



Review Article

Bibliometric Analysis of Instructional Models in Physical Education: From Direct Instruction to Transformative Learning

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Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

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Accepted for Publication: August 5, 2025

Published: September 30, 2025

DOI: 10.17309/tmfv.2025.5.28

Abstract

Background. This study presents a comprehensive bibliometric analysis of research trends related to instructional models in physical education over the period 2015–2024.

Objectives. Utilizing the Scopus database and analyzed through Biblioshiny and VOSviewer, the study aimed to map the scientific landscape surrounding the evolving pedagogical approaches from Direct Instruction to Cooperative and Transformative Learning.

Materials and Methods. The analysis was conducted using data extracted from the Scopus database, processed with Biblioshiny and VOSviewer to examine publication trends, author productivity, collaboration networks, and keyword co-occurrence.

Results. The findings reveal a consistent annual growth rate of 25.99% in publication, with significant contributions originating from Spain, China, and the United States. Javier Fernández-Río has been identified as the most productive and highly cited author. Journals such as *Physical Education and Sport Pedagogy* and the *International Journal of Environmental Research and Public Health* have emerged as leading publication outlets. Author and country collaboration maps highlight the strong presence of research networks, particularly in Europe. Keyword co-occurrence analysis indicates the emergence of new themes, including cooperative learning, hybrid instructional models, digital technology integration, and alignment with the Sustainable Development Goals (SDGs).

Conclusions. These findings reflect a paradigm shift in physical education pedagogy from traditional methods towards more collaborative, reflective, and sustainability-oriented teaching models. The study provides insights into emerging research opportunities and offers implications for future curriculum innovation in physical education.

Keywords: physical education, instructional models, cooperative learning, direct instruction, transformative learning.

Introduction

Physical Education (PE) plays a strategic role in the holistic development of students, not only in terms of physical fitness, but also within cognitive, affective, and social domains. In the context of modern education, PE is recognized as a critical platform to promote healthy lifestyles, foster social skills, and cultivate character development

(Ramires et al., 2023). As the needs of 21st-century learners become increasingly complex, pedagogical approaches in PE have evolved, requiring innovative teaching strategies and the application of relevant instructional models.

Instructional models in PE serve as systematic frameworks that guide the teaching and learning process effectively. These models reflect the approaches employed by educators in delivering content, managing classrooms, and fostering student engagement (Guzmán & Payá, 2020). One of the most widely applied models is Direct Instruction (DI), which emphasizes the teacher's active role in delivering content through explicit demonstrations, clear instructions, and reinforcement of student performance. DI has proven

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effective in enhancing mastery of fundamental motor skills and ensuring the efficiency of the instructional process (Guzmán & Payá, 2020).

In line with the growing emphasis on learner-centered approaches, Cooperative Learning (CL) has also gained considerable attention. In CL, students work in small, heterogeneous groups with shared learning objectives, promoting social interaction, collective responsibility, and improved communication skills (Jiang et al., 2023; Zach et al., 2023). Studies have shown that CL in PE contributes to increased learning motivation, affective engagement, and the development of sustainable social competencies.

Alongside the demand for more contextual and participatory learning, alternative approaches grounded in games and social values have also been widely adopted in PE. The Sport Education Model (SEM), for instance, organizes learning in the format of a "sports season" in which students take on formal roles such as coach, referee, or team manager, providing an authentic and collaborative learning experience (Zhang et al., 2024). On the other hand, Transformative Learning (TL) introduces a new dimension by emphasizing critical reflection, social awareness, and changes in students' perspectives regarding their physical experiences (Casey & Kirk, 2020). TL is believed to support identity formation, empathy development, and ethical decision-making through meaningful learning processes.

The increasing volume of scholarly publications related to instructional models in PE over the past decade reflects the rapid development and dynamism of the field. Recent research has extensively explored innovative pedagogies in PE, including the integration of technology, collaborative learning, and transformative approaches (Sargent, 2017). However, to date, there is a lack of systematic bibliometric mapping that identifies major trends, author collaborations, and the intellectual impact of various instructional models in PE at the global level.

Therefore, this study aims to conduct a bibliometric analysis of global literature related to instructional models in physical education, focusing on classical models such as Direct Instruction and contemporary approaches like Cooperative Learning and Transformative Learning. This review seeks to uncover the evolution of pedagogical approaches over time, identify key contributors in the field, and highlight underexplored areas of research. The findings are expected to provide a foundation for the development of more contextual, reflective, and future-responsive PE pedagogy

Materials and Methods

Research Design

This study employed a quantitative bibliometric approach to map the global research landscape concerning instructional models in physical education. The primary aim of this approach is to identify publication trends, influential authors, patterns of scholarly collaboration, and key thematic areas within the academic literature. Bibliometric analysis is recognized as an effective method for evaluating the structure and dynamics of knowledge development in a specific field through scientific publication metadata (Aria & Cuccurullo, 2017; Donthu et al., 2021). The core objectives of this study include:

Identifying annual publication trends in the field of instructional models in physical education to map the dynamics of literature development over the past decade.

Analyzing author productivity and citation frequency to determine key contributors and assess their academic impact within the discipline.

Mapping the geographical distribution and institutional affiliations that significantly contribute to the literature, to reveal global research excellence hubs.

Examining the distribution of publications across leading journals and thematic trends among the most frequently cited articles related to instructional models in physical education.

Identifying and analyzing frequently occurring keywords (keyword co-occurrence) to capture the conceptual focus and thematic evolution of research in this domain.

Data Source and Search Strategy

The data for this study were retrieved from the Scopus database, which is widely recognized as one of the most credible and internationally indexed scientific repositories. Data collection was conducted in May 2025, using the following search strategy: TITLE-ABS-KEY ("physical education" AND ("instructional model" OR "teaching model" OR "pedagogical model").

Table 1. Document Search Criteria

| Criteria | Description |
|----------------------|----------------------------------|
| Source Database | Scopus |
| Search within | Article title, abstract, keyword |
| Documents found | 497 |
| Years | 2015-2024 |
| Publication Stage | Final |
| Publication Language | English |
| Documents Final | 364 |

Following a screening process based on the relevance of titles and abstracts, as well as initial data filtering, a total of 364 articles were identified and utilized as the primary dataset for analysis.

Data Analysis Procedure

The bibliographic data retrieved from the Scopus database were exported in .csv format and analyzed using two primary software tools: VOSviewer version 1.6.20 and Biblioshiny, the web interface of the Bibliometrix package in RStudio (Aria & Cuccurullo, 2017). Prior to analysis, the raw data underwent a data-cleaning phase using OpenRefine to ensure accuracy and consistency. This process included the normalization of author names, unification of affiliation variations, and correction of duplicate entries, common issues arising from inconsistencies in bibliographic metadata (Ahmi, 2023). This step was essential to enhance the validity of the bibliometric analysis, particularly in mapping collaborations and identifying institutional affiliations.

The analysis proceeded in several stages, beginning with the identification of annual publication trends to observe the dynamics of literature development over the past decade.

Subsequently, author productivity and citation frequency were analyzed to identify key contributors and assess their academic influence (Donthu et al., 2021). Geographic distribution and institutional affiliations were mapped to uncover centers of scholarly excellence in the field of instructional models in physical education. Keyword co-occurrence analysis was conducted to identify key terms and trace the evolution of research themes. Finally, co-authorship and co-citation network visualizations were developed to provide a comprehensive understanding of the intellectual structure and collaborative relationships within this research domain (Van Eck & Waltman, 2010).

Result

General Information

This bibliometric analysis is based on 341 documents published between 2015 and 2024, retrieved from the Scopus database. Over the past decade, the number of publications has shown an annual growth rate of 25.99%, indicating increasing interest and research intensity in this field. The average age of the documents is 3.78 years, with a mean of 13.22 citations per document, suggesting that many of the publications are relatively recent and exhibit considerable academic influence. A total of 13,423 references were cited across all documents, reflecting the broad scope of the literature base.

A total of 778 authors contributed to the publications, demonstrating a relatively high degree of collaboration, with an average of 3.16 authors per document. Nevertheless, there were also 55 single-authored papers. The proportion of international cooperation was recorded at 18.18%, indicating the presence of an active global network in research on instructional models in physical education. In terms of document types, the publications were predominantly journal articles (280 documents), followed by conference papers (40), review articles (18), and a small number of editorials and errata. A total of 932 author keywords and 1,058 Keywords Plus were identified and subsequently analyzed to map the main thematic areas in this body of research.



Fig. 1. General Information of the analysed metadata

The identification of annual publication trends in the field of instructional models in physical education was conducted to map the dynamics of literature development over the past decade.

Figure 1 illustrates the annual publication trends related to instructional models in physical education from 2015 to 2024. Overall, the data reveal a positive growth trajectory, albeit with significant fluctuations across certain years.

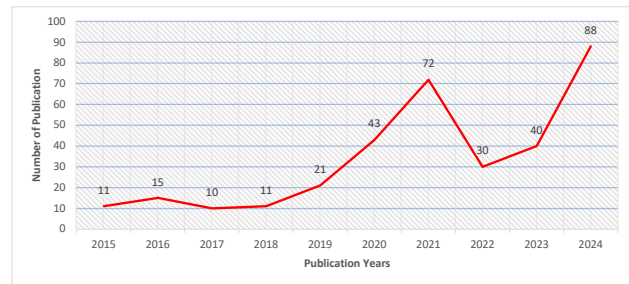


Fig. 2. Trends in Publications on Instructional Models in Physical Education (2015–2024)

During the initial period (2015–2018), the number of publications remained relatively low and stable, averaging around 11 to 15 documents per year. An upward trend began in 2019 with 21 publications, followed by a substantial increase to 43 publications in 2020. The peak was recorded in 2021, with 72 documents published, reflecting growing academic interest in this topic, likely driven by the need for pedagogical innovation during the COVID-19 pandemic.

However, this surge was followed by a sharp decline to 30 publications in 2022. The trend began to recover gradually in 2023, with 40 documents, and surged dramatically in 2024, reaching 88 publications—the highest figure within the decade. These findings indicate the sustained relevance of instructional models in physical education, particularly in addressing post-pandemic educational challenges and supporting the broader goals of sustainable development (SDGs).

Analysis of Author Productivity and Citation Frequency

To identify key contributors and evaluate their academic impact on the development of knowledge in instructional models for physical education, an analysis of author productivity and citation frequency was conducted.

The analysis of author productivity reveals that Javier Fernández-Río ranks first with a total of 25 publications, establishing himself as the most prolific contributor in this research domain. He is followed by Sixto González Villora (14 publications), David Hortigüela Alcalá and Alfonso Valero Valenzuela (10 publications each), and Stephen Harvey (9 publications). These five authors have consistently conducted and published research in the domain of physical education pedagogy, particularly focusing on cooperative learning models, values-based education, and instructional assessment. Most of them are affiliated with higher education institutions in Spain and Western European countries, reinforcing the region's status as an active and consistent hub for research in physical education pedagogy.

In terms of academic influence, measured through citation frequency, Javier Fernández-Río also holds the top position with 772 citations, indicating that his work is not only prolific but also widely referenced in scholarly literature. Other influential authors include Ashley Casey (509 citations) and Sixto González Villora (361 citations). Although Casey has published only seven documents, the high number of citations reflects the significant quality and scholarly impact of his contributions. Additionally, scholars such as Ann Macphail, Alexander Gil Arias, and Victoria A. Goodyear have also emerged as highly cited authors,

Table 2. Author Productivity and Citation Impact

| Top 13 Productivity | | Top 13 Most Cited Authors | |
|---------------------------|-------|---------------------------|-------|
| Author | Total | Author | Total |
| Javier Fernandez Rio | 25 | Javier Fernandez Rio | 772 |
| Sixto González Villora | 14 | Ashley Casey | 509 |
| David Hortigüela Alcalá | 10 | Sixto González Villora | 361 |
| Alfonso Valero Valenzuela | 10 | David Hortigüela Alcalá | 278 |
| Stephen Harvey | 9 | Stephen Harvey | 278 |
| Oscar Chiva Bartoll | 8 | Ann Macphail | 271 |
| Ashley Casey | 7 | Alexander Gil Arias | 242 |
| Alexander Gil Arias | 7 | Victoria A Goodyear | 242 |
| David Manzano Sánchez | 7 | Gustavo González Calvo | 217 |
| David Gutiérrez | 6 | Daniel Bores García | 214 |
| Ann Macphail | 5 | Oscar Chiva Bartoll | 184 |
| Carlos Evangelio | 5 | David Kirk | 168 |
| Alejandra Hermando Garijo | 5 | Alfonso Valero Valenzuela | 152 |

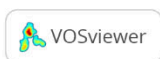
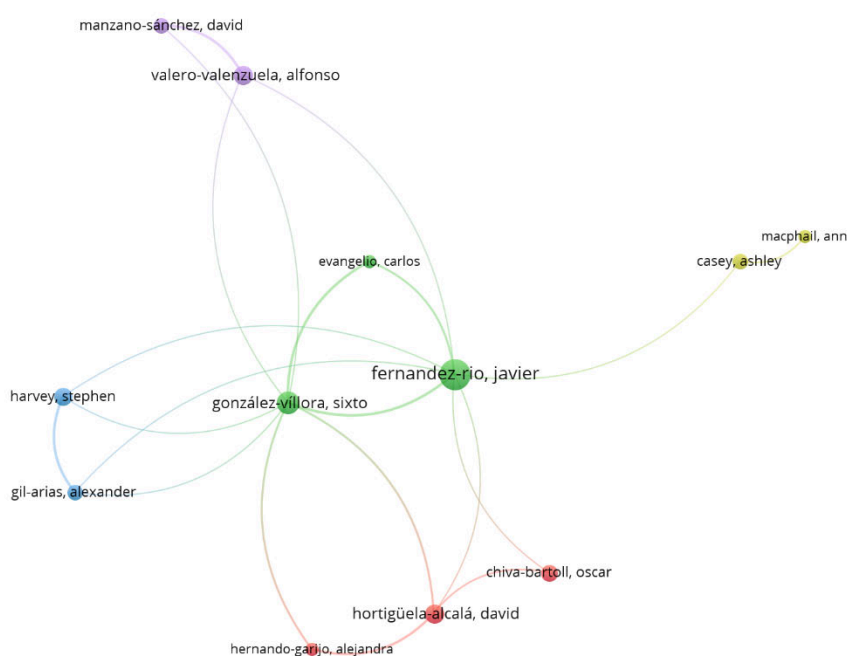


Fig. 3. Author Collaboration Network Analysis

highlighting their important roles in advancing discussions on innovative instructional models, reflective teaching, and the integration of digital technology in physical education. The combination of publication volume and citation metrics suggests that several authors act as both prolific knowledge producers and key thought leaders within the field.

The co-authorship network analysis, with a minimum threshold of five publications, reveals that collaborative structures in research on instructional models in physical education tend to be concentrated around a few prominent figures, with Javier Fernández-Río positioned as the central node. He maintains strong collaborative ties with several key

scholars, including Sixto González-Villora, David Hortigüela Alcalá, Oscar Chiva-Bartoll, and Carlos Evangelio, reflecting the formation of a cohesive research group, particularly within Spanish academic circles. These collaborations indicate not only a high frequency of joint publications but also continuity in research agendas focusing on cooperative and values-based instructional models.

Additionally, several smaller yet meaningful collaboration clusters are evident, for instance, the partnership between Stephen Harvey and Alexander Gil-Arias, who have extensively explored game-based learning and the affective domain in physical education. Meanwhile, Ashley Casey

and Ann MacPhail appear along a distinct collaboration pathway, albeit in a relatively peripheral position within the network. This suggests a specialized focus in their work and more limited interaction across the central research clusters.

Overall, the network structure suggests that, although the field involves contributors from diverse institutions, there is a notable dominance of central actors and an intense concentration of regional collaborations, particularly within Europe, which significantly shape the knowledge ecosystem in physical education pedagogy.

Mapping the Geographical Distribution and Institutional Affiliations

This analysis maps the geographical distribution and institutional affiliations that have significantly influenced the publication of research on instructional models in physical education. The aim is to identify global centers of research excellence and understand the regional dynamics shaping scholarly productivity in this field.

Table 3. Geographical Distribution and Countries with the Highest Academic Influence

| Top 15 Geographical Distribution | | Top 15 Geographical Distribution | |
|----------------------------------|-------|----------------------------------|-------|
| Country | Total | Country | Total |
| Spain | 116 | Spain | 2188 |
| China | 100 | United States | 1001 |
| United States | 43 | United Kingdom | 959 |
| United Kingdom | 23 | Ireland | 487 |
| Indonesia | 18 | China | 253 |
| Portugal | 12 | Australia | 244 |
| Australia | 11 | Sweden | 197 |
| Ireland | 8 | Norway | 145 |
| Norway | 8 | New Zealand | 137 |
| Sweden | 8 | Portugal | 113 |
| Norway | 8 | Indonesia | 39 |
| South Korea | 7 | Malaysia | 32 |
| Philippines | 6 | South Korea | 23 |
| Malaysia | 6 | Brazil | 14 |
| New Zealand | 6 | Philippines | 5 |

The geographical distribution of publications reveals that Spain holds a dominant position, contributing a total of 116 documents, followed by China (100 documents) and the United States (43 documents). Although countries such as the United Kingdom (23 documents) and Indonesia (18 documents) report comparatively fewer publications, their presence reflects active engagement from various global regions in advancing instructional models within physical education. Other contributing countries—including Portugal, Australia, Ireland, Norway, and Sweden—demonstrate that research centers are not limited to a single region but are increasingly dispersed across Asia, Europe, and Oceania.

In terms of academic impact, measured by total citation counts, Spain again leads with 2,188 citations, underscoring both its research productivity and the high academic significance of its contributions. The United States (1,001 citations) and the United Kingdom (959 citations) follow, confirming their roles as major reference points in pedagogical discourse. Notably, Ireland shows a high citation-to-publication ratio (487 citations), indicating exceptional research efficiency and influence relative to output volume. Countries such as China, Australia, and Sweden also demonstrate substantial academic contributions.

Emerging economies such as Indonesia (39 citations), Malaysia (32 citations), and the Philippines (5 citations) are beginning to increase their presence, though their global academic influence remains at an early stage. These data suggest that while the knowledge ecosystem in this field remains somewhat hierarchical, it is gradually expanding toward more inclusive global participation.

Table 4. Institutional Affiliations: Global Research Excellence Centers

| Top Ten Institutional Affiliates | | |
|---|----------------|-------|
| Affiliate | Country | Total |
| Faculty of Teacher Training and Education, University of Oviedo | Spain | 6 |
| Department of Specific Didactics, Faculty of Education, University of Burgos | Spain | 5 |
| School of Sport, Exercise and Health Sciences, Loughborough University | United Kingdom | 5 |
| Department of Educational Sciences, University of Oviedo | Spain | 4 |
| Division of Kinesiology and Health, University of Wyoming | United States | 4 |
| Universitas Pendidikan Indonesia | Indonesia | 4 |
| Department of Food and Nutrition, and Sport Science, University of Gothenburg | Sweden | 3 |
| Department of Physical Education and Sport Sciences, University of Limerick | Ireland | 3 |
| School of Education, University of Strathclyde | United Kingdom | 3 |
| School of Kinesiology, Auburn University | United States | 3 |

Top 10 Countries with the Most Publications in Physical Education Pedagogy Research

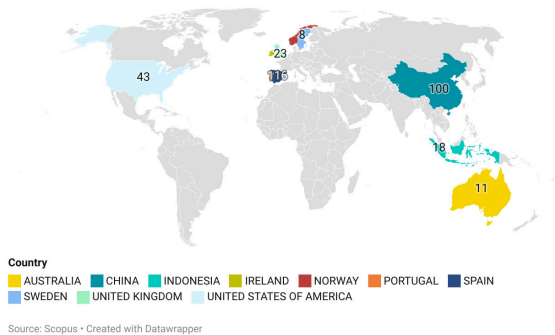


Fig. 4. Countries with the most publications in physical education pedagogy research

The analysis of institutional affiliations reveals that leading research centers in the field of instructional models in physical education are geographically dispersed, with an intense concentration in Europe and North America. Among the top ten institutions, four are based in Spain, confirming the country's position as a major producer of knowledge in this field. The Faculty of Teacher Training and Education at the University of Oviedo ranks highest, with a total of six publications. This institution has become a key hub for the development and dissemination of model-based practices, particularly through the contributions of scholars such as Javier Fernández-Río. Other notable Spanish affiliations include the University of Burgos and the Department of Educational Sciences at the University of Oviedo, reflecting a robust intra-national research network supporting pedagogical innovation.

Outside of Spain, institutions in the United Kingdom also play a significant role. The School of Sport, Exercise and Health Sciences at Loughborough University and the School of Education at the University of Strathclyde have contributed five and three publications, respectively. Loughborough, in particular, is widely recognized as a multidisciplinary center of excellence for physical education and fitness research, including the integration of technology into sport pedagogy. These contributions highlight the importance of critical, evidence-based approaches in curriculum development for physical education. The United States is also strongly represented, with the Division of Kinesiology and Health at the University of Wyoming and the School of Kinesiology at Auburn University contributing four and three publications, respectively. Research from these institutions tends to focus on evaluating the effectiveness of Direct Instruction models and the application of evidence-based pedagogy in physical education settings.

Notably, Universitas Pendidikan Indonesia (UPI) emerges as the only institution from a developing country in the top ten, with four publications. UPI's presence signifies the rising participation of Southeast Asia in global research on physical education pedagogy. This engagement presents opportunities for further development through international collaboration and the strengthening of culturally contextualized themes, such as ethnosport and indigenous-based education. Other institutions worthy of mention include the University of Gothenburg (Sweden) and the University of Limerick (Ireland). The University of Gothenburg showcases an interdisciplinary approach that integrates nutrition science with physical education, while the University of Limerick is well known for its contributions to reflective pedagogy and the teaching of physical education teachers.

An analysis of the distribution of publications in the top journals and thematic trends of popular articles that are most often cited in the study of physical education learning models

The analysis of the most productive journals publishing research on instructional models in physical education indicates that Physical Education and Sport Pedagogy is the leading outlet, with a total of 30 publications. This journal consistently serves as a primary platform for pedagogical research that emphasizes model-based approaches, critical

Table 5. Top Journals in Physical Education Learning Model Publications (2015–2024)

| Top Ten Journal | |
|---|----------|
| Journal Name | Document |
| Physical education and sport pedagogy | 30 |
| International journal of environmental research and public health | 22 |
| Applied mathematics and nonlinear sciences | 21 |
| Journal of physical education and sport | 19 |
| European physical education review | 17 |
| Journal of teaching in physical education | 15 |
| Acm international conference proceeding series | 11 |
| Sustainability (switzerland) | 10 |
| Journal of physics: conference series | 9 |
| Revista internacional de medicina y ciencias de la actividad fisica y del deporte | 9 |

reflection, and curriculum innovation. It is followed by the International Journal of Environmental Research and Public Health (IJERPH) with 22 documents, reflecting a growing intersection between physical education, public health, and the pursuit of Sustainable Development Goals (SDGs). The prominence of these journals highlights the increasingly interdisciplinary nature of physical education, encompassing health, social, and environmental dimensions.

Interestingly, journals such as Applied Mathematics and Nonlinear Sciences, the ACM International Conference Proceedings Series, and the Journal of Physics: Conference Series also appear in the top ten. Their inclusion suggests the emergence of quantitative and technology-based approaches in assessing the effectiveness of instructional models in PE. This points toward a new trajectory in the discipline, one that integrates pedagogy with technological innovation, data science, and digital simulation. Other core journals, such as the Journal of Physical Education and Sport, European Physical Education Review, and the Journal of Teaching in Physical Education, continue to be foundational in supporting both theoretical development and instructional practices. Meanwhile, the presence of Sustainability and Revista Internacional de Medicina y Ciencias de la Actividad Física y del Deporte underscores the relevance of sustainability perspectives and culturally contextualized pedagogical approaches in contemporary physical education research.

An analysis of the ten most cited articles in the field of instructional models in physical education reveals that model-based teaching approaches, particularly Cooperative Learning, Teaching Games for Understanding (TGfU), and Sport Education, have dominated the most influential literature over the past decade. The article by Casey & Goodyear (2015) "Can Cooperative Learning Achieve the Four Learning Outcomes of Physical Education?" ranks first with 211 citations, highlighting Cooperative Learning as a key topic in addressing the demands of modern PE curricula. This work reflects the importance of collaborative approaches in achieving affective, social, cognitive, and psychomotor learning dimensions.

Table 6. Trend analysis in popular articles that are regularly cited

| No | Author's name | Article Title | Total of Citation |
|----|---|---|-------------------|
| 1 | Ashley Casey & Victoria A. Goodyear | Can Cooperative Learning Achieve the Four Learning Outcomes of Physical Education? A Review of Literature (Casey & Goodyear, 2015). | 211 |
| 2 | Ashley Casey & Ann MacPhail | Adopting a models-based approach to teaching physical education (Casey & MacPhail, 2018). | 173 |
| 3 | Javier Fernandez-Rioences, Naira Sanz, Judith Fernandez-Cando & Luis Santos | Impact of a sustained Cooperative Learning intervention on student motivation (Fernandez-Rio et al., 2017) | 115 |
| 4 | Kimberly L. Oliver & David Kirk | Towards an activist approach to research and advocacy for girls and physical education (Oliver & Kirk, 2016) | 114 |
| 5 | Sixto González-Villora, Carlos Evangelio, Jacob Sierra-Díaz & Javier Fernández-Río | Hybridizing pedagogical models: A systematic review (González-Villora et al., 2019) | 99 |
| 6 | Méndez-Giménez, Fernández-Río, J. & Méndez-Alonso, | Sport education model versus traditional model: Effects on motivation and sportsmanship; [Modelo de educación deportiva versus modelo tradicional: Efectos en la motivación y deportividad] (Méndez-Giménez et al., 2015) | 87 |
| 7 | Daniel Bores-García, David Hortigüela-Alcalá, Francisco Javier Fernandez-Río, Gustavo González-Calvo & Raúl Barba-Martín. | Research on Cooperative Learning in Physical Education: Systematic Review of the Last Five Years (Bores-García et al., 2021) 15 articles were fully assessed based on eight criteria: (1 | 86 |
| 8 | Peter Iserbyt, Phillip Ward & Weidong Li | Effects of improved content knowledge on pedagogical content knowledge and student performance in physical education (Iserbyt et al., 2017) | 82 |
| 9 | Luis García-Rico, L. Fernando Martínez-Muñoz, María Luisa Santos-Pastor & Oscar Chiva-Bartoll | Service-learning in physical education teacher education: a pedagogical model towards sustainable development goals (García-Rico et al., 2021) | 82 |
| 10 | Raúl A. Barba-Martín, Daniel Bores-García, David Hortigüela-Alcalá, & Gustavo González-Calvo | The application of the teaching games for understanding in physical education. Systematic review of the last six years (Barba-Martín et al., 2020) updating and expanding with new categories the last published review by Harvey and Jarret in 2014. Four databases were used to select those articles that included information on the implementation of Teaching Games for Understanding in different educational stages. According to PRISMA guidelines and including the PICO strategy after the exclusion criteria, 12 articles were fully assessed based on eight criteria: (1 | 81 |

In parallel, there is a consistent trend toward hybridized instructional models, as exemplified by González-Villora et al. (2019) and Barba-Martín et al. (2020) updating and expanding with new categories the last published review by Harvey and Jarret in 2014. Four databases were used to select those articles that included information on the implementation of Teaching Games for Understanding in different educational stages. According to PRISMA guidelines and including the PICO strategy after the exclusion criteria, 12 articles were fully assessed based on eight criteria: (1, which explore integrated approaches such as TGfU combined with affective taxonomies. Articles by Fernandez-Río et al. (2017) and Bores-García et al. (2021) 15 articles were fully assessed based on eight criteria: (1 further highlight the sustained impact of Cooperative Learning on student motivation and social development. Meanwhile, Oliver & Kirk, (2016) introduce a critical pedagogical perspective by advocating for pedagogical activism and gender equity in PE, marking a broadening of thematic focus in the most cited works. Equally significant are publications that connect service-learning strategies to the achievement

of the Sustainable Development Goals (SDGs), as seen in García-Rico et al. (2021), which expand the scope of physical education into the domain of sustainable development and community engagement. Collectively, these highly cited articles exemplify not only methodological rigor and thematic originality but also reflect a growing academic concern for social values, sustainability, and pedagogical justice in PE instructional design. The systematic presence of scholars such as Ashley Casey, Javier Fernández-Río, and David Hortigüela-Alcalá among the most cited authors underscores their role as thought leaders in shaping the global discourse on physical education pedagogy.

To capture the conceptual focus and thematic evolution within the literature on instructional models in physical education, a keyword co-occurrence analysis was conducted

The keyword co-occurrence map reveals a thematic structure divided into several major clusters, each representing distinct conceptual focuses within the physical education

Table 7. Presents the top 15 most frequently used keywords, extracted from author keywords and Keywords Plus, which reflect the dominant research themes and their interrelations

| Key Word | Occurrences | Total Link Strength |
|---------------------|-------------|---------------------|
| physical education | 212 | 1330 |
| students | 90 | 831 |
| pedagogical models | 81 | 464 |
| teaching | 74 | 725 |
| sports | 73 | 694 |
| humans | 59 | 885 |
| education computing | 53 | 306 |
| human experiment | 47 | 748 |
| article | 47 | 730 |
| motivation | 41 | 477 |
| female | 37 | 610 |
| teaching models | 36 | 180 |
| male | 34 | 561 |
| learning | 34 | 494 |
| physical activity | 33 | 406 |

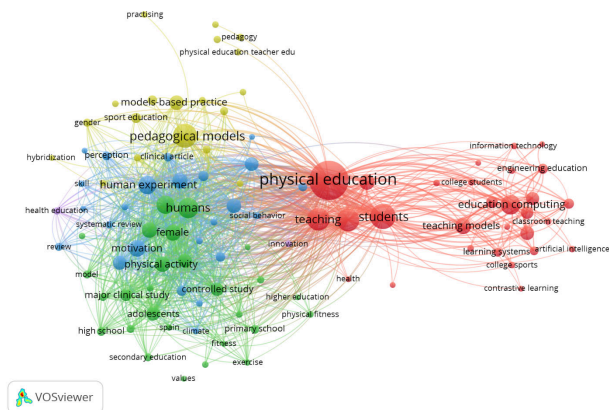


Fig. 5. Keyword Co-Occurrence Analysis: Conceptual Structure and Theme Evolution

literature. The keyword “physical education” appears as the central node, the largest and most connected highlighting its role as the core domain to which all other research themes are linked. The red cluster, located on the right side of the map, comprises keywords such as students, teaching, teaching models, education computing, engineering education, and learning systems. This cluster indicates a thematic focus on integrating technology into physical education, including

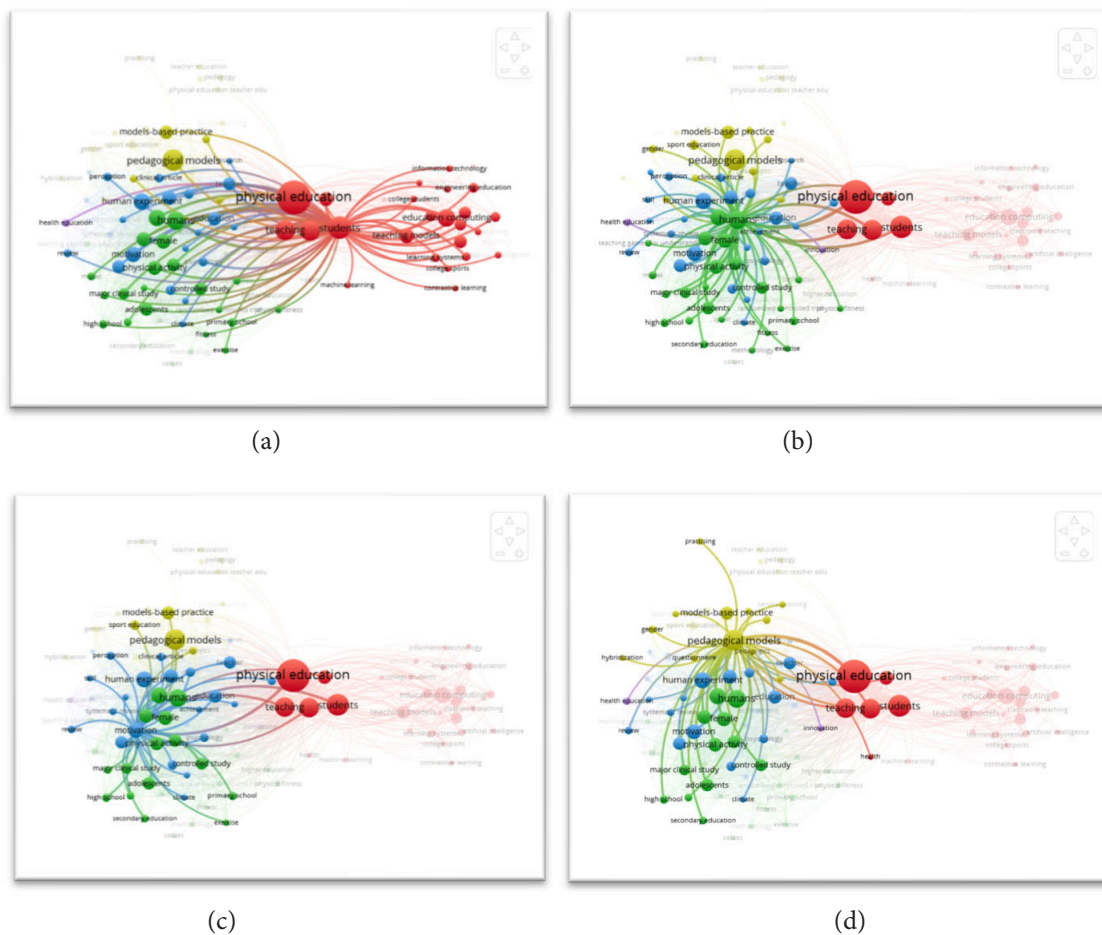


Fig. 6. Some examples of specific keywords: a) education computing, b) humans, c) motivation, d) pedagogical models

terms such as artificial intelligence, contrastive learning, and information technology. It reflects a contemporary trend toward merging pedagogical strategies with digital systems and educational technology (edtech), particularly within higher and vocational education contexts.

Conversely, the green and blue clusters on the left side of the map feature keywords such as motivation, physical activity, female, human experiment, adolescents, and controlled study. These clusters represent themes focused on student participation, physical health, and empirical research assessing the effectiveness of instructional models based on psychological and physiological variables. The presence of keywords such as “systematic review” and “review” further indicates a growing body of meta-analyses and literature reviews over the last decade.

The yellow cluster includes keywords such as pedagogical models, models-based practice, sport education, and hybridization. This reflects a strong emphasis on the development and evaluation of value-based instructional models, including Cooperative Learning, the Sport Education Model, and hybrid strategies that combine multiple models to achieve more holistic learning outcomes. Overall, the map demonstrates that contemporary literature in physical education extends beyond skill acquisition. It increasingly incorporates social-emotional learning, educational technology, health promotion, and sustainability. This thematic evolution reflects the urgent need for physical education to adapt to modern educational demands emphasizing digital contexts, social justice, and curricular relevance in the 21st century.

Discussion

The publication trends in the study of instructional models in physical education have shown a significant increase over the past decade. Following a relatively stable period from 2015 to 2018, a sharp increase in publication output began in 2019, culminating in the highest peak in 2024. This increase reflects growing academic attention to pedagogical innovation within physical education. One of the key drivers was the need to adapt physical education to the constraints imposed by the COVID-19 pandemic. Restrictions on physical activity within school environments have prompted educators to explore new approaches, including the integration of digital technologies and more flexible instructional models (Howley, 2021). In particular, the integration of digital technology into physical education has become a central focus. A study by Casey et al. (2016) emphasized the use of technology to enhance student learning through pedagogically driven case-based approaches that foster critical reflection and collaboration between educators and researchers. The rise in publications also aligns with global efforts to achieve the Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-Being) and SDG 4 (Quality Education) (UNESCO, 2020). Thus, the surge in scholarly output reflects an ongoing transformation in physical education toward more adaptive, tech-informed, and holistically student-centered approaches.

The bibliometric findings further demonstrate a substantial thematic shift in the literature on instructional models in physical education over the last decade. This evolution is characterized by a movement away

from traditional, teacher-centered instruction toward participatory, reflective, and globally responsive models. A key finding is the increased focus on cooperative learning as a pedagogical approach that not only enhances student engagement but also significantly contributes to the development of social-emotional competencies (Dyson et al., 2021; Zhou et al., 2023). Recent literature highlights the importance of collaborative strategies in fostering inclusive, emotionally supportive, and value-oriented learning environments (Zach et al., 2023).

Moreover, there is a notable rise in the integration of technology in physical education, evidenced by growing research on digital tools, artificial intelligence, and online learning platforms. Emerging studies show that technology is increasingly employed not only as a visual or evaluative aid but as a core component of adaptive, data-driven instructional design (Sargent & Calderón, 2021; Y. Wang & Wang, 2024). This is supported by systematic reviews exploring teachers’ readiness and challenges in adopting digital technologies in physical education settings (Saiz-González et al., 2024). Another strategic direction in the literature is the alignment of instructional models in physical education with the Sustainable Development Goals (SDGs). Research by (Baena-Morales et al., 2021, 2023, 2024). Illustrates how value-based and service-learning approaches are being integrated to foster environmental awareness, social collaboration, and character development. These studies reinforce the notion that physical education not only contributes to physical well-being but also serves as a vital educational tool for building a healthy and sustainable society.

Additionally, hybrid or blended learning models have begun to gain traction in the design of physical education curricula, particularly in higher education. Studies by C. Wang et al. (2023, 2024) reveal that these blended approaches not only improve students’ motor skills but also positively influence their attitudes toward sport and physical activity. This thematic evolution reflects a knowledge ecosystem in physical education that is increasingly complex, interdisciplinary, and responsive to the demands of 21st-century education

Conclusion

This study examined the evolving landscape of research on instructional models in physical education using a bibliometric approach covering the period 2015–2024. The analysis revealed steady growth in the field, marked by increasing publication output, broader author participation, and expanding institutional and geographic diversity. Scholars from Spain emerged as dominant contributors in both productivity and citation impact, highlighting the presence of strong research hubs in the European region. Leading journals such as *Physical Education and Sport Pedagogy* and the *International Journal of Environmental Research and Public Health* played pivotal roles in disseminating knowledge and shaping discourse in this domain. The thematic evolution of the literature indicates a shift away from traditional instructional models toward more reflective, collaborative, and contextual pedagogical approaches. Keywords such as cooperative learning, hybrid learning, digital technology, and Sustainable Development

Goals (SDGs) serve as critical indicators of this emerging research orientation. These findings underscore that physical education is no longer perceived merely as a vehicle for physical activity but increasingly as a strategic space for promoting social values, fostering 21st-century competencies, and contributing to the global sustainability agenda. Accordingly, this study offers valuable insights into current research trajectories and provides strategic direction for curriculum development, instructional practice, and future research agendas. Moving forward, strengthening cross-national collaborations and further exploring the integration of digital innovation and sustainability values into physical education represent promising areas for continued scholarly inquiry.

Acknowledgment

To all parties who have helped so that this article can be compiled well, to the Indonesian Education Scholarship, the Center for Funding and Assessment of Higher Education, and the Indonesian Education Endowment Fund, who have provided encouragement and support related to funding. Hopefully, this article can be useful for all of us, and we can get constructive criticism and suggestions for future improvements.

Conflict of Interest

The authors declare no conflicts of interest.

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Бібліометричний аналіз інструктивних моделей у фізичному вихованні: Перехід від методу прямої інструкції до трансформативного навчання

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

Реферат. Стаття: 12 с., 7 табл., 6 рис., 32 джерела.

Історія питання. У цьому дослідженні представлено комплексний бібліометричний аналіз дослідницьких тенденцій щодо інструктивних (освітніх) моделей у фізичному вихованні за період 2015–2024 років.

Мета дослідження. Мета дослідження полягала у мапуванні наукового ландшафту, пов'язаного з еволюцією педагогічних підходів від методу прямої інструкції до кооперативного та трансформативного навчання, використовуючи наукометричну базу даних Scopus та здійснюючи аналіз за допомогою програмного забезпечення Biblioshiny та VOSviewer.

Матеріали та методи. Аналіз проводився із використанням отриманої інформації з бази даних Scopus, обробленої за допомогою Biblioshiny та VOSviewer для вивчення публікаційних тенденцій, авторської продуктивності, мереж співпраці та сполучуваності ключових слів.

Результати. Результати дослідження показують стабільне щорічне зростання кількості публікацій на 25.99% за рахунок значного внеску науковців з Іспанії, Китаю та США. Хав'єра Фернандеса-Ріо визнано найпродуктивнішим і найцитованішим автором. Провідними публікаційними виданнями стали такі журнали, як «Фізичне виховання та педагогіка спорту» й «Міжнародний журнал екологічних досліджень та громадського здоров'я». Мапи співпраці авторів та країн підкреслюють сильну присутність дослідницьких мереж, особливо в Європі. Аналіз сполучуваності ключових слів вказує на появу нових тематик, зокрема кооперативного навчання, гібридних освітніх моделей, інтеграції цифрових технологій та узгодження з Цілями Сталого Розвитку (ЦСР).

Висновки. Отримані результати відображають зміну парадигми в педагогіці фізичного виховання від традиційних методів до більш колаборативних, рефлексивних та орієнтованих на сталий розвиток моделей навчання. Проведене дослідження забезпечує розуміння нових науково-дослідних можливостей та має значення для розвитку подальших інновацій у навчальній програмі з фізичного виховання.

Ключові слова: фізичне виховання, освітні моделі, кооперативне навчання, метод прямої інструкції, трансформативне навчання.

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Cite this article as: Triansyah, A., Hidayat, Y., Haetami, M., Lukitowati, S., Atmaja, N. M. K., & Mu'ammam, M. (2025). Bibliometric Analysis of Instructional Models in Physical Education: From Direct Instruction to Transformative Learning. *Physical Education Theory and Methodology*, 25(5), 1290-1301. <https://doi.org/10.17309/tmfv.2025.5.28>

Received: 01.07.2025. Accepted: 05.08.2025. Published: 30.09.2025

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