Analysis of Using Technology In Physical Education: Systematic Literature Review

Adi S[1A-E*], Made Bang Redy Utama [2B-C], Fasi Kulisan Arba[3B-C], Sri Indah Ihsani[4D-E], Hilmy Aliriad[5D-E], Achmad Syakur Fahri[6D-E]

[1]Physical Education Department, Faculty of Sports Science, Semarang State University, Semarang City, Central Java, Indonesia
[2]Sports Training Program Department, Faculty of Sports Science, Jakarta State University, Jakarta, Indonesia
[3]Physical Education Department, Faculty of Sports Science, Semarang State University, Semarang City, Central Java, Indonesia
[4]Department of Sports Science, Faculty of Sports and Health Sciences, Jakarta State University, Jakarta, Indonesia
[5]Faculty Of Teacher Training and Education, Physical Education Department, Universitas Nahdlatul Ulama Sunan Giri Bojonegoro, Jawa Timur, Indonesia
[6]Department of Primary Teacher Education Physical Education, Faculty of Sport and Health Education, Indonesian University of Education, West Java, Indonesia

adis@mail.unnes.ac.id[1], made.bang@unj.ac.id[2], fasikulisan03@students.unnes.ac.id[3], sri_indah@unj.ac.id[4], hilmy@unugiri.ac.id[5], achmadsyakurfahri@upi.edu[6]

ABSTRACT

The purpose of this research is to look into the use of technology analysis in physical education. The PRISMA standards for systematic reviews and meta-analyses were followed in this review investigation. The study must have been published within the prior five years, from 2020 to 2025. In the search procedure, the following keywords are used: (1) physical education and (2) technology. The search engines Scopus (Science Citation Index Expanded; Social Science Citation Index; Arts & Humanities Science Citation Index). This evaluation included the results of 10 articles. The study revealed two key findings: firstly, Physical Education Pre-Service Teachers (PPETs) frequently employed technology for planning, instructing, and assessing secondary PE classes while also encountering notable barriers in its implementation. Secondly, systematic instruction led to a significant increase in evaluation scores, highlighting the efficacy of structured teaching methods. Additionally, discussions in the article addressed theoretical and practical implications, limitations, and future directions, emphasizing the importance of integrating technology with a clear pedagogical purpose to impact student learning. Technology integration in physical education has enhanced teaching methods and safety, while e-learning adoption in Indonesia requires infrastructure improvements. Additionally, challenges persist in healthcare, including evaluating vaccine models and implementing blockchain technology.

AUTHORS' CONTRIBUTION
A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

Adi S[1A-E*], Made Bang Redy Utama [2B-C], Fasi Kulisan Arba[3B-C], Sri Indah Ihsani[4D-E], Hilmy Aliriad[5D-E], Achmad Syakur Fahri[6D-E]
adis@mail.unnes.ac.id[1*]

INTRODUCTION

Intelligent vision technology is used in physical education to innovate content, methods, and means of teaching, enhancing students' interest and motivation to participate in physical exercise (Xie, 2021). Using technology in physical education helps students develop skills and abilities for the independent practice of physical activities, making it safer, fairer, and more attractive (Suciu et al., 2021). Using computer technology in physical education, such as multimedia and mathematical algorithms, can improve teaching content, methods, and student understanding of sports knowledge (Yang, 2021). Intelligent vision technology, computer technology, and multimedia applications have revolutionized physical education, offering innovative content, methods, and teaching tools. Through these advancements, students are not only motivated to engage in physical exercise but also empowered to develop skills independently (S et al., 2023). By leveraging technology, educators create safer, fairer, and more appealing learning environments. Moreover, the integration of mathematical algorithms enhances students' comprehension of sports knowledge. Consequently, the use of technology in physical education not only enriches teaching practices but also fosters a deeper understanding and appreciation for physical activities among students.

E-learning platforms like Edmodo, Schoology, Moodle, Quipper, and Ruangguru are widely used in Indonesian secondary schools to enhance distance learning and improve education quality (Sundari & Utomo, 2020). Technology in education in Indonesia can improve learning quality and motivation but requires improved infrastructure, training, and collaboration among the government, educational institutions, and the private sector (Rabani et al., 2023). Over 80% of Indonesian Islamic educational institutions have implemented technology, enhancing students' abilities and 21st-century skills through critical thinking, creativity, collaboration, and communication (Ritonga et al., 2023). The widespread adoption of e-learning platforms like Edmodo, Schoology, Moodle, Quipper, and Ruangguru in secondary schools across Indonesia reflects a concerted effort to utilize technology for enhancing distance learning and improving the quality of education. While these platforms offer the potential for improving learning outcomes and student motivation, their effective implementation requires substantial enhancements in infrastructure, training, and collaboration among governmental bodies, educational institutions, and the private sector (Adi et al., 2024). Additionally, the integration of technology in over 80% of Indonesian Islamic educational institutions has shown significant benefits, particularly in cultivating students' 21st-century skills such as critical thinking, creativity, collaboration, and communication. This underscores the potential of technology to enhance education across diverse contexts in Indonesia.

Quantitative benefit-risk models applied to vaccines show high variability in methodology and reporting quality, highlighting the need for reporting guidance for this area (Arlegui et al., 2020). Effective database selection and complementary search protocols can significantly impact the quality of conclusions in systematic reviews (Harari et al., 2020). Blockchain technology can improve healthcare data sharing and

storage, but organizations remain hesitant due to security, interoperability, and technical skills challenges (Abu-elezz et al., 2020). Quantitative benefit-risk models for vaccine evaluation vary greatly in methodology and reporting quality, highlighting the need for standardized guidelines. The quality of conclusions in systematic reviews depends heavily on database selection and search protocols (Endrawan et al., 2023). Additionally, while blockchain technology shows potential for improving healthcare data sharing and storage, concerns about security, interoperability, and technical expertise hinder its widespread adoption among organizations.

METHODS

Method Study participants

The words "Analysis of using a technology in physical education" were searched for in published articles from the Science Direct (Science Citation Index Expanded; Social Science Citation Index; Arts & Humanities Science Citation Index) from the years 2020 through 2024.

Data Collection Techniques and Instruments

Planning

Planning is the first step in the systematic review process, which involves forming a review panel of professionals and experts to develop review questions. Data synthesis and analysis will follow the review questions. The problem formulation chapter has addressed the questions of the literature review.

Data Collection

The secondary data of this study came from research data that had been conducted by previous researchers and published in international journals indexed by Sciendirect, a highly reliable database. The keywords "Technology" and "Physical Education" were used in the article search. To increase the quantity of article searches, the authors also checked the references of the articles searched.

Inclusion and Exclusion Criteria

The study's inclusion criterion is that only keyword-related data were utilized. Only English articles that meet predefined criteria are included in the data, which is original content utilized between 2020 and 2024. In the meantime, these are the exclusion standards: Information that is not about Technology In Physical Education, is not an original piece (including reviews), is not in the English language, and is indexed based on pre-established standards. The information was utilized between 2020 and 2024.

The database yielded 377,994 articles in total when articles were searched using keywords. Following filtration based on the language, article type, and publication period 2020–2024, 170,667 articles were found. Additionally, a total of 10 articles were acquired after the articles were chosen based on inclusion and exclusion criteria based on relevancy.
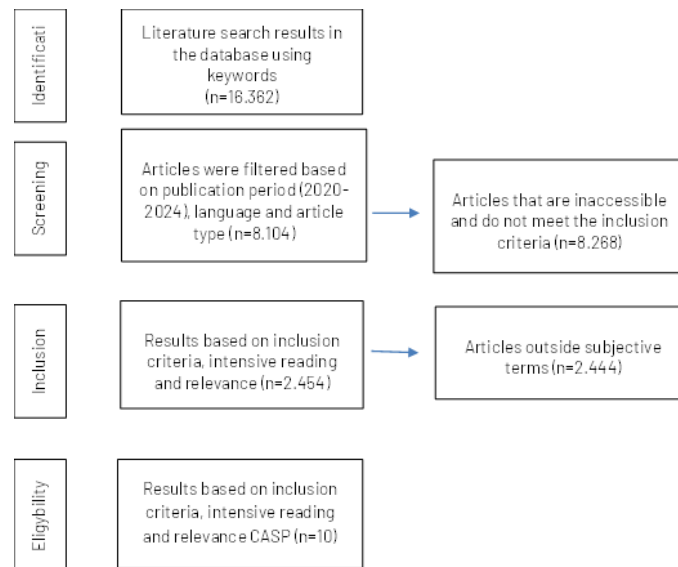
As shown in the flow diagram (Figure 1), a total sample of 10 articles was obtained from a total of 16.362 articles by adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Moher, Stewart, et al., 2016) during the phases of identification, screening, suitability, and inclusion. The following variables were taken into account in the bibliometric analysis: (a) The annual trend of articles published between 2020 and 2025; (b) the distribution of publications at the institution of the first author; (c) the number of authors; (d) the subject area (training, health, management, education, other, or mixed); (e) the type of study (experimental, descriptive, correlational, other); and (f) the average number of citations per article.

Study organization

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Statistical analysis

Article titles, abstracts, and keywords were focused as these were sufficient to produce a reliable and sufficient core of articles for further use and analysis. Only open-access articles were included in this review study because the authors of this review did not wish to exclude anyone who did not have access to their research. The following inclusion and exclusion criteria were deployed to derive only relevant studies dealing exclusively with a particular topic.

RESULTS AND DISCUSSION

Result

The table below shows the total number of publications during the selected period. Year of publication.

Table 1.
Evolution of the number of publications per year

Year of publication	Number of articles	percentage
2020	17.977	14,2%
2021	22.277	16,5%
2022	25.340	19,8%
2023	28.396	21,3%
2024	35.799	28,1%
2025	8	0,1%
Total	**126,849**	**100%**

Various periods can be seen in the evolution of the number of publications, as depicted in Table 1. First, there has been a noticeable rise in scientific output from 2020 (17.977 articles), 2021 (22.277 articles), 2022 (25,340 articles), 2023 (28.396 articles), 2024 (35.799 articles), and 2025 (8 articles).

Table 2.
Summary Table of studies

Title/Source	Sample	Result
Physical Education Pre-Service Teachers as Design Thinkers: Exploring the Role of Divergent and Convergent Thinking and TPACK (Lee & Chung, 2025).	Physical education teacher	Divergent thinking can predict technological content knowledge, technological pedagogical knowledge, and technological pedagogical content knowledge.
Pecha Kucha: The Use of Visual Technology for Storytelling to Improve Students Presentation Skills in Marketing Course (Hamid et al., 2025).	Student	Improve overall student performance as well as on each evaluated component.
Using digital tools in STEM education and the impact on student creativity in the field of tribology (Skakov et al., 2025).	Student	STEM education can be very effective in developing students' creativity. The pedagogical experiment was carried out during the teaching of the author's course entitled "Physical Foundations of Tribology.".
Investigating the effect of using a home safety training application by caregivers on accident risk management in the elderly (Dehnavi et al., 2025).	Elderly	The use of home safety education apps can effectively reduce the risk of accidents and improve the management of preventive measures among the elderly.
Effects of AI-assisted dance skills Teaching, evaluation and Visual Feedback on dance Students' learning performance, motivation and self-efficacy (L.-J. Xu et al., 2025).	Students	The DSTEVF-based learning approach significantly improved students' dance skills and self-efficacy.
Technology-Driven Serious Games and Simulations for Construction Management Education (Kim et al., 2025).	Students	Quantitative effects of technology-driven serious and simulation games and the efficacy of various aspects of design and development for future educational game developers, designers, and instructors in the construction industry.
Internet of Educational Things (IoET): Enhancing Learning Experiences for People with Disabilities (Ahmed et al., 2025).	Students with disabilities	The increasing variety of learning tools and applications can help students with disabilities to learn.

Title/Source	Sample	Result
Teaching Physical Education Post-COVID-19: Curriculum, Instruction, and Assessment (Fan et al., 2025).	Students	Results underscore the shifting emphasis on the three learning domains in curriculum, instruction, and assessment across different periods, with a focus on the affective learning domain in post-pandemic physical education.
Bridging the digital-physical divide using haptics and wearable technology (Qi et al., 2024).	Students	This can help bridge the digital-physical divide through several technologies.
Increase grit and learning satisfaction in physical education among student-athletes: augmented reality Learning is the Solution? (Paramitha et al., 2024)	Students	AR integrated into PE is a powerful way to improve grit and learning satisfaction among student-athletes.

Discussion

Technology in physical education, it is important to consider the impact of technological innovations on learning and teaching experiences in physical spaces. The use of technology such as mobile apps, wearable devices, and motion sensors allows for greater student engagement, personalization of learning, more detailed performance analysis, physical health monitoring, and increased accessibility for individuals with special needs. While technology brings significant benefits, it is important to pay attention to the challenges and ethical considerations in its use and ensure inclusion for all students in this digital era.

Factors affecting technology in physical education include low utilization rate, weak computer ability of teachers, weak innovation ability, backwards thinking, and unclear objectives of platform construction (Xianpeng, 2022). Factors affecting technology in physical education include low utilization rate, weak computer ability of teachers, weak innovation ability, backwards thinking, and unclear objectives of platform construction (Hu & Ye, 2021).

Technology has become essential in physical education, boosting student engagement, personalized learning, and information accessibility. Devices like heart rate monitors and fitness trackers offer real-time feedback, motivating students to reach fitness goals. Adaptive tech tailors PE programs to individual needs, while the internet provides resources like videos and tutorials. VR and AR create immersive experiences, and gamification and data analysis expand learning options. In remote learning, technology enables virtual instruction, ensuring student involvement. Overall, tech enhances PE learning, fostering inclusivity and engagement. Technology in physical education has become important due to specific apps for physical activity and the potential of virtual and augmented reality in assessment (Calabuig-Moreno et al., 2020). augmented reality can also be used for learning media because AR itself has a strong allure for students and it can help increase student interest in learning(F. Xu & Chu, 2021). AR simulations can be highly engaging for students, especially those with behavioural and academic challenges, but also present unique technological, managerial, and cognitive challenges(Santoso, 2018).

These studies suggest that PPETs use technology to plan, instruct, and assess their secondary physical education classes, although they face barriers and varying levels of preparedness. PPET menggunakan teknologi untuk merencanakan, mengajar, dan/atau menilai kelas pendidikan jasmani menengah mereka, tetapi menghadapi kendala saat menggunakannya. untuk itu seharusnya lebih ada simulasi atau pelatihann untuk teknologi PPET supaya ketika terjadi masalah bisa diatasi secara pribadi(Phelps et al., 2021). PPETs can also be used in physical education to provide virtual learning to middle and high school students(Webster et al., 2021). PPETs technology also has many benefits such as assessing students and can also be used to measure students' physical fitness(Keating et al., 2020; X. Liu et al., 2022).

In the modern era, Game-based learning, collaboration, and design challenges are used to teach mechatronic system design using 3D modelling and design according to CDIO standards in physical education(Wendland, 2023). Now physical education learning is no longer monotonous, many teaching media have developed such as AR, even now using 3D learning media which greatly helps educators to deliver physical education materials(Borge et al., 2022; Y. Liu et al., 2022). With 3D design and using CDIO standards, physical education learning is packaged attractively for students so that the material is easy to understand(da Silva et al., 2022).

CONCLUSION

Based on the analysis of literature related to technology in physical education, it is evident that the integration of technology has led to significant advancements in teaching methods and content, creating a safer and more engaging learning environment. Innovative tools such as intelligent vision and multimedia applications enhance students' comprehension of sports knowledge. In Indonesia, the widespread adoption of e-learning platforms reflects a commitment to improving education quality, yet infrastructure and collaboration improvements are needed. Moreover, technology integration in Islamic educational institutions fosters 21st-century skills among students. However, challenges persist in healthcare, particularly in evaluating vaccine benefit-risk models and implementing blockchain technology due to security and interoperability concerns. Nonetheless, technology remains a powerful tool for transforming various sectors, provided that infrastructure, training, and ethical considerations are addressed effectively.

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adis@mail.unnes.ac.id[1*]

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