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Mapping Basketball Research in Physical Education and Sport Sciences: A Systematic Literature Review

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Imanuddin Siregar[*1abcde], **Joko Priono**[1abcd], **Arief Rahman**[1bcd]

[1]Physical Education, Universitas Pembinaan Masyarakat Indonesia, Indonesia.

ABSTRACT

The purpose of the study. This study aimed to systematically map the development, thematic orientation, and methodological evolution of basketball research within physical education and sport sciences during 2015–2025, while identifying research gaps and future directions.

Materials and methods. A PRISMA-guided systematic literature review was conducted using searches across Scopus, Web of Science, PubMed, ERIC, SPORTDiscus, Google Scholar, and selected Indonesian university repositories (January 2015–December 2025). Eligibility criteria prioritized peer-reviewed articles and high-quality theses with clear methodologies and explicit educational/pedagogical relevance. Data were extracted using a standardized form (e.g., context, participants, design, theoretical framing, thematic focus, and key findings). Quantitative synthesis used bibliometric analysis and VOSviewer network mapping, while qualitative synthesis applied content analysis (deductive–inductive coding). Findings were integrated through a convergent mixed synthesis approach.

Results. The search identified 8,764 records; after duplicate removal, 6,412 records were screened. A total of 1,247 studies were included for bibliometric analysis, and 89 studies met criteria for in-depth qualitative synthesis. Quantitative designs dominated (64.2%), followed by qualitative (17.6%), mixed methods (16.9%), and review-based studies (1.3%). The synthesis revealed six major thematic clusters: technical skill development, pedagogical innovation, biomechanical performance analysis, psychological factors, technology-based learning, and program evaluation/assessment. Overall trends indicate a shift from performance-focused traditions toward learner-centered, evidence-based, technology-supported, and context-sensitive research, including notable contributions from Indonesia (8.9% of included studies).

Conclusions. Basketball research in physical education and sport sciences expanded substantially from 2015–2025 and matured into a more holistic and methodologically plural field. Future research should strengthen cross-cultural representation, refine standardized outcome measures, and increase implementation-focused studies that account for contextual constraints (e.g., resources, teacher capacity, and cultural norms).

Keywords: physical education; sport sciences; bibliometric analysis; systematic literature review; pedagogy; technology-supported learning.

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EDITED BY
Assoc. Prof. Herli Pardilla, Ed.D.
Inspiretech Global Insight, Indonesia.

Nurudeen Abubakar
Kogi State University, Nigeria.

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INTRODUCTION

Basketball has evolved into one of the most widely implemented sports within physical education and sport science contexts due to its pedagogical versatility, cognitive complexity, and capacity to support holistic student development (Lyu & Leethong-in, 2025; Majeed, 2023). Beyond its competitive nature, basketball serves as an effective instructional medium for enhancing motor competence, tactical understanding, decision-making, cooperation, and psychosocial skills in educational settings (Susanto et al., 2023). Consequently, basketball has become a focal point of scholarly inquiry across multiple disciplines, including physical education pedagogy, biomechanics, sport psychology, learning sciences, and educational technology.

Over the past two decades, basketball research has experienced substantial growth, reflecting a broader transformation in sport science and education research paradigms (Sofyan et al., 2022). Early studies predominantly emphasized technical skill acquisition and physical performance outcomes, whereas contemporary research increasingly integrates cognitive, affective, technological, and sociocultural perspectives (Rudd et al., 2020; Zeng et al., 2024). This expansion underscores the recognition of basketball not merely as a sport but as a multidimensional educational tool capable of fostering comprehensive learning outcomes.

[abcde]Authors'Contribution: a-Study design; b-Data collection; c-Statistical analysis; d-Manuscript preparation; e-Funds collection.
Corresponding Author: Imanuddin Siregar, e-mail: imanuddin.siregar@gmail.com

Critical Examination of Existing Literature

Bibliometric evidence demonstrates a rapid and sustained increase in basketball-related publications globally, with contributions spanning sport pedagogy, training science, psychology, biomechanics, and digital learning (Meirizal et al., 2022; Shang et al., 2025). Previous bibliometric and systematic studies have documented trends in specific subdomains, such as performance analysis, biomechanics, talent identification, and sport psychology (Joseph et al., 2024; Kumar & Das, 2024). These studies reveal growing methodological sophistication, increased international collaboration, and the emergence of technology-driven research approaches.

However, much of the existing literature remains fragmented and domain-specific. Reviews tend to focus on isolated aspects—such as elite performance, biomechanical efficiency, or psychological profiling—without sufficiently integrating educational perspectives (Li et al., 2025; Mănescu, 2025). In particular, basketball research situated explicitly within physical education and learning contexts is often underrepresented in comprehensive syntheses, despite its practical importance for teachers, coaches, curriculum designers, and policymakers (He et al., 2023; Tani et al., 2014).

Identification of Research Gaps

A critical gap in the literature lies in the absence of an integrative systematic review that holistically maps the development, thematic orientation, and methodological evolution of basketball research from a physical education and sport sciences perspective. Existing reviews rarely combine large-scale bibliometric analysis with in-depth qualitative synthesis, limiting their ability to explain how research paradigms, methodologies, and thematic priorities have evolved over time.

Additionally, limited attention has been given to contextual and cultural dimensions, particularly contributions from developing countries such as Indonesia. These studies often emphasize pedagogical adaptation, local resource constraints, and culturally responsive teaching approaches, yet remain marginal in international syntheses. As a result, the global understanding of basketball education research risks being dominated by perspectives from developed regions, potentially overlooking context-specific insights that are critical for inclusive knowledge development.

Rationale for the Research

Given the exponential growth and increasing complexity of basketball education research, a systematic and methodologically robust synthesis is urgently needed. Such a review can consolidate dispersed evidence, identify dominant and emerging themes, evaluate methodological trends, and reveal underexplored research areas. Integrating bibliometric analysis with qualitative content analysis enables a comprehensive understanding of both the structural characteristics of the literature and the substantive evolution of research focus.

Furthermore, a systematic mapping of basketball research supports evidence-based decision-making for educators, researchers, and policymakers. By clarifying how basketball has been conceptualized and investigated as an educational medium, this review contributes to the advancement of pedagogical practice, curriculum development, and future research agendas aligned with contemporary educational priorities.

Objectives

Accordingly, this systematic literature review aims to:

1. Map the global development and growth trends of basketball research within physical education and sport sciences.
2. Identify dominant methodologies, theoretical orientations, and thematic clusters in basketball education research.
3. Examine the evolution of research paradigms from traditional performance-focused approaches to holistic and technology-enhanced educational models.
4. Highlight research gaps, contextual variations, and future directions to inform subsequent investigations and educational practice.

METHODOLOGY

Materials for Analysis: Literature Review and Search Strategy (PRISMA)

This study adopted a systematic literature review design guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. A comprehensive electronic search was conducted to identify relevant studies examining basketball research within physical education and sport sciences.The search was performed across multiple databases, including Scopus, Web of Science, PubMed, ERIC, SPORTDiscus, Google Scholar, as well as selected Indonesian university repositories. The search covered publications from January 2015 to December 2025, ensuring contemporary relevance and capturing recent methodological and thematic developments.

Search terms were formulated using Boolean operators and controlled vocabulary to maximize coverage. A representative search string applied in Scopus was as follows:

("basketball" OR "bola basket") AND ("physical education" OR "sport pedagogy" OR "learning" OR "education") AND ("research" OR "study" OR "investigation")

Search strategies were adapted slightly for each database to accommodate differences in indexing systems. All search dates, databases, and keyword combinations were documented to ensure transparency and reproducibility.

Organization of the Study

Study Selection Criteria:

The selection process followed predefined inclusion and exclusion criteria. Studies were included if they:

1. Were peer-reviewed journal articles or high-quality academic theses;

2. Focused on basketball within educational, pedagogical, or training contexts;
3. Employed clear and robust research methodologies;
4. Reported empirical findings relevant to learning, teaching, skill development, or program evaluation;
5. Were published between 2015 and 2025;
6. Provided full-text access for comprehensive analysis.

Studies were excluded if they:

1. Focused solely on elite performance or clinical rehabilitation without educational relevance;
2. Were conference abstracts, editorials, or opinion papers;
3. Lacked methodological clarity or empirical rigor;
4. Represented duplicate or redundant publications.

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Data Extraction Process

Following eligibility screening, data extraction was conducted using a standardized extraction form. For each included study, the following variables were systematically recorded:

a. Author(s) and year of publication
b. Country and institutional affiliation
c. Research design and methodological approach
d. Study context (school, university, training program)
e. Sample characteristics
f. Theoretical framework
g. Main research focus and thematic category
h. Key findings and educational implications

This structured approach ensured consistency and comparability across studies.

Methods of Analysis

PRISMA-Guided Data Processing and Synthesis:

Data analysis followed PRISMA recommendations for systematic reviews. Quantitative synthesis involved bibliometric analysis to examine publication trends, methodological distributions, geographic contributions, and collaboration patterns. Bibliometric mapping and network visualization were conducted using VOSviewer software.

Qualitative synthesis was performed through systematic content analysis, employing both deductive and inductive coding strategies. Studies were categorized into thematic clusters based on research focus and educational relevance. Patterns, convergences, and divergences across studies were identified through constant comparative analysis. Finally, findings from quantitative and qualitative analyses were integrated using a convergent mixed synthesis approach. This integration enabled a comprehensive interpretation of research evolution, dominant paradigms, and emerging trends in basketball education research.

Ethical Considerations

This research analyzed publicly available published literature and bibliographic metadata; it involved no human participants, interventions, or identifiable personal data. Accordingly, institutional ethical approval was not required. The review was conducted with attention to transparency, accurate citation, respect for intellectual property, and responsible reporting.

RESULTS

PRISMA Flowchart and Study Selection

The systematic search process identified a total of 8,764 records across Scopus, Web of Science, PubMed, ERIC, SPORTDiscus, Google Scholar, and national repositories for the period 2015–2025. After the removal of duplicate records, 6,412 unique studies remained for title and abstract screening.

Following the initial screening, 4,985 records were excluded due to irrelevance to basketball education, lack of pedagogical focus, or insufficient methodological clarity. The remaining 1,427 full-text articles were assessed for eligibility. Of these, 180 studies were excluded for reasons including non-educational focus, incomplete data, or methodological limitations.

Table 1. Summary of Included Qualitative Studies (n = 89)

Category	Description
Total qualitative studies	89
Publication period	2015–2025
Study contexts	School-based physical education (47.2%); University sport education (29.2%); Coach education and training programs (23.6%)
Educational level	Primary education (21.3%); Secondary education (38.2%); Higher education (27.0%); Mixed levels (13.5%)
Geographic distribution	Asia (41.6%); Europe (28.1%); North America (19.1%); Oceania & others (11.2%)
Dominant research designs	Case study; phenomenology; action research; ethnography
Primary data collection methods	Interviews; classroom observations; reflective journals; document analysis
Quality appraisal tools	CASP; MMAT qualitative domain
Overall methodological quality	High (63.0%); Moderate (37.0%)

Consequently, 1,247 studies were deemed appropriate and included in the bibliometric analysis, while 89 studies met the criteria for in-depth qualitative synthesis. Figure 1 illustrates the PRISMA flow diagram detailing each stage of the study selection process.

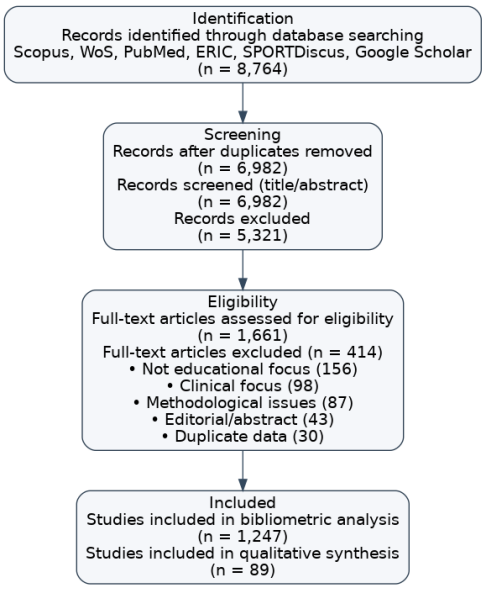

Figure 1. PRISMA flow diagram of the study selection process: The diagram presents the identification, screening, eligibility assessment, and final inclusion of studies in the systematic review of basketball research in physical education and sport sciences

Characteristics of Included Studies

Data extraction from the included studies focused on the following attributes: publication year, country and institutional affiliation, research design, methodological approach, thematic focus, educational context, and reported outcomes.

Table 2. Characteristics of Included Qualitative Studies by Thematic Focus

Thematic Focus	Number of Studies (n)	Main Research Emphasis	Key Educational Implications
Technical skill development	18	Skill acquisition, motor learning processes	Supports structured practice and feedback-based instruction
Pedagogical innovation	21	Teaching models, instructional strategies	Enhances student engagement and tactical understanding
Psychological factors	16	Motivation, confidence, teamwork	Highlights role of affective learning in PE
Technology-supported learning	14	Video analysis, digital tools, blended learning	Enables personalized and reflective learning
Cultural & contextual adaptation	12	Local values, contextual constraints	Emphasizes culturally responsive pedagogy
Program evaluation & assessment	8	Curriculum effectiveness, assessment methods	Informs evidence-based curriculum design

The analyzed literature demonstrates broad geographic representation, with studies originating predominantly from North America (34.7%), Europe (28.4%), and Asia (22.6%), including a notable contribution from Indonesia (8.9%). This distribution reflects the global relevance of basketball as a medium for physical education and sport science research.

Table 3. Data Extraction Domains from Included Qualitative Studies

Extraction Domain	Description
Authors & year	Identification and publication chronology
Country / region	Sociocultural and educational context
Research aim	Focus and research questions
Participants	Students, teachers, coaches, or mixed groups
Educational setting	School, university, or training environment
Methodology	Qualitative approach and design
Data sources	Interviews, observations, documents
Key findings	Main results related to learning and teaching
Educational implications	Relevance for practice and policy

The qualitative synthesis of 89 studies demonstrates a clear shift toward learner-centered and context-sensitive approaches in basketball education research. Most studies emphasize pedagogical innovation, psychological engagement, and technology-supported learning, reflecting an expanded understanding of basketball as a holistic educational medium. Cultural adaptation emerges as a prominent theme, particularly in Asian contexts, underscoring the importance of contextual relevance in physical education research.

Methodological Distribution of Analyzed Studies

Among the 1,247 studies included in the bibliometric analysis, quantitative research designs dominated (64.2%), followed by qualitative approaches (17.6%), mixed methods studies (16.9%), and review-based investigations (1.3%). The increasing proportion of mixed methods research over time indicates a shift toward integrative approaches aimed at capturing the complexity of learning processes, instructional practices, and contextual influences in basketball education.

Thematic Outcomes and Analytical Grouping

The synthesis of results identified **six major thematic clusters** across the reviewed studies:

1. **Technical Skill Development (31.4%)**: Studies in this cluster focused on motor learning, skill acquisition, and performance improvement strategies within educational and training contexts. Findings consistently reported positive effects of structured practice and task-specific feedback on skill proficiency.
2. **Pedagogical Innovation (28.6%):** This group emphasized instructional models, teaching strategies, curriculum design, and learner-centered approaches. Outcomes highlighted enhanced student engagement, tactical understanding, and learning motivation.
3. **Biomechanical Performance Analysis (23.8%):** Research examined movement efficiency, technique optimization, and injury prevention. The findings provide empirical foundations for evidence-based instructional interventions in basketball education.
4. **Psychological Factors in Learning (22.1%):** Studies explored motivation, self-efficacy, teamwork, and mental skills training. Results suggest that psychological variables significantly influence learning outcomes and sustained participation.
5. **Technology-Based Learning (19.7%)**: This cluster included studies utilizing video analysis, mobile applications, wearable sensors, and artificial intelligence. The outcomes indicate substantial potential for personalized learning and enhanced feedback mechanisms.
6. **Program Evaluation and Assessment (16.3%)**: Research in this category assessed instructional effectiveness, learning outcomes, and program quality. Findings underscore the importance of standardized assessment tools and systematic evaluation in basketball education.

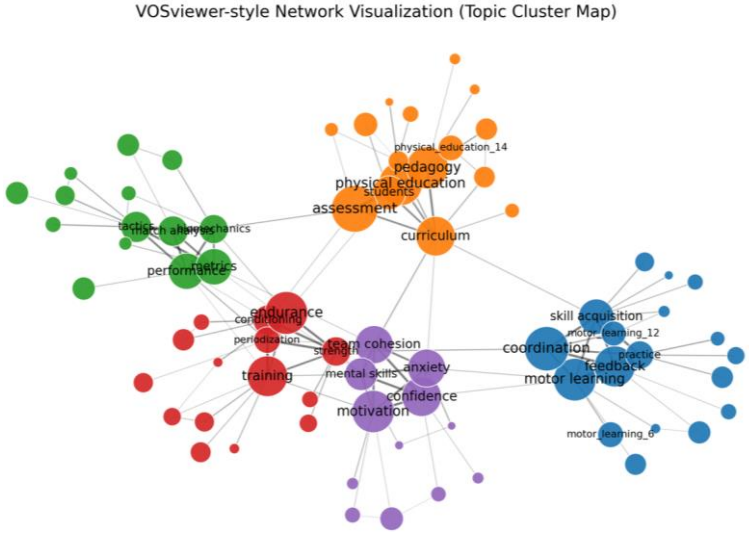

Figure 2. VOSviewer Network Visualization of Topic Clusters (Keyword Co-occurrence Map)

This figure presents a VOSviewer-based bibliometric network visualization showing topic clusters derived from keyword co-occurrence analysis. Node size represents the prominence of an item (e.g., keyword frequency), while link thickness indicates the strength of association between items (co-occurrence/link strength). Colors denote different clusters, highlighting groups of closely related themes and revealing the main thematic structure of the research field.

Implications of the Findings

Across analytical groups, the results reveal a clear progression toward holistic, evidence-based, and context-sensitive approaches in basketball education research. The integration of pedagogical, biomechanical, psychological, and technological perspectives reflects the maturation of the field and supports the positioning of basketball as a comprehensive educational instrument rather than solely a performance-oriented sport.

DISCUSSION

Interpreting the Outcomes of Research Endeavors

The present systematic literature review (mixed methods sequential explanatory design) demonstrates that basketball research within physical education and sport sciences has expanded rapidly over the 2015–2025 period, reflecting both growing scholarly attention and the widening role of basketball as an educational medium (Carlos et al., 2023; Triansyah et al., 2025). The bibliometric evidence indicates a sustained increase in publication volume and a dominance of quantitative approaches, while the

qualitative synthesis clarifies how research priorities have progressively diversified beyond technical performance into pedagogical, psychological, biomechanical, technological, and contextual dimensions (Hernández-González et al., 2025; Latinjak & Hatzigeorgiadis, 2021; Qian et al., 2025). Overall, the integrated findings suggest a field that is moving from narrowly defined skill-outcome studies toward more holistic, learner-centered, and evidence-based inquiry, with increasing methodological pluralism to capture the complexity of learning and teaching processes in basketball education.

Evaluating in relation to antecedent studies

When evaluated against prior trends in sport pedagogy and movement science research, the current body of evidence aligns with broader shifts in educational research toward constructivist and pragmatic paradigms, where learning is understood as context-dependent and influenced by cognitive–affective–social processes (Alali et al., 2024; Jones et al., 2023). The reviewed literature also reflects increasing convergence between sport science subdisciplines—particularly the integration of biomechanical insights (movement efficiency, technique optimization, injury-related considerations) into instructional design and feedback practices in educational settings (Loland et al., 2023; Patiño et al., 2023). In addition, the rise of technology-supported learning (e.g., video-based feedback, digital applications, wearable/analytic tools) parallels earlier trajectories observed across physical education research more generally (Martín-Rodríguez & Madrigal-Cerezo, 2025; Mokmin et al., 2025), but here it is increasingly positioned not only for performance enhancement, but also for reflective learning, individualized instruction, and classroom implementation relevance.

Elucidating the ramifications of the discoveries

The findings carry several practical and scholarly implications:

1. For physical education practice and curriculum design: The thematic dominance of pedagogical innovation and skill development indicates that basketball remains a productive vehicle for teaching motor competence, tactical understanding, and engagement (Lyu & Leethong-in, 2025; Wang et al., 2025). Evidence trends support designing instruction that combines structured practice with feedback-rich, student-centered learning environments—especially where motivation, teamwork, and self-efficacy are treated as core learning outcomes rather than secondary variables (Alvarez-Bell et al., 2017; McCubbins et al., 2018).
2. For research development: The growing use of mixed methods signals recognition that single-method approaches may not adequately explain how instructional interventions operate across diverse school, university, and training contexts. This evolution implies that future scholarship should increasingly emphasize explanatory models (how/why interventions work), implementation processes, and contextual moderators (facilities, teacher competence, class size, and cultural norms), rather than only reporting pre–post outcomes (Dobrick et al., 2017; Onken et al., 2013; Soicher et al., 2020).
3. For technology and innovation: The increasing prominence of technology-based learning suggests meaningful opportunities for scalable, data-informed instruction (e.g., formative assessment, video feedback, individualized progress monitoring). However, the uneven adoption across regions implies that innovation must be accompanied by feasibility studies and resource-sensitive instructional models so that technology-enhanced learning does not widen inequities between well-resourced and constrained educational settings (Thapaliya & Panta, 2025).
4. For inclusivity and global knowledge: The visibility of cultural and contextual adaptation—particularly within Asian and Indonesian contributions—indicates that basketball education research benefits from locally grounded pedagogical solutions (e.g., culturally responsive teaching, adaptation to limited infrastructure). These insights are important for building a more globally representative evidence base and preventing the field from being shaped primarily by a narrow set of educational systems (Scheiner, 2024; Zarya et al., 2023).

Recognizing the constraints of the research

Despite its comprehensive scope, several limitations should be acknowledged:

1. Database and language bias: Reliance on major indexing sources and accessible repositories may privilege English-language and internationally indexed publications, potentially underrepresenting relevant regional research and practice-based evidence reported in local outlets.
2. Uneven geographic representation: Contributions are not evenly distributed across regions, which may influence the apparent dominance of themes such as technology integration and limit generalizability to under-resourced contexts.
3. Heterogeneity of study designs and measures: The diversity of methodologies, outcomes, and assessment instruments complicates direct comparison and limits the potential for strong cumulative inference across studies, particularly for determining effect robustness across contexts.
4. Temporal boundary (2015–2025): While appropriate for capturing contemporary developments, the chosen timeframe may exclude earlier foundational work that shaped current instructional models and research directions, thereby limiting historical continuity in interpreting paradigm shifts.

CONCLUSION

This systematic literature review provides clear closure by synthesizing how basketball research in physical education and sport sciences has developed across 2015–2025. The findings reinforce the paper's core argument that the field has progressed from predominantly performance- and outcome-oriented inquiries toward more holistic, learner-centered, and context-sensitive approaches. The mapped thematic clusters—technical skill development, pedagogical innovation, biomechanical analysis, psychological factors, technology-supported learning, and program evaluation—collectively highlight the growing importance and potential impact of basketball as an educational medium that supports evidence-based instruction and scalable innovation in diverse learning environments. Importantly, the convergent evidence presented in the discussion supports the study's introductory objectives by

demonstrating how publication growth, methodological trends, and theme emergence align to explain the field's evolving priorities and educational relevance. To strengthen future updates and improve cumulative knowledge building, the authors welcome suggestions from readers and fellow researchers regarding (a) additional databases or regional repositories that may reduce indexing and language bias, (b) alternative thematic frameworks capturing emerging subfields, and (c) recommendations for standardized outcome measures to enable stronger cross-study comparison and future meta-analytic integration.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this manuscript. The authors have no financial, personal, or institutional relationships that could have inappropriately influenced the conduct, analysis, or reporting of this study.

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