



Review Article

# Beyond the Whistle: Mapping Global Trends in Physical Education Teaching Methods through Bibliometric Analysis

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## Abstract

**Objectives.** Focusing on the increasing importance of new pedagogies that incorporate technology, inclusivity, and student-centered approaches, this bibliometric study examines the development and current trends in physical education (PE) teaching methods from 2020 to 2024. In order to guide future research and practice, the study aimed to map the field's intellectual structure, identify significant contributors, and highlight emergent topics.

**Materials and methods.** The study employed bibliometric techniques, including co-citation and co-word analysis, to rigorously assess publishing patterns, influential works, and theme clusters using data from 278 articles that were retrieved from the Web of Science.

**Results.** The results show a notable rise in scholarly output, which peaked in 2022 and was mostly contributed to by China and Spain. Key players include universities like the University of Extremadura and core writers like Feu and Ibanez. Dominant foci, such as curricular innovation, technological integration (e.g. gamification and the Internet of Things), and motivational techniques, are highlighted by thematic clusters. The interaction of pedagogy and technology is emphasized by high-impact research, comprising those conducted by Demchenko et al. on inclusive teaching and by Ding et al. on digital tools. Sub-themes such as teacher roles in health promotion and game-based learning are further defined by co-word analysis.

**Conclusions.** The findings of this study underscore a move towards multidisciplinary and hybrid approaches, which is consistent with worldwide trends in education. However, issues like resource inequalities and teacher readiness still exist. In order to close the gaps between theory and practice, the study concluded with recommending focused professional development, fair resource distribution, and additional research. This study acts as a fundamental resource to promote collaborative innovation in the field and advance evidence-based physical education pedagogies.

**Keywords:** physical education, teaching methods, bibliometric analysis, hybrid models, educational technology.

## Introduction

The importance of physical education (PE) in supporting students' social, cognitive, and physical development has drawn a lot of attention to research on teaching strategies. Though modern approaches promote holistic education by combining personal responsibility, teamwork, and strategic thinking, traditional pedagogies have frequently placed an emphasis on skill acquisition and physical health. Studies like those by Mesquita et al. (2012) and García-Ceberino et al. (2020) demonstrate how well hybrid methods like Sport Education and Teaching Games for Understanding (TGfU) work to increase students' tactical awareness and

involvement. In a similar vein, Ding et al. (2020) show how incorporating technology, such as the Internet of Things (IoT), can produce inclusive and flexible physical education settings that serve a variety of learners.

The development of PE teaching strategies is in line with more general trends in education, such as blended learning, flipped classrooms, and gamification. By tackling global issues like teenage physical inactivity, these innovations seek to improve motivation and inclusivity (Braithwaite et al., 2011; Segura-Robles et al., 2020). Furthermore, hybrid models are emphasized by García-Castejón et al. (2021) as a means of fostering social responsibility and teamwork. Researchers can find trends, gaps, and future directions by using bibliometric analysis to examine various methodologies, ensuring that physical education teaching practices continue to progress.

Innovative teaching strategies are becoming more and more important in physical education (PE), but there are still obstacles to overcome in order to successfully incorporate these strategies into a variety of educational contexts. A lot of conventional approaches don't work for kids with different skill levels or needs. The challenges of implementing inclusive solutions in physical education, especially when it comes to meeting the requirements of students with disabilities, are highlighted by research by Demchenko et al. (2021). Similarly, Zheng et al. (2021) show inconsistent student performance throughout the COVID-19 pandemic, highlighting flaws in blended learning strategies. The insufficient knowledge of how virtual teaching technologies affect long-term skill development and motivation is another point of emphasis for González-Calvo et al. (2022). Finding efficient, scalable, and flexible teaching strategies that improve PE learning outcomes and experiences requires more research into these problems.

In physical education (PE), creative teaching strategies are essential for fostering students' mental, emotional, and physical growth. According to Goodyear and Dudley (2015), student-centered methods have a transformative effect that promotes independence and lifetime physical exercise. Furthermore, Pozo et al. (2018) emphasize how frameworks for societal and personal responsibility can foster moral principles and teamwork. According to research by Bailey et al. (2009), contemporary pedagogies improve overall educational outcomes and support students' holistic development. These strategies are crucial for educational transformation and public health enhancement as physical education increasingly tackles global issues like physical inactivity.

There are many obstacles to overcome when implementing novel PE teaching strategies, such as teacher preparedness, resource constraints, and technology integration. According to García-Espinosa et al. (2020), ineffective teacher preparation frequently prevents modern pedagogies from being delivered effectively. Technology inequalities limit access to resources like flipped classrooms and gamified classes, according to Hinojo Lucena et al. (2020). Additionally, structural problems including insufficient policies to encourage physical activity instruction are highlighted by Guthold et al. (2020). Targeted approaches are needed to address these issues, including increased institutional support for creative teaching methods, fair resource distribution, and professional development.

## Materials and Methods

A vital tool for methodically analyzing the evolution and significance of research in physical education (PE) teaching methodologies is bibliometric analysis. It allows academics to track theme evolutions, identify key articles, and evaluate worldwide trends. Zhou et al. (2023) highlighted the increasing use of digital tools in traditional teaching and stressed how bibliometric analysis can highlight the connections between online education and physical education. Similar to this, Marín-Suelves et al. (2023) investigated how technology affected physical education during the pandemic, highlighting the usefulness of bibliometric techniques in mapping flexible teaching approaches. The importance of bibliometric research in

evaluating the efficacy of hybrid teaching models—which blend conventional and cutting-edge pedagogies—was further emphasized by Alcóser et al. (2023).

Bibliometric analysis lays the groundwork for improving instructional strategies by spotting trends and gaps. By examining global trends in PE teacher education and revealing the changing pedagogical techniques in various countries, Yanar and Avşar (2023) illustrated its potential. Using bibliometric approaches, Perdima et al. (2022) investigated how educational technology was used in physical education, illuminating its transformative potential to improve learning outcomes. In their study on Teaching Games for Understanding (TGfU), Ortiz Gómez et al. (2023) employed bibliometric analysis to evaluate the model's popularity and efficacy during the previous five years. Together, these research show how bibliometric techniques help improve physical education instruction.

Furthermore, bibliometric analysis promotes a better comprehension of the field's major contributors and intellectual framework. In their investigation of the integration of digital technology into physical education pedagogy, Sargent and Casey (2021) highlighted significant publications and exposed networks of researchers that collaborate. This was furthered by Baytur and Ulaş (2022), who examined studies on sports education models and showed how they influence curriculum and policy. According to Zhou et al. (2023), bibliometric techniques allow for the discovery of new trends in physical education teaching methodologies by measuring research production as well as offering insights into cross-disciplinary impacts.

Finally, by offering data-driven insights into successful teaching strategies, bibliometric analysis aids in evidence-based decision-making. Marín-Suelves et al. (2023) demonstrated how bibliometric techniques might assess the effects of pandemic-driven changes toward technology-enhanced physical education instruction. Alcóser et al. (2023), who argued for the wider use of hybrid models in response to changing educational demands, concur with these observations. Bibliometric analysis is crucial in influencing the direction of physical education teaching approaches in the future and guaranteeing their conformity with international educational objectives by showcasing influential research and developing fields.

## Inclusion Criteria

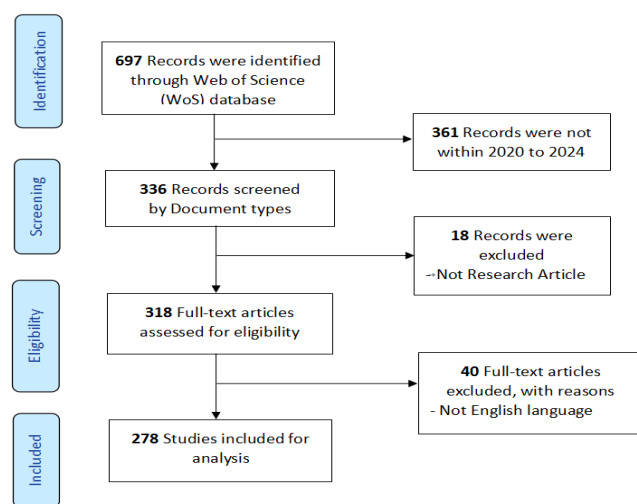
Precision and relevance are given top priority in the inclusion criteria for this bibliometric analysis of physical education teaching methods, guaranteeing that the dataset includes the most relevant research in the area. A preliminary search of the Web of Science database with the keywords “physical educat\*” or “PE” and “teach\* method\*” yielded 697 articles. By using particular filters, such as publishing years (2020–2024), English-language texts, and document categories limited to articles and review articles, this dataset was narrowed down to 278 (Table 1). The criteria guarantee that chosen studies directly address the intersection of physical education and teaching methodologies by concentrating on the title search field (TS), thereby removing irrelevant works. This procedure demonstrates the increased scholarly interest in creative physical education teaching methods, especially in the last four years.

**Table 1.** Inclusion Criteria for Bibliometric Analysis

| WoS Database         | ALL                                             |
|----------------------|-------------------------------------------------|
| Time period          | 2020 to 2024                                    |
| Search field         | TS                                              |
| Search keywords      | “physical educat*” OR “PE” AND “teach* method*” |
| Citation Topics Meso | ALL                                             |
| Document type        | Article or Review Article                       |
| Language             | English                                         |

## Findings

The citation and publication activity pertaining to physical education teaching techniques from 2020 to 2024 is graphically represented by the PRISMA flowchart (Figure 1) and the trend figures (Figure 2). This analysis demonstrates a distinct rising trend in academic production during this time, highlighting the dynamic evolution of teaching methods as a research emphasis. The increasing number of articles and their citation impact reflect the expanding understanding of how creative teaching practices affect learning outcomes, student engagement, and the overall efficacy of physical education programs.

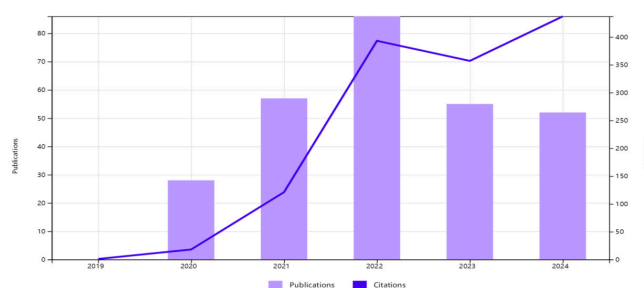
**Fig. 1.** PRISMA Flowchart

Between 2020 and 2024, there will be a notable increase in research on physical education teaching approaches, according to the trend analysis based on data from 278 articles in the Web of Science database. Publications peaked at 86 in 2022, while total citations rose from 18 in 2020 to 437 in 2024. This growth is a result of more academics concentrating on the creation and evaluation of creative physical education teaching methods. The research's scholarly impact is further highlighted by its average citation rate of 4.79 per article and H-index of 17.

A dynamic change in publishing and citation activity over time is revealed by the analysis. For example, citation rates increased even until 2022, despite a minor decline in publications, suggesting that prominent works released

earlier were still of relevance. This pattern implies that research on physical education teaching strategies is having a lasting effect that appeals to both researchers and teachers. It also emphasizes how interdisciplinary techniques are increasingly being incorporated to improve physical education's efficacy.

All things considered, the increasing trend in citations and the consistent output of publications show that the significance of instructional strategies in physical education is becoming increasingly recognized. This development shows a wider understanding of their contribution to raising academic performance, student involvement, and overall development. The study lays the groundwork for future research that expands on current understanding while tackling new issues in the field by recognizing these trends.

**Fig. 2.** Quantity of publications and citations between 2020 and 2024

## Results

### Performance Analysis

#### Documents

With 116 citations, Demchenko et al.'s (2021) most referenced study looks at how future teachers are trained in inclusive teaching methods. The substantial influence of this study highlights its contribution to the development of inclusive physical education approaches. The application of IoT technology in physical education is the subject of another well-known paper, Ding et al. (2020), which has 71 citations and emphasizes the growing significance of digital integration in teaching methods. Similarly, with 41 citations, Segura-Robles et al. (2020) investigate the efficacy of gamification and flipped learning strategies. Together, these pieces show how pedagogy, technology, and inclusivity interact to create creative teaching strategies, offering a solid basis for future research in the area.

### Source Analysis

Sustainability and Frontiers in Psychology are the most influential publications in this topic, each contributing 11 documents, according to source analysis with a threshold of 44 citations. Together, these journals have received 66 and 95 citations, respectively, indicating their important contribution to the advancement of physical education teaching techniques research. Other well-known sources are Retos (48 citations) and the International Journal of Environmental Research and Public Health (93

citations). These articles connect physical education, health, environmental sustainability, and creative teaching techniques, reflecting the interdisciplinary approach of contemporary studies. These contributions highlight the growing influence and scholarly interest in this field of study.

#### Author Analysis

According to the author's analysis, Feu and Ibanez are important contributors to the study of physical education teaching strategies, with a threshold of 66 total link strength. Together, their work has received 115 citations, highlighting their impact on cutting-edge teaching techniques. With an emphasis on gender-specific methods, García-Ceberino has made significant contributions and received 79 citations. Similarly, with 48 citations to her name, D'Elia has pioneered performance-based teaching approaches. Through their insights into inclusive, successful, and student-centered teaching methods, these authors have had a substantial impact on the scholarly conversation. Their work still forms the basis for investigating novel patterns and tackling issues in the area.

#### Organization Analysis

The University of Extremadura is the leading institution in physical education research, contributing 9 papers with 117 citations, based on a citation criterion of 77. With 7 publications and 83 citations, the University of Granada comes in second, demonstrating its significant contributions to interdisciplinary approaches. Another important contributor is the University of Salerno, which has produced eight papers with forty-eight citations, demonstrating its

commitment to cutting-edge teaching methods. In order to improve the caliber of physical education teaching procedures, these schools prioritize collaboration and integrate contemporary ideas, promoting sustainable practices and captivating educational frameworks. When taken as a whole, their contributions support international initiatives to improve teaching methods in this area.

#### Country Analysis

With 130 publications and 538 citations, China tops the field based on a threshold of 46 documents, indicating its significant influence and dedication to furthering physical education research. With 44 publications and 367 citations, Spain comes in second, emphasizing its emphasis on creative and sustainable teaching strategies. Diverse viewpoints on combining technology and pedagogy are contributed by other nations, including the USA, Italy, and South Korea. These countries are essential in advancing multidisciplinary research, tackling issues, and enhancing the international conversation on physical education. Their combined efforts highlight how crucial regional and cultural diversity is to improving teaching strategies and advancing sustainable education globally.

#### Co-Citation Analysis

Ten significant papers that explore important topics in physical education, such as curriculum creation, policy enactment, and pedagogical practices, are highlighted by the co-citation analysis, which has a threshold of 46 citations. These publications are compiled in Table 2, where Dyson et al. (2004) rank best with 9 citations and the highest total

**Table 2.** Co-citations (Top 10 Articles)

| Rank | Authors                | Title                                                                                                                                                     | Citations | Total Link Strength |
|------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------|
| 1    | Dyson et al.(2004)     | The more things change the more they stay the same: Factors influencing teachers' interpretations and delivery of national curriculum physical education. | 9         | 47                  |
| 2    | Bailey et al.(2009)    | Physical education curriculum reform in China: a perspective from physical education teachers.                                                            | 8         | 38                  |
| 3    | Ding et al.(2020)      | Enabling curriculum change in physical education: the interplay between policy constructors and practitioners.                                            | 8         | 3                   |
| 4    | Mesquita et al.(2012)  | Curriculum, pedagogy and assessment: three message systems of schooling and dimensions of quality physical education.                                     | 7         | 45                  |
| 5    | Gil-Arias et al.(2017) | Points of tension and possibility: boundaries in and of physical education.                                                                               | 7         | 35                  |
| 6    | Hastie & Casey.(2014)  | "There is new wording, but there is no real change in what we deliver": Implementing the new National Curriculum for Physical Education in England.       | 7         | 32                  |
| 7    | D'Elia et al.(2019)    | From policy to pedagogy: prudence and precariousness; actors and artefacts.                                                                               | 7         | 15                  |
| 8    | Miller.(2015)          | Breaking and making curriculum from inside 'policy storms' in an Australian pre-service teacher education course.                                         | 6         | 37                  |
| 9    | Guthold et al.(2020)   | Curriculum interpretation and policy enactment in health and physical education: researching teacher educators as policy actors.                          | 6         | 28                  |
| 10   | Goodyear&Dudley.(2015) | Teacher voice and ownership of curriculum change.                                                                                                         | 6         | 24                  |



link strength (47), indicating their significant influence. While Mesquita et al. (2012) discuss how curriculum, pedagogy, and assessment interact to improve the quality of education, Bailey et al. (2009) investigate curriculum reform in China. When taken as a whole, these seminal studies give a critical lens through which to evaluate how policy directives influence educational practices and results, providing important insights into the development of physical education teaching approaches.

Numerous publications go into great detail about the difficulties teachers encounter when implementing policies and the complications of curriculum transformation. Hastie and Casey (2014) examine the gap between curriculum revisions and their actual implementation, highlighting how superficial adjustments frequently have no lasting effect on instructional strategies. Similarly, Gil-Arias et al. (2017) highlight how novel teaching approaches, such as hybrid TGfU-Sport Education, can improve student engagement by focusing on their motivational impacts. Ding et al. (2020) highlight the complex link between policy architects and educators by discussing how practitioners translate policy mandates into workable methods. Together, these papers provide insight into the challenges, possibilities, and flexible approaches associated with managing curriculum change.

By examining teacher responsibilities and worldwide educational trends, the remaining research broaden the conversation. Miller (2015) emphasizes resilience and flexibility while highlighting the ways in which policy “storms” impact pre-service teacher preparation. An international viewpoint is offered by Guthold et al. (2020), who examine trends in teenagers’ lack of physical exercise and the consequences for curriculum design. Goodyear and Dudley (2015) emphasize the value of student-centered approaches to create dynamic learning environments and support teacher ownership in curriculum creation. When taken as a whole, these pieces offer a thorough foundation for comprehending how curriculum regulations, instructional strategies, and teacher agency interact to influence the changing field of physical education.

### Co-Citation Analysis by Clusters

By grouping the corpus of research into five different theme clusters—Red, Green, Blue, Yellow, and Purple—

the co-citation analysis of physical education teaching approaches, as shown in Figure 3, provides important insights. A specialized field of study exploring distinct facets of curriculum design, assessment, and teaching is represented by each cluster (Table 3). This classification gives researchers a thorough grasp of the area, enabling them to identify knowledge gaps in previous research, create targeted teaching tactics, and create novel approaches that meet the demands of a wide range of learners. By tackling these theme clusters, the analysis supports the larger goal of improving physical education to meet modern educational difficulties and makes a substantial contribution to the advancement of good teaching techniques.

With 16 articles, Cluster 1 is the largest and focuses on creating and implementing cutting-edge physical education curricula and pedagogical approaches. The revolutionary potential of cooperative learning models and curricular reforms is shown in foundational publications like Bailey et al. (2009) and Dyson et al. (2004), which show how they improve student engagement and learning results. In order to make sure that teaching strategies meet the various needs of students, other important research, such as Metzler (2017), investigate instructional models that place a high priority on inclusivity, flexibility, and skill development. Additionally, this cluster looks at sociocritical reflections that support equity and student-centered methods, such as those found in Landi et al. (2016). Collectively, these studies highlight how important it is to match pedagogy to the changing needs of education in order to create more efficient and significant learning opportunities.

Cluster 2, which consists of 11 articles, is centered on using evidence-based approaches to maximize teaching effectiveness and analyze learning outcomes. Strong evaluations of game-centered and hybrid educational models are offered by Mesquita et al. (2012) and Miller (2015), who demonstrate how these approaches can enhance students’ decision-making, abilities, and general performance. To improve teaching effectiveness, Feu et al. (2019) stress the value of organized task planning and keeping an eye on both internal and external demands. In order to provide a more accurate assessment of students’ development, Oslin et al. (1998) introduced assessment methods such as the Game Performance Assessment Instrument (GPAI). In order to improve teaching methods and attain quantifiable learning

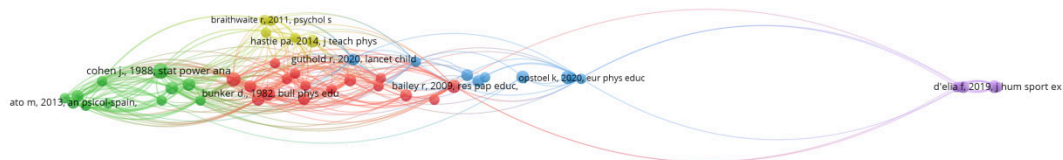


Fig. 3. Co-citations Analysis (VOSviewer Visualisation)

**Table 3.** Co-citation Cluster

| Cluster No and Colour | Cluster Labels                               | No. of Articles | Representative Publications                                                                                                                                        |
|-----------------------|----------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cluster 1 (Red)       | Curriculum and Pedagogical Innovation        | 16              | Bailey et al.(2009); Dyson et al.(2004); Gil-Arias et al.(2017); Goodyear& Dudley(2015); Landi et al.(2016); Metzler (2017); Casey & Goodyear (2015); Ryan (2017); |
| Cluster 2 (Green)     | Assessment and Learning Outcomes             | 11              | Mesquita et al.(2012); Miller.(2015); Feu et al.(2019); García-Ceberino et al.(2020); Oslin et al.(1998);                                                          |
| Cluster 3 (Blue)      | Technology Integration in Physical Education | 9               | Ding.(2020); Hinojo Lucena et al.(2020); Guthold et al.(2020); Da-Wei et al.(2018); García-Castejón et al.(2021); Opstoel et al.(2020);                            |
| Cluster 4 (yellow)    | Motivational and Responsibility Models       | 5               | Hastie & Casey (2014); Pozo et al. (2018); Braithwaite et al.(2011);                                                                                               |
| Cluster 5(purple)     | Teacher Training and Curriculum Design       | 5               | D'Elia(2019); D'Elia (2020); D'Elia et al. (2020);                                                                                                                 |

objectives in physical education, this cluster highlights the need of evaluation by fusing theoretical understanding with real-world applications.

Cluster 3, which has 9 articles, examines how technology is changing physical education teaching strategies. The use of digital tools like virtual reality and flipped learning models to improve student engagement and learning results is highlighted by Ding et al. (2020) and Hinojo Lucena et al. (2020). In their analysis of the role of technology in addressing the trends of physical inactivity among adolescents, Guthold et al. (2020) offer a global approach. Research on hybrid educational programs that combine game-based learning with social responsibility concepts was conducted by García-Castejón et al. in 2021. The combined findings of these research highlight the increasing significance of incorporating digital platforms and multimedia resources to update instruction, encourage student engagement, and satisfy changing learning demands.

Cluster 4, which has 5 articles, focuses on methods for encouraging students to be motivated and to develop their sense of personal and social responsibility. In their analysis of fidelity in the use of model-based practices, Hastie and Casey (2014) emphasize the importance of these practices in fostering uniform teaching standards. Braithwaite et al. (2011) and Pozo et al. (2018) examine how well responsibility-based programs and motivational climate interventions promote enthusiastic student engagement and individual development. This cluster emphasizes the social and psychological aspects of education, with special emphasis on interventions that include students as active members of their communities as well as learners. Collectively, these findings support all-encompassing strategies that take into account students' emotional and cognitive needs.

The importance of curriculum design and teacher preparation in raising the efficacy of physical education is emphasized in Cluster 5, which consists of 5 items. D'Elia et al. (2020) investigate how teachers view curriculum objectives, emphasizing how teaching objectives relate to primary school pupils' developmental requirements. Other research, like D'Elia (2019), focus on creating age-appropriate lesson plans that incorporate contemporary pedagogical ideas. This cluster emphasizes how crucial it is for educators to pursue ongoing professional development in order to ensure that they have the abilities and know-how necessary to successfully connect policy and practice.

In order to develop dynamic and effective physical education programs that satisfy a range of learner needs and further the more general objectives of educational reform, these studies seek to develop teacher competency and creativity.

### Co-Occurrence Analysis

Using a threshold of 61, the co-occurrence analysis finds 1,050 terms that generate 602 links with a total link strength of 956. This network emphasizes the interconnection of study subjects by highlighting important thematic areas in physical education teaching approaches. With 71 occurrences and the greatest total link strength of 188 among the top 15 keywords, "physical education" stands out for its crucial importance in the literature. Words like "students," "teaching methods," and "motivation," which highlight the emphasis on student engagement and pedagogical innovation, are also important. Future research in the topic will be guided by this analysis, which offers an organized summary of the main study issues and how they relate to one another.

**Table 4.** The 15 most frequent keywords in the co-occurrence analysis

| Rank | Keyword            | Occurrences | Total Link Strength |
|------|--------------------|-------------|---------------------|
| 1    | physical education | 71          | 188                 |
| 2    | students           | 34          | 107                 |
| 3    | physical-education | 22          | 45                  |
| 4    | teaching methods   | 21          | 47                  |
| 5    | teachers           | 20          | 83                  |
| 6    | Performance        | 19          | 66                  |
| 7    | Education          | 19          | 52                  |
| 8    | motivation         | 18          | 61                  |
| 9    | sport              | 17          | 67                  |
| 10   | impact             | 15          | 51                  |
| 11   | sport education    | 14          | 66                  |
| 12   | model              | 14          | 55                  |
| 13   | teaching method    | 12          | 37                  |
| 14   | children           | 11          | 55                  |
| 15   | sports             | 10          | 23                  |

In the second tier of keywords, more focused topics are revealed, including “teaching method” (12 occurrences, 37 total link strength) and “sport education” (14 occurrences, 66 total link strength). These phrases emphasize how crucial it is to investigate various teaching philosophies in order to maximize learning results. Additionally, “teachers” and “children” stand out as crucial elements, highlighting the dual focus on educator responsibilities and student development. When combined, these keywords show how teaching methods, learning environments, and learning objectives interact dynamically, highlighting important areas for pedagogical development.

Finally, words like “motivation,” “performance,” and “impact” convey the results-driven character of this field’s study. The effects of instructional strategies on students’ general wellbeing, athletic performance, and cognitive and physical development are regularly evaluated in studies. The multifaceted nature of physical education is highlighted by this term network, which also shows how it can promote holistic development. By comprehending these interrelated topics, researchers can fill up knowledge gaps, develop novel teaching strategies, and improve educational practices all around.

### Co-Word Analysis

Five keyword clusters, each representing a thematic area of research in physical education teaching methods, are highlighted by the co-word analysis, which is illustrated in Figure 4 and condensed in Table 5. Based on their co-occurrence strength and correlations, the research finds 44 keywords in five clusters. These clusters represent several areas of interest, including motivation, learning strategies, sports pedagogy, school satisfaction, and the roles of teachers in promoting health. A thorough analysis of teaching methods and their results is made possible by the

visualization, which provides an organized knowledge of the connections between study issues.

Sports are emphasized as a fundamental part of physical education in Cluster 1, which consists of 12 keywords. Terms such as “sport,” “sport education,” and “children” emphasize how important sports are for promoting social, emotional, and physical growth. The words “intervention” and “knowledge” refer to organized programs that are intended to improve performance or meet particular developmental needs. The importance of using sports as a teaching tool and a platform for fostering general well-being is highlighted by this cluster. Teachers may establish inclusive settings that accommodate a range of learning preferences, enhance motor skills, and encourage collaboration, leadership, and critical thinking in their students by implementing well-thought-out interventions.

With ten keywords, Cluster 2 explores the uses of game-based learning and how it might improve physical education. Keywords like “learning,” “games,” and “teaching method” highlight the application of dynamic and captivating teaching techniques. Words such as “basketball” and “experience” demonstrate how sports-specific games can enhance conceptual understanding and practical skills, reflecting a focus on subject-specific games and experiential learning methodologies. This cluster emphasizes how games may help kids become more creative, collaborative, and capable of solving problems. Teachers can create stimulating learning environments that improve motivation and skill development by including games into their lesson plans. This makes learning fun and efficient.

Cluster 3, which has 9 keywords, focuses on methods for improving physical education students’ motivation and performance. Words like “performance,” “motivation,” and “design” highlight how crucial it is to organize classes to optimize student participation and results. Phrases like “gamification” and “experiences” emphasize the use of

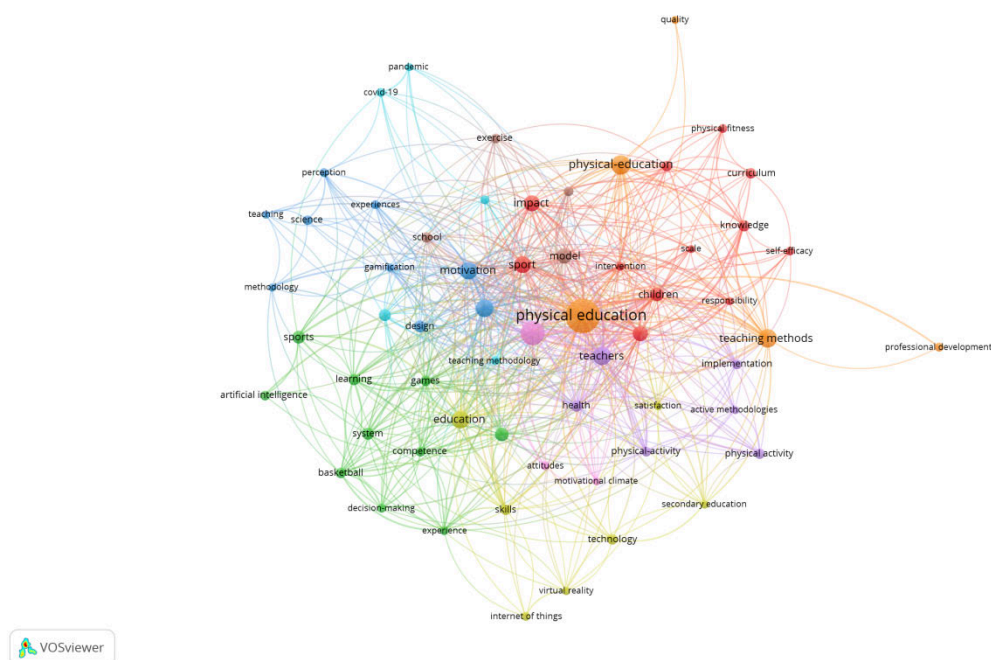


Fig. 4. Co-word Analysis of physical education and teaching methods (VOS viewer Visualization)

**Table 5.** Co-word Analysis on relationship between physical education and teaching methods.

| Cluster No and Colour | Cluster Label                       | Number of Keywords | Representative Keywords                                                        |
|-----------------------|-------------------------------------|--------------------|--------------------------------------------------------------------------------|
| 1 (Red)               | Sports and Interventions            | 12                 | “sport,” “sport education,” “children,” “impact,” “intervention,” “knowledge,” |
| 2 (Green)             | Game-Based Learning and Methodology | 10                 | “games,” “learning,” “teaching method,” “basketball,” “experience,”            |
| 3 (Blue)              | Performance and Motivation          | 9                  | “performance,” “motivation,” “design,” “experiences,” “gamification,”          |
| 4 (Yellow)            | Education and Skills Development    | 7                  | “education,” “skills,” “satisfaction,” “secondary education,”                  |
| 5(purple)             | Teacher Roles and Health Promotion  | 6                  | “teachers,” “health,” “physical-activity,”                                     |

technology-driven and interactive methods to engage pupils and maintain their interest. The increasing focus on individualized learning environments that meet the needs of each individual student and promote active engagement is reflected in this cluster. Teachers can promote changes in the cognitive and physical components of education by implementing cutting-edge tactics like performance monitoring and incentive tools, which will ultimately create a more comprehensive learning environment.

Cluster 4, which has 7 keywords, is about how education should be in line with skill development and learner satisfaction, particularly in secondary education. The words “education,” “skills,” and “satisfaction” highlight the importance of developing well-rounded and efficient teaching frameworks. This cluster also looks at the relationship between skill development and academic achievement, making sure that pupils are ready for both intellectual and physical difficulties. Prioritizing skill development and satisfaction allows educators to create programs that enhance students’ educational experiences by fostering long-term engagement, resilience, and confidence in addition to developing motor abilities.

Cluster 5, which has 6 keywords, emphasizes how important educators are in encouraging physical activity and health in classrooms. The terms “teachers,” “health,” and “physical-activity” highlight the importance of both teaching and the formation of wholesome habits that last a lifetime. According to this cluster, it is crucial to give teachers the tools they need to incorporate health education into physical education classes so that students can comprehend and value active lifestyles. Teachers may encourage students to place a higher priority on their physical and mental health by serving as role models and facilitators, ultimately resulting in a generation that is healthier and more knowledgeable.

## Discussion

Significant trends in the study on physical education (PE) teaching strategies from 2020 to 2024 are shown by this bibliometric analysis. The report notes a notable rise in citations and publications, which peaked in 2022 and highlights the rising interest of academics in cutting-edge PE pedagogies. Key individuals like Feu and Ibanez, as well as organizations like the University of Extremadura, have become well-known, and their work is regularly recognized. The convergence of technology and inclusion is a prominent

issue in high-impact research, such as those by Demchenko et al. (2021) on inclusive education and Ding et al. (2020) on IoT integration. Five theme clusters, such as curricular innovation, technological integration, and motivational tactics, are further defined by co-citation and co-word analyses, which illustrate the field’s dynamic evolution. All of these results point to a trend in physical education toward inclusive, technology-enhanced, student-centered teaching approaches.

The findings are consistent with earlier research that highlights the transformative potential of student-centered and technology-driven approaches in physical education, including that conducted by García-Ceberino et al. (2020) and Goodyear and Dudley (2015). But this study also reveals new elements that weren’t as noticeable in previous studies, like hybrid models that combine TGfU and sport education. This study’s focus on recent years (2020–2024), which capture post-pandemic movements toward blended learning and digital resources, may be the cause of discrepancies with previous work. For example, Zheng et al. (2021) observed difficulties with blended learning during COVID-19, but our results show that it has since been normalized and improved. These variations highlight how environmental and chronological factors influence research trends.

Thematic clusters found in this study show how PE research has matured, with a focus on comprehensive student development and interdisciplinary integration (such as technology and psychology). According to Ryan’s (2017) theory, the popularity of phrases like “gamification” and “motivation” points to a paradigm shift toward engagement and lifelong learning. On the other hand, the continuation of “knowledge silos” in some subfields, such teacher preparation, suggests unequal advancement. Influential publications like Dyson et al. (2004), which continue to influence curriculum frameworks, are revealed by this study’s co-citation network, indicating that core theories are still important while being adjusted to meet modern demands.

The results provide policymakers and educators with useful information. According to García-Castejón et al. (2021), hybrid models are successful, which supports their broader use in physical education programs. However, targeted professional development and equitable resource allocation are necessary to address issues like teacher readiness (García-Espinosa et al., 2020) and resource inequities (Hinojo Lucena et al., 2020). As demonstrated by the prominent roles played by Chinese and Spanish



universities, institutions should place a high priority on collaborations in order to promote innovation. In order to ensure successful adoption, the emergence of digital tools also necessitates updated infrastructure and training.

The scope of this study may be limited by its rejection of non-English literature and gray materials, even though its usage of the Web of Science guarantees rigor. Although VOSviewer offers strong visuals for co-citation and co-word analysis, it may miss subtle patterns that can be found using mixed-methods approaches. The 2020–2024 period may not accurately represent long-term changes, but it does capture recent patterns. As proposed by Sargent and Casey (2021), future research might use qualitative techniques to contextualize bibliometric findings or broaden data sources to include Scopus and ERIC.

There are various restrictions on this study. First, the representation of non-Western research may be skewed due to its reliance on English-language publications. Second, books and conference proceedings are not included in the emphasis on journal articles, which may leave out important work. Third, established authors may be given preference over up-and-coming voices based on bibliometric metrics like citation counts. Lastly, the post-pandemic rapid evolution of PE pedagogies calls for constant updating to reflect new developments.

Longitudinal patterns should be investigated in future studies to confirm the viability of popular trends like gamification and the Internet of Things. As demonstrated by Perdimma et al. (2022), bibliometrics and content analysis together may enhance knowledge of pedagogical efficacy. To guarantee global diversity, research into underrepresented areas and unconventional publications is also required. Last but not least, Zhou et al. (2023) point out that multidisciplinary partnerships may help close the gap between theory and practice and promote creativity in PE teaching approaches.

## Conclusions

The research landscape of physical education (PE) teaching methods from 2020 to 2024 was extensively analyzed using bibliometric techniques in order to pinpoint important trends, seminal publications, and developing themes. Through an analysis of 278 articles from the Web of Science database, the study offers a thorough picture of the development and intellectual framework of the area.

Three main conclusions were drawn: (1) A change toward student-centered pedagogies was reflected in the thematic clusters, which showed a strong emphasis on curriculum innovation, technological integration (such as IoT, gamification), and motivational techniques. (2) Research production was dominated by China and Spain, with writers like Feu and Ibanez influencing academic discourse and universities like the University of Extremadura leading in citations. (3) Co-citation analysis brought to light both new hybrid approaches (e.g., TGfU-Sport Education) and established frameworks such as the curricular model developed by Dyson et al.. These findings highlight the field's rapid shift toward digital adaption and inclusion.

The study provides useful information for educators and legislators, highlighting the necessity of equitable resource distribution and professional development in technology-enhanced instruction. Future study could broaden data sources (e.g., Scopus) and include qualitative

methodologies, as limitations include the exclusion of non-English literature and reliance on citation-based measures. This bibliometric analysis provides a fundamental resource for developing evidence-based pedagogies and encouraging interdisciplinary collaboration as physical education continues to address global issues like physical inactivity.

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## Conflict of Interest

The author has no conflict of interest.

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## За межами навчального процесу: Мапування глобальних тенденцій у методах викладання фізичного виховання шляхом проведення бібліометричного аналізу

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 9 с., 5 табл., 4 рис., 39 джерел.

**Мета дослідження.** Орієнтуючись на зростаючу важливість новітніх педагогічних методик, що включають технології, інклюзивність та студентоцентричні підходи, у цьому бібліометричному дослідженні вивчаються розвиток та сучасні тенденції у методах викладання фізичного виховання (ФВ) у період з 2020 по 2024 рік. Щоб скерувати подальші дослідження та практичну діяльність, мета дослідження полягала у мапуванні інтелектуальної структури галузі, визначенні вагомих авторів та виокремленні актуальних тематик.

**Матеріали та методи.** У дослідженні використовувалися бібліометричні методології, включаючи коцитування та аналіз співвідношення слів, з метою ретельної оцінки публікаційних патернів, авторитетних робіт та тематичних кластерів на основі даних із 278 статей, отриманих з наукометричної бази Web of Science.

**Результати.** Результати показують помітне зростання кількості наукових публікацій, яке досягло максимуму в 2022 році та було переважно зумовлене роботами вчених з Китаю та Іспанії. Серед ключових гравців — такі університети, як Університет Естремадури, та провідні автори, серед яких Фейу та Ібаньес. У тематичних кластерах висвітлено домінуючі фокуси, як-от інновації в навчальних програмах, технологічна інтеграція (наприклад, гейміфікація та Інтернет речей) й мотиваційні техніки. Взаємодія педагогіки та технологій підкреслюється високоефективними дослідженнями, зокрема тими, що були проведені Демченком та іншими вченими щодо інклюзивного навчання, а також Дінгом та ін., у роботах яких розглядалося питання цифрових інструментів. Субтеми, як-от роль викладачів у сприянні здоровому способу життя та ігрове навчання, визначаються додатково за допомогою аналізу співвідношення слів.

**Висновки.** Результати цього дослідження підкреслюють перехід до мультидисциплінарних та гібридних підходів, що відповідає загальносвітовим тенденціям в освіті. Однак все ще існують такі проблеми, як нерівність у розподілі ресурсів та підготовленість викладачів. З метою подолання розриву між теорією та практикою, за результатами дослідження було рекомендовано зосередитися на професійному розвитку, справедливому розподілі ресурсів та проведенні додаткових досліджень. Представлене дослідження є фундаментальним джерелом інформації, що сприяє спільним інноваціям у цій галузі та вдосконаленню науково обґрунтованих педагогічних методів фізичного виховання.

**Ключові слова:** фізичне виховання, методи навчання, бібліометричний аналіз, гібридні моделі, освітні технології.

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