AND," "OR," and "NOT" to refine the search scope effectively. Subsequently, abstracts and keywords of identified articles were scrutinized to ensure alignment with the research theme, while the PICO framework guided the formulation of research questions, focusing on population, intervention, comparison, and outcome. Through this methodical approach, the search strategy facilitated the systematic identification of relevant literature, enhancing the rigor and validity of the systematic review process.

The PICO (Population, Intervention, Comparison, Outcome) framework served as a cornerstone for formulating research questions and guiding the systematic evaluation of intervention effectiveness in integrating sports education into public health advocacy.

Population: This encompasses students or professionals engaged in either sports education or public health advocacy, providing a clear focus on the individuals or groups targeted by interventions.

Intervention: The intervention component delineates strategies or methods employed to integrate sports education into public health advocacy efforts. This includes activities such as curriculum development, advocacy training initiatives, or the implementation of specialized sports education programs within public health contexts.

Comparison: Within the PICO framework, comparison delineates scenarios where different intervention strategies are contrasted or where the intervention's effects are compared with situations lacking such interventions. This element helps to establish the efficacy of interventions in achieving desired outcomes.

Outcome: The outcome dimension encapsulates the effects or impacts of integrating sports education into public health advocacy efforts. These outcomes may include heightened knowledge levels, improved advocacy skills, increased participation in advocacy activities, or notable changes in public health policies.

By structuring research questions around the PICO framework, this systematic review facilitated a systematic and focused investigation into the effectiveness of interventions, thereby enhancing understanding of their impact on the target population and informing evidence-based practice within the field of sports education and public health advocacy.

Selection of Studies

Two reviewers autonomously chose research for potential inclusion by evaluating the titles and abstracts. Studies that were considered to have fulfilled the criteria for inclusion by either reviewer were then subjected to a thorough examination of the complete text. Reviewers engaged in discussions to address any disputes, and a third party was included to facilitate consensus if needed.

Data Extraction and Quality Assessment

Data extraction and quality assessment procedures were integral components of this systematic review, ensuring the relevance, reliability, and methodological rigor of the gathered information. Initially, variables and outcomes of interest were defined, and systematic methods, including the development of data extraction forms, were established to capture pertinent data from the selected studies. Quality assessment tools were then employed to evaluate the methodological rigor and potential biases of the included studies. These tools enabled reviewers to assess various aspects of study quality, such as study design, sample size, data collection methods, and statistical analyses. Scores or ratings were assigned based on predefined criteria, allowing for a comprehensive evaluation of each study's quality. Subsequently, synthesized data from multiple studies were analyzed, potentially through meta-analysis, to derive robust conclusions while considering both the strengths and limitations of the included studies. Transparent reporting of the data extraction and quality assessment processes, in accordance with established guidelines, enhanced the credibility and validity of the research outcomes, thereby contributing to the overall integrity of the systematic review. (Figure 1).

Figure 1. Flow Chart for Study based on PRISMA Guidelines
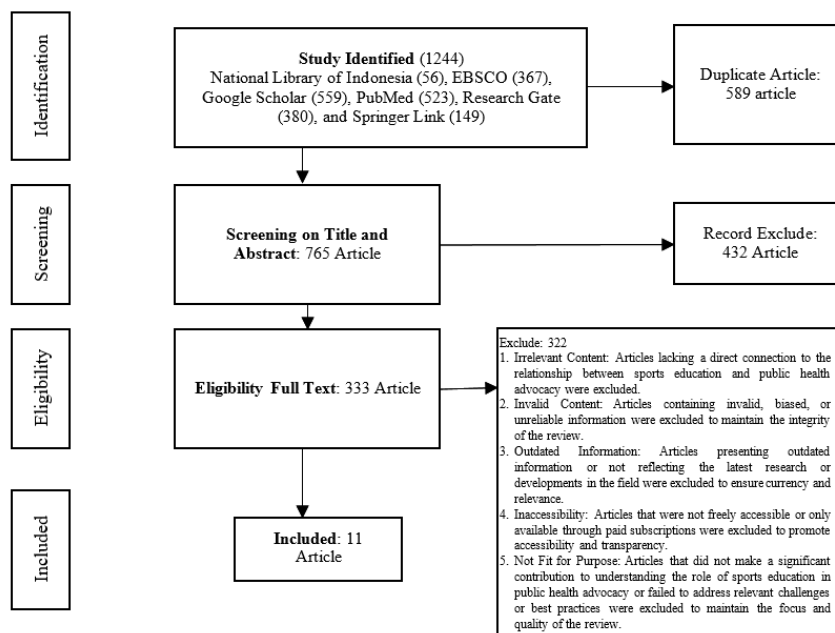
Results

Insert the result text with Cambria font, size 11, justified and single line spacing.

The influence of digitalization on transformative learning in sports and nursing, the key digitalization trends, the impact on skill acquisition and performance improvement, the challenges and opportunities of integrating digital technologies, and the ethical considerations associated with their use (Table 1 and Table 2).

Table 1. Data analysis matrix table for articles used in the Systematic Review

Title, Journal	Method Design	Variable being investigated	Sample size	Population	Results
Leading and organizing workplace learning in healthcare digital transformation: The proposal of a conceptual model (CEUR Workshop Proceedings)	develop theories	digital health digital transformation of healthcare	-	-	A better understanding is needed of i) how management and organization can facilitate change in working methods and related processes, and ii) how learning in everyday work can be integrated with digital transformation in order to achieve the full potential of digitalization.
A System for the Management of Digital Transformation to Develop Productive and Competitive Performance in Sports Facilities International Journal of Human Movement and Sports Sciences	descriptive approach	performance of sports teams, clubs, facilities, and institutions	689 sports facilities' sports	689 sports facilities' sports	1. There is a lack of digital transformation in Saudi sports Facilities. 2. There is poor planning of production operations in Saudi sports facilities. 3. There is poor production capacity and poor control over production processes in Saudi sports facilities. 4. Competitive performance levels are low in Saudi sports facilities. 5. There is a positive correlation between the management of digital transformation and both the productive and competitive performance of Saudi sports facilities. 6. Therefore, the researchers proposed a system that can be used to develop the productive and competitive performance of Saudi sports facilities through digital transformation.
Experiencing being objectified? A critical investigation of basic pedagogical categories in digital health education Health Education Journal	Bildung-oriented perspective rooted in German-speaking pedagogy	digital health education can play in physical education	-	-	Supposedly clear distinctions between, virtual, and, real, and digital and analogue, are increasingly untenable. On the one hand, the use of digital technologies can convey reductionist images of humankind and a narrow understanding of education. On the other hand, students can experience differences between supposedly objective and subjective views of their bodies and their movement behaviour using digital technologies. This can lead to Bildung processes in which the relationship between oneself and the world is questioned, which in a sense constitutes a form of Bildung-oriented digital health education.
Digital technology in physical education: global perspectives Sport, Education and Society	Analysis covered	technology within education, and more specifically physical education	-	-	Collectively, these chapters present a wealth of examples that highlight the growing importance and influence that technology is having on the way physical education is delivered. Considering the key messages that a reader might take away from the text, I come back to the TPACK model initially discussed by the editors in chapter one. The relationship between technology, pedagogy, and contentis vitally important and pedagogues could revisit this framework to inform decisions when considering fully embedding technology into teaching and learning practice.
Potentials of Digitalization in Sports Medicine Current Sports Medicine Reports	-	Potential that digital technologies can have for health care providers and patients in the clinical practice of sports medicine	-	-	some technologies are already used in current medical practice, others still have undiscovered potential. Due to the diversity and ever changing nature of this field, we will briefly review multiple areas in an attempt to give readers some general exposure to the landscape instead of a thorough, deep review of one topic.

					Further research will be necessary to show how digitalization applications could best be used for patient treatments.
Teaching digital competences in nursing education-a comparative analysis of the federal and state framework curricula Bundes gesundheitsblatt, Gesun dheitsforschung,	explicative-qualitative content analysis	framework curricula take up digitalisation	1586	578	The topic should be taken into focus more strongly. Improvements can also be made directly at technical and vocational schools as well as universities since the framework curricula are sometimes only of a recommendatory nature.
Sustainable integration of digitalisation in nursing education-an international	-	sustainable integration of digitalisation in nursing education	-	-	Among the sustainability desiderata derived from the literature is the involvement of nursing professionals in the development, testing and implementation of digital technologies. Only through active cooperation between nursing professionals and nursing sciences can the topic of digitalisation be integrated into the education and training of professional nursing in a targeted and future-oriented manner, whereby the focus should always be on the ability to deal with digital technologies and the associated change.
Exploring the Impact of IT-Enabled Innovations on Athlete Performance: Insight from Rapid Product Development Research Revista de Psicologia del Deporte	Exploring Analysis	Athlete Performance	1780	1579	The spectator experience is improved with augmented reality overlays, and fan participation on social media and interactive platforms is increased regardless of a fan's location. Although these developments are revolutionary, moral issues are very important. Complex issues that must be resolved include preservation data privacy, maintaining fair competition, and establishing the limits of performance enhancement.
Learning Outcomes of Digital Learning Interventions in Higher Education Computers, informatics, nursing : CIN	analyze and synthesize the evidence	evidence related to the effects of using digital technologies on learning outcomes in higher education	86	86	Academic, collaborative, and study skills, in turn, contribute to general competence development. Our findings suggest that digital technology has the potential to improve learning in various disciplines.
Internet Research And Ethics: Transformative Issues In Nursing Education Research Journal of Professional Nursing	-	transformative research ethics because Internet use is an increasing component of current research studies	-	-	agricultural trade; and food and nutrition; articles on the; bill debate; competitors or collaborators; drive the next farm; environment of the next; external fact
Ethics in educational technology: towards a framework for ethical decision making in and for the discipline	Framework Theory	ethical issues arise involving the study and use of educational technologies.	-	-	ethical issues involved with educational technology implementation, use and research are not well explored nor widely known. This paper provides a preliminary framework for ethical decision making with regard to educational technologies.

Table 2. Theme and Sub-Theme

Theme	Sub Theme
Influence of Digitalization on Transformative Learning in Sports and Nursing	- Digitalization is increasingly influencing nursing education, with a focus on integrating digital skills into training and maintaining the employability of older nursing staff through professional development [1]. - The use of digital technologies in higher education, including nursing, is considered a modern and innovative way of teaching and learning, with the potential to improve learning outcomes in various disciplines [2]. - The digital transformation in healthcare requires changed competences in the nursing professions, and the reform of nursing education opens up the opportunity to anchor the requisite content in vocational education [3].
Key Digitalization Trends in Sports and Nursing	- In sports medicine, digital technologies such as mobile applications, wearables, smart devices, telemedicine, artificial intelligence, big data, virtual reality, and augmented reality are increasingly influencing clinical practice and patient care [4].

	- The digital transformation in the physical education and sport sector is leading to the development of advanced training of academic faculties to establish and use modern e-learning resources and keep abreast with modern digital transformation progress trends [5]. - The role of digital health education in physical education is offering multi-layered opportunities and risks, which have not yet been sufficiently discussed from a sports pedagogical perspective in a digitalized world [6].
Impact of Digitalization on Skill Acquisition and Performance Improvement	- The digital revolution in sports has transformed training, performance analysis, injury prevention, and fan involvement, allowing athletes to fine-tune their performances with unmatched accuracy and improve player performance through advanced analytics powered by machine learning [7] . - Digital transformation has led to improvements in the performance of sports teams, clubs, facilities, and institutions, resulting in an increase in fans' participation while maintaining financial efficiency [8].
Challenges and Opportunities of Integrating Digital Technologies	- The acquisition of competences in the area of digitalization forms the foundation for later professional life and is an important component of the digital transformation in nursing education [3] - The digital transformation of healthcare not only entails changes in the IT environment but also affects the healthcare professionals' daily clinical work, requiring a better understanding of existing practices and new competencies required in response to current changes associated with digitalization [9].
Ethical Considerations Associated with the Use of Digital Technologies	- The use of digital technologies in educational settings raises ethical issues, including the potential to increase the digital divide and disadvantaging some students while benefitting others [10] . - The ethical implications of using students or research participants in cyberspace need to be addressed when engaging in research utilizing methodologies inclusive of technology [11] .

Digitalization is significantly influencing transformative learning in sports and nursing, with key trends including the integration of digital skills in nursing education, the use of digital technologies in sports medicine, and the impact on skill acquisition and performance improvement. However, ethical considerations and challenges related to integrating digital technologies also need to be carefully addressed in both sports and nursing contexts.

Discussion

The discussion delves into the multifaceted influence of digitalization on transformative learning within the domains of sports and nursing, addressing the primary objectives of this study. Firstly, it examines the profound impact of digitalization on both fields, highlighting key trends such as the integration of digital skills in nursing education and the utilization of digital technologies in sports medicine (Herrera-Ligero et al., 2022). These trends underscore the significant role of digitalization in shaping educational methodologies and enhancing patient care practices (Oetter et al., 2022). Furthermore, the discussion explores the implications of digitalization on skill acquisition and performance improvement, elucidating how advancements in digital technologies facilitate more efficient training methods and personalized learning experiences for athletes and healthcare professionals alike (Lysenko et al., 2022). Additionally, the challenges and opportunities inherent in integrating digital technologies are thoroughly examined, emphasizing the need for careful navigation of technological advancements to maximize their benefits while mitigating potential drawbacks (Deldar & Froutan, 2022). Moreover, ethical considerations surrounding the use of digital technologies in sports and nursing contexts are critically evaluated, underscoring the importance of ethical practice and responsible implementation of digital innovations to uphold patient safety and welfare (Hou et al., 2022). By addressing these key aspects, the discussion provides valuable insights into the transformative effects of digitalization on sports and nursing education, while also highlighting areas for future research and development.

The existing literature highlights the growing influence of digitalization on transformative learning within the fields of sports and nursing. While several studies have explored the integration of digital skills into nursing education, particularly focusing on professional development initiatives to enhance the employability of older nursing staff (Ehrmann & Hermanns, 2022), there remains a notable gap in understanding the specific mechanisms through which digitalization impacts skill acquisition and performance improvement in nursing practice. Additionally, while the adoption of digital technologies in higher education, including nursing, is recognized as a modern and innovative approach to teaching and learning, there is limited research addressing the effectiveness of these technologies in improving learning outcomes across various disciplines (Babacan & Yuvarlakbas, 2022). Furthermore, while the digital transformation in healthcare necessitates the development of new competencies within nursing professions, there is a dearth of literature examining the specific competencies required and the

strategies for integrating them into vocational education programs (Seemann et al., 2020). Thus, there is a need for further research to bridge these gaps in knowledge and provide insights into the optimal utilization of digital technologies in nursing education to enhance learning outcomes and prepare nursing professionals for the evolving healthcare landscape (Alkhowailed et al., 2020).

While the impact of digitalization on skill acquisition and performance improvement in sports is evident from the literature, there remains a notable gap in understanding the nuanced effects of these technological advancements on athletes of varying skill levels and disciplines (Ruin & Giese, 2023). The studies cited emphasize the broad benefits of digital technologies, including enhanced training methodologies, performance analysis, injury prevention, and fan engagement (Wintle, 2019). However, there is a lack of research addressing how these advancements specifically influence skill acquisition and performance improvement for athletes across different sports and proficiency levels (Rigamonti et al., 2020). Additionally, while some studies highlight the positive outcomes of digital transformation on sports teams, clubs, and facilities, there is limited exploration into potential disparities in access to and utilization of digital technologies among different sports organizations, particularly at grassroots levels (Hofstetter et al., 2022). Thus, further investigation is warranted to elucidate the differential impact of digitalization on skill development and performance enhancement across diverse sporting contexts, as well as to identify strategies for ensuring equitable access to digital resources within the sports community (Sormunen et al., 2021).

The discussion identifies several gaps in the current literature regarding the challenges and opportunities of integrating digital technologies in nursing education and healthcare practice. While existing research acknowledges the significance of acquiring digital competencies in nursing education as a crucial aspect of the broader digital transformation (Tischendorf et al., 2024), there remains a need for more comprehensive studies that delve deeper into the specific competencies required by healthcare professionals to navigate the evolving digital landscape (Spector, 2016). Despite recognizing the overarching impact of digitalization on healthcare practices, including changes in IT environments and clinical workflows, there is a gap in understanding the nuanced challenges faced by healthcare professionals in adapting to these changes and acquiring new competencies. Additionally, the literature lacks sufficient exploration of the opportunities presented by digital technologies in enhancing healthcare delivery and improving patient outcomes (MAHON, 2008). By addressing these gaps, future research can contribute valuable insights into the effective integration of digital technologies in nursing education and clinical practice, thereby better preparing healthcare professionals for the digital challenges of the future.

The discussion highlights several significant gaps in the literature concerning the ethical considerations associated with the use of digital technologies in educational settings. While existing research acknowledges the potential for digital technologies to exacerbate the digital divide, particularly in terms of disadvantaging certain students while benefiting others, there remains a lack of comprehensive understanding regarding effective strategies to mitigate these disparities (Gretchen & Abeza Ellen, 2023). Furthermore, ethical implications surrounding the involvement of students or research participants in cyberspace are noted, emphasizing the need for robust ethical frameworks and guidelines to govern research methodologies inclusive of technology (Ahmed & Hassan, 2022). Despite these insights, there remains a dearth of empirical studies examining the practical implications of such ethical considerations in educational contexts. Thus, future research endeavors should aim to address these gaps by exploring the nuanced ethical dilemmas arising from the integration of digital technologies in education and devising equitable solutions to ensure fair access and ethical conduct in digital learning environments (Svensson & Hult, 2022).

Several limitations should be acknowledged in this study. Firstly, the scope of the literature review was confined to English-language publications, potentially leading to the omission of relevant studies published in other languages. This limitation may have restricted the comprehensiveness of the review and introduced language bias into the analysis. Secondly, the inclusion and exclusion criteria applied during the selection process may have introduced subjectivity, despite efforts to maintain objectivity. Additionally, the reliance on published literature may have resulted in publication bias, as studies with null or non-significant findings are less likely to be published. Moreover, while efforts were made to conduct a comprehensive search, it is possible that some relevant articles were inadvertently overlooked. Furthermore, the quality assessment of included studies may have been subjective, as

different reviewers may have varying interpretations of study quality criteria. Lastly, the dynamic nature of digital technologies means that the findings of this review may become outdated over time, highlighting the need for ongoing updates and revisions to ensure the currency of the evidence base. These limitations should be considered when interpreting the findings of this study and designing future research endeavors in this area.

Conclusions

In conclusion, this study sheds light on the multifaceted influence of digitalization on transformative learning in sports and nursing, while also addressing key trends, challenges, and ethical considerations associated with the integration of digital technologies. By synthesizing existing literature, the study underscores the importance of considering the ethical implications of digital technologies in educational settings, particularly concerning issues of accessibility, equity, and privacy. The findings highlight the need for ongoing research to explore effective strategies for mitigating the digital divide and ensuring equitable access to digital learning resources. Additionally, the study underscores the importance of robust ethical frameworks and guidelines to govern the use of digital technologies in educational research and practice. Moving forward, researchers are encouraged to conduct empirical studies to further elucidate the practical implications of ethical considerations in digital learning environments, as well as to explore innovative approaches for leveraging digital technologies to enhance transformative learning experiences in sports and nursing education. By addressing these gaps and challenges, future research endeavors have the potential to advance our understanding of the role of digitalization in education and contribute to the development of effective strategies for harnessing the transformative potential of digital technologies in sports and nursing education.

Acknowledgements

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