

Optimization of Learning Physical Education In Digital Era: A Systematic Review

Optimización del aprendizaje de Educación Física en la era digital: una revisión sistemática

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Abstract. In the digital era, the evolution of physical education is imperative to meet the changing technological landscape. This study aims to explore strategies for enhancing physical education learning by integrating technology to foster student motivation and participation. Employing a systematic review with the PRISMA framework, we critically examined the intersection of technology and physical education. Our findings reveal that a multifaceted approach involving educational management, cooperative and blended learning, and curriculum innovation is essential. We also recognize the challenges and potential drawbacks of digitalization, ensuring a balanced perspective. The study concludes that optimizing physical education in the digital age requires not only embracing technological advancements but also addressing their complexities to enrich the learning experience.

Keywords: Digital era, e-learning, physical education pedagogy, student engagement, technology integration, blended learning, educational technology, cooperative learning

Resumen. En la era digital, la evolución de la educación física es imperativa para hacer frente al cambiante panorama tecnológico. Este estudio tiene como objetivo explorar estrategias para mejorar el aprendizaje de educación física mediante la integración de tecnología para fomentar la motivación y la participación de los estudiantes. Empleando una revisión sistemática con el marco PRISMA, examinamos críticamente la intersección de la tecnología y la educación física. Nuestros hallazgos revelan que es esencial un enfoque multifacético que incluya la gestión educativa, el aprendizaje cooperativo y combinado y la innovación curricular. También reconocemos los desafíos y posibles inconvenientes de la digitalización, garantizando una perspectiva equilibrada. El estudio concluye que optimizar la educación física en la era digital requiere no sólo adoptar los avances tecnológicos sino también abordar sus complejidades para enriquecer la experiencia de aprendizaje.

Palabras clave: Era digital, e-learning, pedagogía de educación física, participación estudiantil, integración tecnológica, aprendizaje combinado, tecnología educativa, aprendizaje cooperativo

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Introduction

The digital revolution has profoundly influenced various sectors, including education (Silva Monsalve & Montañez Sánchez, 2019). The integration of technology into educational practices, especially in physical education, has opened new horizons for teaching and learning (Silva Monsalve & Montañez Sánchez, 2019). This paper aims to critically examine the role of technology in physical education, offering an objective perspective that considers both the potential advantages and the inherent challenges (Qolamani & Mohammed, 2023).

Technology's role in the classroom extends beyond mere facilitation; it has the potential to redefine the educational landscape (Bernate et al., 2021). In physical education, technological tools such as virtual simulations and fitness trackers provide innovative methods to engage students and enhance their understanding of physical concepts (Calabuig-Moreno et al., 2020). These tools can make learning more captivating, interactive, and efficient, leading to improved educational outcomes (Mustika et al., 2024).

The presence of technology in the learning environment can also catalyze increased student involvement (Pandita & Kiran, 2023). By incorporating digital media into the curriculum, educators can create a dynamic learning atmosphere that resonates with the interests of the digital-native generation. However, it is crucial to navigate the digitalization of education carefully to ensure that it supports rather than supplants the essential teacher-student interaction (Montilla et al., 2023). The rapid pace of technological advancement necessitates that educators adapt

and develop digital competencies to effectively integrate these tools into their teaching practices (Muharlisiani et al., 2022). The success of technology in physical education is contingent upon the educators' ability to utilize these tools to provide real-time feedback, facilitate effective teaching, and expand students' comprehension of physical education activities and concepts (Javier & Alianzas, 2022). Digital media platforms like YouTube, Twitter, Facebook, and Instagram have become ubiquitous, shaping how individuals communicate and learn (Purnama & Asdlori). In the context of physical education, these platforms offer a wealth of resources that can be utilized to convey information and demonstrate activities in a visually engaging manner. This study will delve into the utilization of digital media in physical education, exploring its potential to enrich the learning experience and the strategies that can maximize its positive impact (Bimantara & Iwandana, 2023).

In conclusion, this paper will provide a thorough analysis of the integration of technology in physical education, assessing both the benefits and challenges. It will identify effective strategies for implementation and explore the role of technology as a supportive tool in achieving the goals of physical education. Ultimately, this study aims to contribute to a deeper understanding of how digital tools can be harnessed to foster a more engaging and effective learning environment, thereby enriching the educational experience for students.

Background

The digitalization of physical education has gained

momentum over the last few decades. Historically, physical education has focused on the development of motor skills and the promotion of physical activity. However, the digital revolution has transformed this traditional approach by integrating technological tools that offer new opportunities for learning and teaching (Jastrow et al., 2022).

At the dawn of the digital era, physical education began experimenting with simple electronic devices to enhance the learning experience. Over time, this integration has evolved into the use of interactive platforms, mobile applications, and physical activity tracking devices, allowing for a more personalized and data-driven experience (Østerlie & Sargent, 2022).

Despite these advancements, the digitalization of physical education has faced significant challenges. Resistance to change by some educators, lack of resources in certain regions, and concerns about excessive screen time are just a few of the obstacles that have emerged. These challenges underscore the importance of a balanced approach that values both tradition and innovation (Timotheou, et al., 2022).

Current State of the Topic

Currently, the state of digitalization in physical education reflects a diversity of approaches and outcomes. Recent literature reveals a growing body of research supporting the integration of technology, highlighting its benefits in terms of student motivation, participation, and performance (Jastrow et al., 2022).

However, there is also a critical stream that warns about the over-reliance on technology and the potential loss of fundamental elements of physical education. Recent studies suggest that while technology can be a valuable tool, it should not replace human interaction or the direct experience of movement and physical activity (Østerlie & Sargent, 2022).

The choice of keywords in research reflects a variety of related themes, from 'gamification' and 'augmented reality' to 'movement pedagogy' and 'digital well-being'. This selection demonstrates an effort to capture the complexity and full scope of the topic, recognizing both emerging trends and ethical and practical concerns (Calabuig-Moreno, et al., 2020).

In summary, the current state of the topic is one of active exploration and debate. The educational community continues to seek the right balance between adopting emerging technologies and preserving the pedagogical principles of physical education (Timotheou, et al., 2022).

Methods

The studies conducted in this study used a qualitative approach with a systematic review method. A systematic

review was carried out by collecting several pieces of literature that are relevant to the research topic. The first step taken in the process of determining literature was literature search, namely literature selection using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (Page et al., 2021) and summarize the findings in the selected literature. The methodology describes how data from available studies need to be collected and analyzed by establishing explicit and reproducible methods that identify (Andreo-Martínez et al., 2022). The keywords used in searching for articles were "implementation of learning physical education in the digital era" in the Scopus journal. The data selection results from the platform were then selected using the PRISMA method which was described as follows.

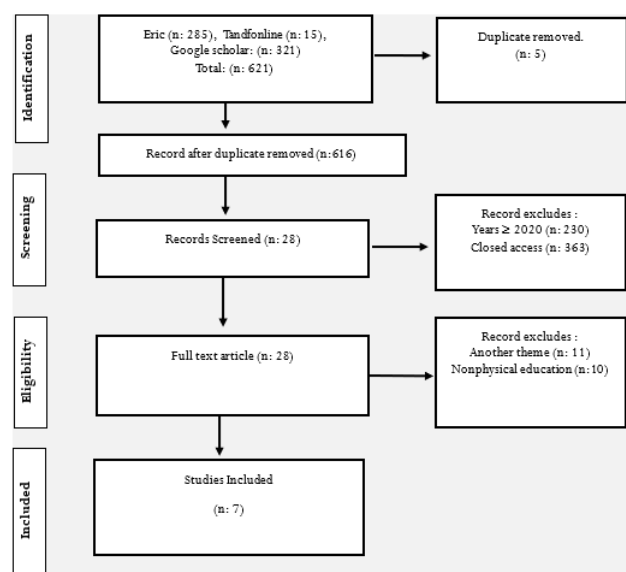


Figure 1. Systematic Review of PRISMA Methods

Figure 1 explains that article searches were carried out using 3 platforms, namely Eric, Tandfonline and Google Scholar. Search results using the keyword "implementation of learning physical education in the digital era" on the Eric platform contained 285 articles, Tandfonline had 15 articles and Google Scholar had 321 articles. Next, screening was carried out by removing articles with the same title and determining other criteria, namely articles with a minimum publication year of 2020 and having closed access. Next, the next stage is to determine the suitability of the article by determining the record excludes, namely another theme and non-physical education.

Results

The results of searching for articles using the PRISMA method resulted in 7 articles about physical education learning. The results of the review of the 7 articles are presented in the following Table 1.

Table 1.

Article was selected by PRISMA.

No	Author	Title	Research Methods	Result
1	Zhu Jinyuan & Wisute Tongdecharoen, (2023)	An Instructional Model for Physical Education in the Next Era for Secondary School	Literature Review	"CISSO" model (collaborate, input, school, student, output) policy makers can understand the dynamic management of Physical education in the next era.
2	Ove Østerlie, et.all (2022)	Flipped learning in physical education: A scoping review	Systematic Reviews (PRISMA)	Overall, FL in PE appears to have a positive impact on student variables. Research on the design and implementation of both the digital and in-class instructional components will be necessary to guide best practice more appropriately
3	Daniel Bores-García, (2020)	Research on Cooperative Learning in Physical Education. Systematic Review of the Last Five Years	Systematic Reviews (PRISMA)	Results showed a diversity of analysis (qualitative, quantitative, and mixed) conducted on diverse contents, with very scarce contribution to those related to body expression
4	David N. Daum, Tyler Goad, Brian Mosier & Chad M. Killian, (2021)	Toward Quality Online Physical Education: Research Questions and Future Directions	Case Study	The COVID-19 pandemic has highlighted the need for evidence-based practices for OLPE pedagogies. Pre-pandemic physical education teachers used technology in a variety of contexts (online, blended, hybrid and flipped) to supplement and enhance learning
5	Liu Shangguozi, Wanit Nirantranon, and Prakit Hongsaenyatham, (2023)	The Development of Physical Education Curriculum Martial Arts Sports for the Nine Years Compulsory Education Stage of Guangdong Province	Survey Study	(1) The selection of martial arts teaching content in the teacher's book of the Cantonese Education Edition is better than that of the People's Education Edition. (2) During the implementation of teaching, there are problems such as the teaching content in the teacher's book cannot meet the needs of the class hours. (3) In the actual teaching implementation, teachers should make full use of lesson preparation resources in the setting of teaching content, deeply understand the new curriculum standards
6	Jie He & Shihong Chen, (2024)	Practical Analysis of Digital Technology in Physical Education and Training in the Context of Multimedia Era	Dynamic Structure	The application of digital technology in physical education can dramatically improve the teaching effect, enhance students' learning motivation and independent learning ability, an important development direction of modern physical education
7	Kim Daniels, et.all., (2024)	Unveiling the digital phenotype: A protocol for a prospective study on physical activity behavior in community-dwelling older adults	Observation	this study holds promise in bridging the gap between conventional assessment methods, innovative methods, and the dynamic nature of older adults' PA behavior

Discussion

The Table 1 above shows the articles that have been selected in this study. All these articles specifically discuss physical education learning practices and all articles come from 2020. Based on the results of a study conducted by Zhu & Tongdecharoen (2023) it explains that policy makers need to understand the management of physical education for a more dynamic future. The "CISSO" (collaborate, input, school, student, output) model approach from this study offers how to make appropriate and wise decisions, thereby enabling the formulation of effective strategies to optimize student learning experiences in a dynamic educational landscape (Zhu & Tongdecharoen, 2023). Regarding dynamic education with good practices Østerlie et al. (2023) explains that the design and implementation of digital learning components and classroom learning will be needed to guide the implementation of better physical education learning. Cooperative learning is also an option in implementing physical education learning, this allows learning to be handled evenly in sports, motor skills and physical abilities (Bores-García et al., 2021).

The COVID-19 pandemic has had a major impact on various sectors of life, including the world of education (Aristovnik et al., 2020). Social restrictions, school closures, and the need to maintain physical distance have forced schools and educational institutions to look for alternative solutions in implementing learning (Mustari et

al., 2022). In this context, physical education teachers need to use technology in various contexts (online, blended, hybrid, and flipped) to complement and improve the learning carried out (Daum et al., 2022). Furthermore, in the context of the physical education curriculum, learning materials need to be adapted to learning needs so that it results in the suitability of well-organized teaching materials (Kohl & Cook, 2013). In implementing classroom learning, teachers should make full use of resources that support the creation of appropriate learning (Liu et al., 2023). In line with previous research, Jie & Chen (2024) also stated that the application of technological resources in physical education can improve teaching significantly. In carrying out the learning process in the classroom, a teacher should maximize the use of all available resources to create learning that suits learning needs and objectives. Utilization of these resources can include various things, such as technology, textbooks, relevant teaching materials, practical activities, and others. Physical education curriculum development needs to be carried out to support the implementation of effective and relevant physical education (Daniels et al., 2024). By making optimal use of these resources, teachers can create a more varied, interesting, and effective learning environment to improve students' understanding and skills.

The digital era is a period where technological advances occur very quickly, allowing easy access to information and knowledge in various aspects of life, including economic, social, and educational. In the context of education in the

digital era, technology has a very significant role in providing new opportunities and challenges. Technology allows easy access to educational resources from anywhere and at any time. In this situation technology can help students access learning materials, videos, and other digital resources online. The development of digital technology such as e-learning, online learning platforms, and other digital resources has expanded the learning space and provided opportunities for individuals to increase their knowledge without being limited by time and space.

The use of technology has very significant potential to increase student engagement in physical education learning. Integrating technology in learning, students can have access to various resources to support their learning abilities. The use of technology in physical education learning not only makes learning fun but also encourages students' active participation in learning process activities. Research results (Jie & Chen, 2024) show that the application of digital technology in physical education can significantly improve teaching. This can have a positive impact in increasing students' learning motivation and independent learning abilities, and this is an important development direction for modern physical education learning. The results of this research show a phenomenon that is not just a change but is also a very important development direction for advancing modern physical education learning. This development is a very important direction in the context of modern physical education. By continuing to utilize digital technology, physical education can be more effective in achieving learning goals.

Conclusion

The integration of digital technologies in physical education (PE) is not merely a trend but a transformative shift that necessitates a reevaluation of pedagogical strategies. This review has illuminated several key areas that warrant attention for the optimization of PE in the digital era:

Strategic Management: Stakeholders must adopt a forward-thinking approach to manage PE, understanding the dynamic interplay between policy, curriculum, and student engagement in the context of technological advancements.

Blended Learning Models: The design and implementation of digital and in-class components should be harmonized to foster a blended learning environment that caters to diverse learning preferences and enhances overall educational outcomes.

Equitable Cooperative Learning: Emphasizing cooperative learning can democratize access to sports and physical activities, ensuring equitable development of motor skills and physical abilities across the student population.

Technology-Enhanced Pedagogy: PE teachers should be equipped to leverage technology in various contexts, including online, blended, hybrid, and flipped classrooms,

to augment traditional teaching methods and cater to the digital-native generation.

Resource Optimization: There is a pressing need for teachers to utilize available resources, particularly technology, to craft more effective and engaging learning experiences.

Curriculum Evolution: The development of the PE curriculum must be ongoing, reflecting the evolving landscape of education and the needs of students to remain relevant and impactful.

Practical Applications

To translate these insights into practice, educators should consider the following:

Develop and implement training programs for PE teachers to enhance their digital literacy and pedagogical skills.

Create collaborative platforms for sharing best practices and innovative teaching methods in PE.

Engage in continuous curriculum review and revision processes to incorporate emerging technologies and methodologies.

Future Research Directions

Future research should focus on:

Exploring the long-term effects of digital integration on student motivation and physical fitness.

Investigating the role of virtual reality and gamification in PE.

Developing frameworks for the systematic evaluation of technology's impact on PE learning outcomes.

By addressing these areas, we can ensure that PE remains a vital and effective component of the educational experience in the digital age.

Conflict of interests

There is no conflict of interest in writing this article.

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