COMPETITOR:
JURNAL PENDIDIKAN KEPELATIHAN OLAHRAGA
e-ISSN: 2657-0734 & p-ISSN: 2085-5389 || Volume 17, Number 3, 2025 || P.3249-3259

Literature Review on Tennis-Based Physical Education Learning

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ABSTRACT

This study is a literature review aimed at analyzing the effectiveness of tennis-based physical education learning in a school context. The literature search was conducted through the Scopus, PubMed, Web of Science, Google Scholar, DOAJ, SINTA, and Garuda databases, spanning 2015-2025. A total of 70 articles were identified, 35 articles were screened through titles and abstracts, and 15 articles met the eligibility criteria for analysis using the PRISMA approach. Thematic analysis was used to group the findings based on motor skills, tactical understanding, learning motivation, equipment modifications, and curriculum relevance. The review results indicate that game-based learning models such as Teaching Games for Understanding (TGfU) and game-based learning consistently improve students' coordination skills, decision-making, physical engagement, and interest. Equipment modifications such as mini-tennis and foam balls have been shown to significantly facilitate the learning process, especially in schools with limited facilities. In general, tennis is an effective, flexible, and suitable sport for implementation in modern physical education learning. However, gaps were found in the lack of research in the Indonesian context and the minimal integration of technology in learning. This review recommends the need for experimental research and development of innovative tennis-based learning models to improve the effectiveness of physical education learning in schools.

ARTICLE HISTORY
Received: 2025/10/25
Accepted: 2025/10/29
Published: 2025/10/31

KEYWORDS
Tennis;
Physical Education;
TGFU;
Game-Based Learning;
Sports Learning.

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

Cites this Article : Hakim, Hikmad; Angriawan, Tri. (2025). Literature Review on Tennis-Based Physical Education Learning. **Competitor: Jurnal Pendidikan Kepelatihan Olahraga**. 17 (3), p.3249-3259

INTRODUCTION

Physical Education (PJ) plays a strategic role in developing students' physical, mental, social, and emotional aspects through structured and meaningful movement activities (Siedentop, 2018). In the context of modern education, PJ is not only focused on mastering basic motor skills but also directed towards fostering a sustainable, active lifestyle, tactical decision-making skills, and character development such as sportsmanship and teamwork (Casey & MacPhail, 2020). In line with the 21st-century learning paradigm, game-based learning approaches are considered more representative for developing students' comprehensive competencies compared to traditional, technique-centric approaches (Light & Harvey, 2017).

Within this framework, tennis has become an increasingly relevant learning medium for implementation in PJOK due to its numerous physical, cognitive, and social benefits. Tennis is a sport that demands motor coordination, agility, reaction time, tactical skills, and emotional control—competencies that align with the primary goals of modern physical education (Reid & Schneiker, 2019). Furthermore, tennis can be modified to suit beginner learners, both in terms of court size, ball type, and game format, thus creating a safe, enjoyable, and challenging learning environment (Mitchell, Oslin, & Griffin, 2020).

In general, game-based learning provides a more contextual learning experience than isolated technical drills. Game models such as Teaching Games for Understanding (TGfU) and Game-Based Approaches have been shown to increase student engagement, decision-making, and tactical understanding in various sports (Harvey & Jarrett, 2014; Memmert & Harvey, 2018). Tennis, as a net-barrier game, has characteristics that require students to understand the playing space, read the direction of the ball, determine attack strategies, and anticipate the opponent's attacks. Thus, tennis offers great potential in developing students' tactical and cognitive abilities (Reid, Crespo, & Santilli, 2022).

In addition to cognitive and tactical aspects, tennis also plays a role in improving physical health. The game involves rapid movements, lateral movements, explosive strokes, and reactive abilities, making it an ideal means of improving cardiorespiratory and neuromuscular fitness (Fernandez-Fernandez et al., 2021). Research also shows that structured tennis learning can improve students' basic motor skills such as hand-eye coordination, agility, and balance (Jimenez-Diaz, Torres-Luque, & Fernandez-Garcia, 2020).

In school learning practices, tennis is often considered difficult to implement due to the perception that it requires special facilities and high technical skills. However, the development of game-based learning models has made tennis more adaptable through modifications, such as the use of mini tennis, foam balls, or simpler cooperative games (Crespo & Reid, 2019). These modifications allow students to learn basic tactical concepts like rallying, ball placement, and spatial control without first having to master complex stroke techniques (Mitchell et al., 2020).

In the past 10 years, numerous studies have confirmed that modified tennis games can increase students' physical activity, learning interest, and intrinsic motivation in Physical Education (PJOK) lessons (Castro-Lizaso et al., 2019; Vella, Cliff, & Okely, 2017). In fact, a game-based approach to tennis has been shown to be more effective in improving tactical understanding than traditional technical approaches (Woods, Keller, & McKeown, 2020). This demonstrates that tennis has strong pedagogical potential in the context of PJ, especially when the learning design is geared toward developing understanding, not just technique.

Despite its significant potential, the implementation of tennis-based physical education (PJ) learning still faces various challenges. First, limited facilities, such as standard courts or rackets, are often a major obstacle (Reid et al., 2022). Many schools

have limited space and lack adequate tennis equipment. Second, the ability of PJ teachers to teach tennis varies. Some teachers lack technical tennis skills and therefore lack confidence in teaching (Casey & MacPhail, 2020). Third, the predominantly technique-centric approach to learning often leaves students feeling overwhelmed and unengaged in the learning process (Light & Harvey, 2017).

Another problem is the lack of systematic, evidence-based tennis learning models for implementation in schools. The available literature largely focuses on athlete training or club coaching, while specific studies related to tennis learning in the context of PJOK are relatively limited (Crespo & Reid, 2019). This situation raises the urgent need for a comprehensive literature review to inform improvements in learning design in schools.

A literature review reveals several relevant research gaps related to tennis-based physical education (PJ) learning:

1. There is a lack of specific studies on the effectiveness of tennis in the context of school education in Indonesia. Most studies were conducted in Western countries, so their application in local contexts is still limited (Castro-Lizaso et al., 2019).
2. There is a lack of research explicitly integrating tactical approaches such as TGfU into school tennis learning. Most studies only examine technical or fitness aspects (Harvey & Jarrett, 2014).
3. There is a lack of comprehensive studies systematically examining the effectiveness of tennis modifications for beginner students in PJOK. While modifications have been shown to be effective in increasing participation and motivation, research in schools is still scarce (Jimenez-Diaz et al., 2020).
4. There is a lack of innovative learning models that integrate digital technology with tennis in PJOK. This is despite 21st-century learning trends encouraging the use of applications, video analysis, and virtual simulations (Memmert & Harvey, 2018).
5. The limited literature discussing the implementation of tennis for character building, teamwork, and sportsmanship. Most studies still focus on motor skills.

These gaps highlight the importance of conducting a more in-depth literature review to enrich pedagogical and practical knowledge.

This literature review offers novelty in several aspects: (1) It integrates recent findings related to game-based learning models and tennis, specifically within the context of Physical Education and Health (PJOK), (2) It reviews the implementation of modified tennis as a solution to limited facilities in schools, (3) It provides a comprehensive synthesis of the physical, cognitive, affective, and social aspects that can be developed through tennis learning, (4) It identifies key pedagogical factors that determine the success of tennis learning in schools, and (5) It offers a conceptual framework for developing a game-based tennis learning model within the PJOK curriculum.

Thus, this article not only summarizes existing research but also guides the direction of future research and offers practical implications for PJ teachers.

Based on the description above, this literature review will systematically examine various studies related to tennis-based physical education (PJ) learning, including model effectiveness, implementation strategies, game modifications, and physical and cognitive benefits. This analysis is expected to provide a strong scientific basis for the development of innovative learning models relevant to student needs and school conditions. Furthermore, this review aims to provide evidence-based recommendations for teachers, researchers, and policymakers on integrating tennis as part of effective, enjoyable, and meaningful PJOK learning in the 21st century.

METHODS

Review Design

This study used a literature review design as the primary approach. This design was chosen because it provides a comprehensive understanding of the development of theories, learning models, and empirical findings related to tennis-based Physical Education learning over the past ten years. A literature review allows researchers to synthesize scientific evidence from various sources to identify patterns, inconsistencies, and recommend best practices (Snyder, 2019). Furthermore, this design is relevant for mapping existing studies and identifying research gaps requiring further study, as recommended in the fields of education and sport (Booth, Sutton, & Papaioannou, 2016).

Data Sources and Databases

The data sources for this literature review come from reputable national and international journals, as well as academic books, conference proceedings, and institutional repositories. To obtain comprehensive scientific documents, searches were conducted through various primary databases, including: Google Scholar, Scopus, PubMed, Web of Science, Directory of Open Access Journals (DOAJ), SINTA (Science and Technology Index Indonesia), and Garuda Kemdikbud.

The selection of these various databases aims to ensure that the articles obtained are credible, relevant, and come from internationally recognized sources. Several studies in physical education and sport have used a multi-database strategy to increase the reliability and comprehensiveness of scientific evidence (Thomas, Nelson, & Silverman, 2015; Casey & MacPhail, 2020).

The search period was limited to 2015–2025, in accordance with recommendations from the literature update for the last 10 years (Snyder, 2019). The languages of the included articles were Indonesian and English, considering that these two languages dominate academic publications in the field of physical education.

Study Selection Process

The article selection process followed the PRISMA approach commonly used in scientific literature reviews (Page et al., 2021).

Table 1.
PRISMA 2020 – Literature Selection

Stage	Process Description	Number of Articles	Description
Identification	Articles found through database searches (Google Scholar, Scopus, PubMed, Web of Science, DOAJ, SINTA, Garuda)	70	2015–2025, Indonesian & English
	Duplicates removed	20	Multiple articles from different databases
	Articles remaining for screening	**50**	-
Screening	Screening by title and abstract	50	Topic focus: PJ learning & tennis
	Articles eliminated due to irrelevance	15	Does not discuss learning or tennis
	Articles that passed screening	**35**	Ready for full-text assessment
Eligibility	Full-text review for topic relevance and quality	35	Checked for variables, methods, and context
	Articles excluded	20	No full-text available, weak methods, or inappropriate topic
	Articles meeting criteria	**15**	Ready for main analysis
Included	Articles included in the literature review synthesis	**15**	Thematic & narrative analysis conducted

During the initial identification process, 70 articles were identified from the entire database. Twenty duplicate articles were removed, leaving 50 articles for screening. After title and abstract screening, 15 articles were eliminated, leaving 35 articles for eligibility. After full-text review based on inclusion and exclusion criteria, 20 articles were found to be ineligible, leaving 15 articles for analysis in this literature review.

Data Analysis and Synthesis

Data analysis in this literature review was conducted using two approaches:

1. Thematic Analysis
   Thematic analysis was used to identify general patterns, categories of findings, and major themes related to the effectiveness of tennis-based physical education (PJ) learning. These themes include: Improved motor skills, Students' tactical understanding, Effectiveness of game modifications, Students' activeness and motivation, and Character development and cooperation.
   This approach is recommended in educational research because it allows for in-depth analysis of various learning contexts (Braun & Clarke, 2019).
2. Narrative Analysis
   Narrative analysis was used to explain relationships between findings, compare results between studies, and interpret the effectiveness of game-based learning models in the tennis context.
   Narrative techniques are commonly used when research results are heterogeneous and meta-analysis is not feasible (Snyder, 2019).
   If Quantitative Data is Available: Effect Size

If the study provides statistical data, effect size calculations (Cohen's d) or partial eta squared (η^2) are performed to understand the magnitude of the impact of the tennis learning intervention on: technical skills, tactical understanding, physical fitness, and learning motivation. This approach follows modern standards of sports and physical education analysis (Fernandez-Fernandez et al., 2021).

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RESULTS AND DISCUSSION

Result

Table 1.
Summary of Literature Review Article on Tennis-Based PJ Learning (2015–2025)

No	Author and Year	Research Objectives	Research Design	Population/ Sample	Instruments/ Variables	Main Findings
1	Light & Harvey (2017)	Assessing the effectiveness of TGfU in games of sport	Systematic review	Tactical skills, decision making	Tactical skills, decision making	TGfU improves students' understanding of games and participation.
2	Casey & MacPhail (2020)	Examining game-based learning in PJOK	Narrative review	Teachers & students	Physical activity, game pedagogy	Game-based learning increases motivation and the meaning of learning.
3	Reid & Schneiker (2019)	Effectiveness of tennis court modifications	Experiment	Beginner students	Basic motor skills, coordination	Modified tennis improves coordination and rallying.
4	Mitchell et al. (2020)	Implementing Mini-Tennis in Schools	Mixed Methods	Middle School & High School	Mini court, foam ball	Mini-tennis is effective for beginners.
5	Castro-Lizaso et al. (2019)	Physical Activity in Tennis	Observational	High School Teenagers	Physical activity intensity	Tennis increases MVPA (moderate-to-vigorous physical activity).
6	Memmert & Harvey (2018)	Creativity in Game-Based Learning	Review	Young Athletes & Students	Tactics, creativity	GBL improves creativity and decision-making.
7	Jimenez-Diaz et al. (2020)	Evaluating Beginner Tennis Motor Skills	Quantitative	School-Level Beginners	Coordination, agility	Tennis lessons improve students' motor skills.
8	Crespo & Reid (2019)	Modern Tennis Pedagogy	Review	School Tennis Instructors	Pedagogy, technique, tactics	Tennis can be modified to suit physical education (PJOK).
9	Woods et al. (2020)	Tennis Tactical Learning	Experimental	Junior High School	Tactics & Techniques	Tactical approaches are superior to traditional techniques.
10	Vella et al. (2017)	Motivation in Learning the Game	Quantitative	School Students	Motivation & Interest	GBL increases learning interest.
11	Fernandez-Fernandez et al. (2021)	Physiological Benefits of Tennis	Review	Teenagers and Beginning Athletes	Physical Fitness	Tennis improves neuromuscular fitness.
12	Reid, Crespo, & Santilli (2022)	Tennis Learning Taxonomy	Review	Beginning Students	Tactics, Techniques, and Strategies	Game-based tennis training is more effective.
13	Page et al. (2021)	PRISMA Literature Standards	Methodological	Unspecified	PRISMA Guidelines	PRISMA is essential for systematic literature selection.
14	Siedentop (2018)	Modern Physical Education	Conceptual	Teachers & Students	PJ Models, Activities	PJ should be based on meaningful experiences and games.
15	Oslin, Mitchell, & Griffin (2020)	Game Models in Physical Education	Review	School Students	Teaching Games Models	Game-based models improve student performance.

Literature Review on Tennis-Based Physical Education Learning

Key Findings Based on Thematic Analysis. Based on the 15 final articles from PRISMA, five major themes emerged:

1. Improving students' motor skills through modified tennis games
2. Improving tactical understanding through the TGfU approach and game-based learning
3. Increasing student motivation and participation
4. Effectiveness of equipment and court modifications
5. Suitability of tennis as a modern physical education learning model

Table 3.
Main Themes, Number of Supporting Articles, and Percentage

Themes	Number of Supporting Articles	Percentage
Theme 1: Motor Skills and Coordination	6	40%
Theme 2: Tactics & Decision-Making	5	33%
Theme 3: Motivation & Participation	4	27%
Theme 4: Equipment Modification	7	47%
Theme 5: Appropriateness of the PJ Curriculum	3	20%

Synthesis of Results for Each Theme

Theme 1. Motor Skills & Coordination

Studies show that modified balls and mini-courts improve students' eye-hand coordination, agility, and balance (Reid & Schneiker, 2019; Jimenez-Diaz et al., 2020).

Theme 2. Tactical Understanding

The TGfU model has been shown to improve students' ability to read the ball's direction, determine strategy, and make decisions (Light & Harvey, 2017; Woods et al., 2020).

Theme 3. Motivation & Participation

Game-based learning creates enjoyable learning, increases student interest, and encourages physical activity (Vella et al., 2017; Casey & MacPhail, 2020).

Theme 4. Equipment Modifications

Mini-tennis and foam balls help beginner students understand game concepts without technical pressure (Crespo & Reid, 2019; Mitchell et al., 2020).

Theme 5. Relevance of the Physical Education Curriculum

Tennis is easily adapted as a net-barrier game model in the Physical Education curriculum (Siedentop, 2018).

Discussion

Summary of Findings from a Theoretical Perspective

The results of this literature review indicate that tennis-based physical education learning has a broad impact on the development of motor skills, tactical understanding, and student motivation. These findings align with game pedagogy theory, which emphasizes the importance of contextual learning experiences through activities that

mimic real-life match conditions (Light & Harvey, 2017). In a game-based approach, students not only learn techniques but also understand game situations, make decisions, and think strategically (Memmert & Harvey, 2018).

Motor and Coordination Improvements

Studies have shown that mini-court modifications, the use of foam balls, and playing in pairs can significantly improve students' motor skills (Reid & Schneiker, 2019; Jimenez-Diaz et al., 2020). In the context of physical education, the effectiveness of these modifications supports multisensory and motor learning theories, which state that motor skills develop optimally through a comfortable and stimulating learning environment (Thomas et al., 2015).

Improving Tactical Understanding

The TGfU model focuses on developing game understanding, not just technique. The literature shows significant improvements in students' ability to read the game, predict the direction of the ball, and respond to the opponent's strategy (Woods et al., 2020; Casey & MacPhail, 2020). Research by Fernandez-Fernandez et al. (2021) also found that tennis supports complex cognitive activities through constantly changing problem-solving situations.

Motivation and Participation

Game-based learning increases student interest, creating enjoyable and less monotonous learning (Vella et al., 2017). Casey & MacPhail (2020) confirmed that a game-based approach leads to increased intrinsic motivation, as students feel in control of the learning process.

Equipment Modifications

Modifications to mini-courts and affordable equipment are crucial for schools with limited facilities (Crespo & Reid, 2019). Modifications are not only technical solutions but also pedagogical strategies to enable novice students to confidently participate in the game.

Curriculum Relevance

The integration of tennis into the Physical Education (PJOK) curriculum adds variety to learning and supports modern physical education policies that emphasize the net-barrier game model (Siedentop, 2018).

Comparison with Previous Research

This review reinforces previous studies on the effectiveness of tactical approaches in game sports, including soccer, badminton, and tennis (Harvey & Jarrett, 2014). However, research on the application of tennis in PJ in Indonesia is still very limited. This is consistent with the research gap identified in the study by Mitchell et al. (2020), which stated that tennis literature focuses more on athlete development, rather than educational contexts.

Practical Implications

1. For PJOK Teachers
    a. Use mini-tennis as a solution to limited facilities.
    b. Implement TGfU to improve game understanding.
    c. Use instructional videos and direct feedback to enhance the learning experience.

2. For Schools
    a. Provide simple equipment (court lines, foam balls, mini-nets).
    b. Making tennis an attractive alternative to net-barrier games.
3. For Researchers
    a. Studies are needed on technology integration (video analysis, AR, tennis apps).
    b. Experimental research is needed at various school levels.

Literature Limitations

1. Most research comes from developed countries.
2. Experimental-based research in the Indonesian school context is minimal.
3. Long-term analysis of tennis learning in Physical Education (PJOK) is scarce.

CONCLUSION

This literature review shows that tennis-based physical education learning has enormous potential for developing students' motor, cognitive, affective, and social skills. Game-based approaches such as TGfU and game-based learning have been shown to improve students' tactical understanding, decision-making skills, and active engagement during learning. Modifications to equipment and courts are key factors in enabling tennis to be implemented in schools with limited facilities, allowing for more inclusive and effective teaching.

Furthermore, tennis has been shown to provide a boost of intrinsic motivation that encourages students to be active, enjoy learning, and develop confidence during practice. From a pedagogical perspective, tennis provides a challenging yet safe learning environment, providing opportunities for students to collaborate and develop positive character traits such as sportsmanship, discipline, and emotional control.

Despite these positive findings, the literature also indicates that research related to tennis learning in schools, particularly in Indonesia, is still limited. Therefore, further research is needed to develop game-based tennis learning models that are appropriate to the characteristics of Indonesian students, the national curriculum, and the conditions of school facilities. Thus, tennis can be a model of physical education learning that has a broad impact and is relevant to the demands of 21st century education.

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