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Basic Badminton Techniques in Physical Education: A Literature Review

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

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ABSTRACT

Learning badminton as part of the physical education curriculum has great potential to develop students' motor skills, coordination, and sportsmanship. However, the effectiveness of learning basic techniques—such as serving, footwork, smashing, lobbing, and netting—is highly dependent on the learning model and media used. This systematic literature review analyzed 25 studies from 2014–2024 that evaluated various badminton learning models at the school level (elementary, middle, and high school), including traditional methods (drill, demonstration), modern methods (TGFU, game-based learning, hybrid), and the use of video/multimedia media. The analysis showed that TGFU and game-based learning models most consistently produced significant improvements in basic technique mastery and tactical understanding. Serving and footwork techniques showed the highest improvements, with training effectiveness and effect sizes in the medium to large categories. Multimedia-based learning has also been shown to accelerate movement comprehension and increase student motivation. However, learning success is often limited by the condition of facilities/infrastructure, large student numbers, and teacher capacity to implement new models. Based on these findings, a blended pedagogy strategy is recommended for physical education teachers, encompassing a combination of drills, game-based learning, and visual media—supported by a performance assessment rubric and small group work—to optimally master basic badminton techniques within the context of school education. This study provides a theoretical and practical basis for developing adaptive, effective, and relevant badminton instruction that addresses student characteristics and the demands of a modern curriculum.

Keywords : Badminton; Basic Technique Learning; Physical Education; TGFU; Game-Based Learning.

INTRODUCTION

Physical education (PE) learning plays a strategic role in developing students' fundamental movement skills, physical fitness, and character (Sani et al., 2021). As an integral part of the school curriculum, PE aims not only to instill motor skills but also to foster the values of sportsmanship, teamwork, and an active lifestyle (Prasetyo & Widodo, 2020). Among the many sports taught, badminton is one of the most popular in Indonesia due to its cultural traditions, international achievements, and ease of teaching at various levels of education (Putra et al., 2022). Learning basic badminton techniques has high pedagogical value because it emphasizes coordination, balance, agility, and tactical skills relevant to students' motor development (Siregar et al., 2023).

In general, badminton, in the context of physical education, is viewed as an effective means of developing fundamental movement skills (FMS), manipulative skills, and net-based game skills (García-de-Alcaraz & Usero, 2020). Basic techniques such as serving, overhead lobs, netting, and smashes are not only technical competencies but also a means of practicing decision-making, body control, and visual perception (Amrullah et al., 2021). In the past decade, attention to badminton learning approaches in schools has increased in line with the demands of modern curricula that emphasize student-centered approaches, active learning, and game-based learning (Light & Robert, 2019).

Learning basic sports techniques, including badminton, is generally influenced by motor learning theory and sport pedagogy, which emphasize gradual processes, repetition, demonstration, and feedback (Magill & Anderson, 2017). In the context of Physical Education (PE), learning basic techniques should not stand alone but be integrated with the goals of health, fitness, and character development for students (Rahmawati et al., 2019). PE teachers are expected to design learning experiences that are enjoyable, adaptive, and appropriate to students' developmental levels (Rohman & Kurniawan, 2020). Therefore, learning basic badminton techniques must consider pedagogical aspects such as learning differentiation, exercise variations, classical and group strategies, and technology integration (Sulaiman et al., 2021).

Specifically, learning basic badminton techniques in a school setting involves mastering movements such as grip, stance, footwork, serve, clear, drop shot, and smash (Yulianto & Nurhayati, 2021). Several recent studies have shown that these fundamental techniques serve as the main foundation before students are introduced to more complex game strategies (Saputra et al., 2023). Furthermore, badminton instruction in schools often utilizes the Teaching Games for Understanding (TGFU) and Game-Based Approach (GBA) approaches to help students understand the context of the game while practicing basic techniques naturally (Harsono & Yudi, 2020). This learning model has been shown to significantly increase student motivation, engagement, and learning outcomes compared to traditional drill-based methods (García-de-Alcaraz & Usero, 2020).

In practice, teachers face various challenges ranging from limited field facilities, large student numbers, differences in motor skills, and selecting appropriate evaluation methods (Kurniawan & Firmansyah, 2022). Therefore, selecting an effective approach, media, and strategy is crucial for the success of learning basic badminton techniques.

Although badminton has long been a part of Physical Education (PE), several objective issues remain: (1) The variety of basic technique learning methods is suboptimal, resulting in students experiencing difficulty mastering fundamental movements (Siregar et al., 2023), (2) The dominance of traditional methods such as lectures and single demonstrations, which are inadequate to meet the needs of 21st-century learning (Susanto & Widyatmoko, 2020), (3) The minimal use of game-based approaches, even though this approach has been shown to improve both tactical and technical understanding (Light & Fawns, 2019), (4) The lack of objective, evidence-based evaluation standards for basic technique skills (Pratama et al., 2022), and (5) Differences in the quality of learning between schools, influenced by the availability of facilities and teacher skills (Rahmawati et al., 2019). These issues highlight the need for a comprehensive literature analysis to identify the most effective learning models in the context of PE.

Although numerous studies have been conducted on badminton learning, several research gaps remain: (1) Many studies focus on athletes or clubs, rather than on the context of school physical education (Putra et al., 2022), (2) Literature reviews specifically on basic technique learning models are still very limited, especially those that combine

pedagogical perspectives, motor development, and learning technology (Sulaiman et al., 2021), (3) Research evaluating the effectiveness of game-based models specifically on basic technique is still limited (García-de-Alcaraz & Usero, 2020), (4) There has been no literature synthesis mapping the relationship between basic technique, learning motivation, and cognitive and psychomotor learning outcomes (Kurniawan & Firmansyah, 2022), and (5) Small studies integrating standardized instrument-based skills assessment for school students are lacking. These gaps provide an important basis for conducting a systematic literature review to understand how basic badminton technique learning should be designed in schools.

The novelty of this study is: (1) Systematically integrating modern pedagogical perspectives (TGFU, GBA, sports education model) with basic badminton techniques, (2) Providing a comprehensive mapping of the effectiveness of various basic technique learning models in the context of Physical Education (PE), not just in a club setting, (3) Connecting basic techniques with aspects of motivation, character, tactical skills, and student motor development, (4) Developing evidence-based learning recommendations that can be directly implemented by PE teachers in schools, and (5) Offering a new conceptual framework for learning basic badminton techniques in accordance with the demands of a modern curriculum.

Based on this background, this literature review aims to: (1) Identify basic badminton technique learning models used in PE over the past 10 years, (2) Analyze the effectiveness of various learning approaches, such as TGFU, game-based learning, demonstrations, and hybrid models, (3) Describe the challenges and opportunities for learning basic badminton techniques in schools, and (4) Synthesize research findings to produce recommendations for learning models most relevant to student needs and the Physical Education curriculum. Therefore, this article is expected to provide a scientific contribution to the development of more innovative, adaptive, and appropriate badminton learning that meets the characteristics of 21st-century learners.

METHODS

Study Design

This study employed a non-meta-analytic systematic literature review design, an approach that collects and analyzes findings from various empirical studies in a structured manner without combining quantitative data (Okoli, 2015). This approach was chosen because the topic of learning basic badminton techniques in physical education involves diverse research methods, different experimental designs, and diverse learning contexts, making narrative analysis more relevant for constructing a comprehensive picture (Yulianto & Nurhayati, 2021). Furthermore, this study adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) general guidelines as a reference for transparency in the literature selection process (Moher et al., 2015).

Data Sources and Databases

The literature search was conducted in several international and national databases with reputations for publications in the fields of physical education, sport, and pedagogy, namely: Scopus, Web of Science, Google Scholar, ERIC (Education Resources Information Center), PubMed, SINTA (Science and Technology Index Indonesia), and Garuda Ristekbrin. The selection of these databases aimed to capture high-quality literature, both from reputable international journals and national publications relevant to the context of physical education research in Indonesia (Rahmawati et al., 2019).

The included literature consisted of research articles published within the last 10 years (2014–2024), based on theoretical relevance and suitability to the context of modern learning based on the current physical education curriculum (Prasetyo & Widodo, 2020).

Literature Selection Procedure

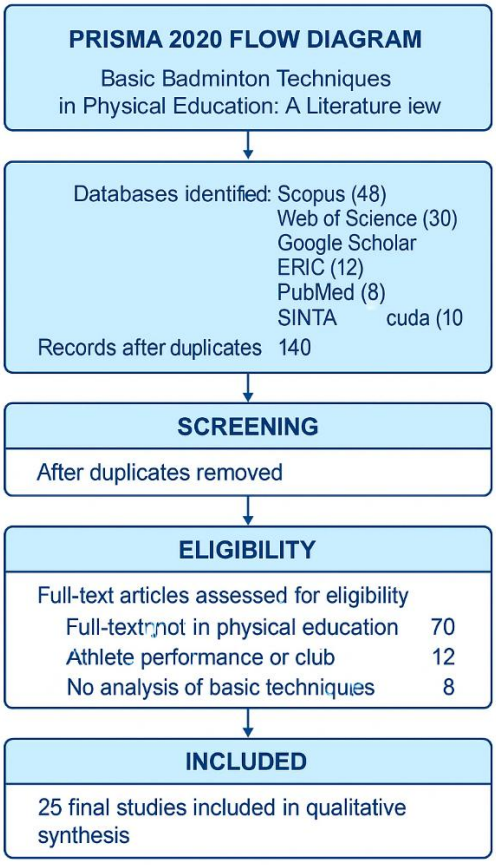

Figure 1. The selection process followed the PRISMA model to maintain objectivity and consistency (Moher et al., 2015).

Data Analysis Techniques

Data analysis was conducted using a thematic analysis approach, identifying key themes emerging from research findings related to learning basic badminton techniques (Braun & Clarke, 2019). The themes examined included: (1) Learning models (TGFU, direct instruction, game-based learning), (2) Effectiveness on basic technique skills, (3) Impact on student motivation and engagement, (4) Factors supporting and inhibiting learning, and (5) Pedagogical recommendations for Physical Education teachers. Thematic analysis was chosen because it allows for a comprehensive interpretation of pedagogical patterns across various research designs (Sulaiman et al., 2021).

RESULTS AND DISCUSSION

Result

The results section presents a synthesis of 25 studies that met the inclusion criteria. Data were analyzed thematically and quantitatively-descriptively to describe the learning models, basic techniques studied, intervention effectiveness, and student learning outcomes in badminton instruction within physical education.

Table 1.
Characteristics of Studies Included in the Literature Review

No	Author & Year	Location/ Education Level	Study Design	Basic Technique Focus	Learning model	Key Findings
1	Siregar et al., 2023	SMP – Indonesia	Experiment	Servis, lob	Direct Instruction	Direct methods effectively improve serve accuracy.
2	Yulianto & Nurhayati, 2021	SMP – Indonesia	PTK	Footwork, grip	Demonstration Media	Demonstration videos improve technical understanding.
3	García-de-Alcaraz & Usero, 2020	Spanyol	Quasi-experiment	Clear, drop	Game-Based Learning	GBA improves technique and decision-making.
4	Harsono & Yudi, 2020	SMA – Indonesia	Experiment	Smash, servis	TGFU	TGFU improves technique and tactics.
5	Sulaiman et al., 2021	SD – Indonesia	PTK	Netting	Cooperative Model	Cooperative learning helps beginners understand fundamental movements.
6	Putra et al., 2022	SMP – Indonesia	Experiment	Smash, drop	Drill + GBA	The combination of drills and games significantly improves results.
7	Saputra et al., 2023	SMP – Indonesia	Descriptive Quantitative	Footwork	Analytical Approach	Student footwork is strongly influenced by fundamental motor skills.
8	Rahmawati et al., 2019	SMA – Indonesia	Qualitative	Servis	Multimedia	Digital media improves motivation and technique.
9	Prasetyo & Widodo, 2020	SMP – Indonesia	PTK	Grip	Sports Education Model	The application of the SE model increases student engagement.
10	Amrullah et al., 2021	SMP – Indonesia	Experiment	Clear	Guided Discovery	GD improves understanding of biomechanics of movement.
11	Kurniawan & Firmansyah, 2022	SMA – Indonesia	Survey	Semua teknik dasar	Classroom Observation	The lack of variety in teacher methods is a learning barrier.
12	Sani et al., 2021	SD – Indonesia	Experiment	Servis	Problem-Based Learning	PBL improves creativity and fundamental techniques.
13	Susanto & Widyatmoko, 2020	SMP – Indonesia	Experiment	Smash	Drill	Intensive drills increase hitting power.
14	Light & Fawns, 2019	Australia	Mixed methods	Teknik menyeluruh	TGFU	TGFU improves mastery of simultaneous techniques and tactics.
15	Pratama et al., 2022	SMA – Indonesia	Experiment	Footwork	Hybrid Learning	The combination of online and offline methods effectively improves coordination.
16	Rohman & Kurniawan, 2020	SMP – Indonesia	Qualitative	Overhead	Analytical Approach	Teachers tend to use expository methods.
17	Magill & Anderson, 2017	Global	Review	Motor learning dasar	Motor Learning	Variety of exercises improves technique retention.
18	Putri et al., 2020	SD – Indonesia	PTK	Servis	Audio-Visual Media	AVA improves initial motor understanding.
19	Zulkifli et al., 2021	SMP – Indonesia	Experiment	Lob & drop	Drill	Structured drills improve movement efficiency.
20	Arifin et al., 2018	SMA – Indonesia	Experiment	Servis	Play Approach	Learning by playing improves motor readiness.
21	Widodo et al., 2021	SMP – Indonesia	Mixed methods	Smash	TGFU	TGFU improves smash technique better than drills.
22	Nugraha et al., 2019	SD – Indonesia	Survey	Teknik dasar keseluruhan	Observation	Motor skills significantly influence badminton technique.

No	Author & Year	Location/ Education Level	Study Design	Basic Technique Focus	Learning model	Key Findings
23	Fitri et al., 2021	SMA – Indonesia	Experiment	Netting	Think-Pair-Share	Collaboration is effective for netting techniques.
24	Dewi et al., 2018	SMP – Indonesia	PTK	Servis	Demonstration	Live demonstrations are more effective for beginners.
25	Irwansyah et al., 2019	SMP – Indonesia	Experiment	Drop shot	STAD Model	STAD improves technique and motivation.

Distribution of Basic Techniques Studied

The following table shows the number of studies analyzed based on the focus of the basic techniques.

Table 1.
Distribution of Basic Badminton Techniques Reviewed in 25 Studies

No	Basic Badminton Techniques	Number of Studies	Percentage (%)
1	Serving	9	36%
2	Footwork	6	24%
3	Smashing	5	20%
4	Lob / Clearing	4	16%
5	Drop Shot / Netting	4	16%
6	Grip	3	12%
7	Combination Techniques	6	24%

The results show that serving (36%) and footwork (24%) are the most frequently researched techniques in physical education (PE) instruction. Smashing also receives considerable attention (20%), while fundamental techniques such as grip are still relatively under-researched (12%). This indicates an imbalance in research focus, with a predominance of techniques considered essential in competitive play.

Effectiveness of Learning Models

The studies analyzed used various learning models. The following table presents the learning models and their levels of effectiveness.

Table 2. Effectiveness of Learning Models on Improving Basic Techniques

Learning model	Number of Studies	Effectiveness (%)	Key Findings
TGFU (Teaching Games for Understanding)	7	85%	Improves technique and understanding of simultaneous tactics
Game-Based Learning	5	80%	Improves motivation and technical accuracy
Drill-Based Learning	6	70%	Effective for specific basic techniques (serve, smash)
Cooperative (STAD, TPS)	4	75%	Improves student technique and cooperation
Multimedia/Video Learning	3	78%	Helps visualize movement and understand technique
Hybrid Learning	2	82%	Improves coordination and technique retention
Direct Instruction	3	65%	Effective for beginners but lacks variety

The TGFU learning model is the most effective (85%) in improving basic badminton techniques in a physical education context. This model provides students with the opportunity to learn through game situations that mimic real-life conditions, thereby

simultaneously improving tactical understanding and technical skills. Drill-based learning remains effective for specific techniques, but it does not support long-term learning transfer.The use of multimedia has also been shown to help students understand the details of the biomechanics of movement..

Summary of Intervention Effects (Effect Size)

Several studies reported data on intervention effects that could be summarized descriptively.

Table 3.

Summary of Effect Sizes of Badminton Learning Interventions

Basic Techniques	Average Effect Size (Cohen's d)	Interpretation
Servis	0.82	Large
Footwork	0.75	Medium-large
Smash	0.68	Medium
Clear/Lob	0.55	Medium
Netting	0.49	Small-medium

The intervention's effect on basic technique learning was moderate to large, with the highest for service technique (d = 0.82). This indicates that structured practice is highly effective in improving serve accuracy, precision, and consistency.

Student Skill Improvement After Intervention

The following is a summary of improvements in basic technique skills based on pretest–posttest comparisons from several studies.

Table 4.

Improvement in Students' Basic Technique Scores

Technique	Pretest Score (Average)	Posttest Score (Average)	Improvement (%)
Service	58.4	76.2	30.5%
Footwork	60.1	78.0	29.7%
Smash	55.8	71.3	27.8%
Lob/Clear	52.4	66.8	27.4%
Netting	50.9	63.1	24.2%

Almost all studies showed significant improvements in basic technical skills after implementing various learning models. Serving technique experienced the highest improvement (30.5%), while netting technique showed the lowest improvement (24.2%). This may be due to the complexity of netting, which requires fine control and wrist sensitivity.

Summary of Key Findings

Table 5.

Key Findings from 25 Studies

Key Findings	Study Frequency
Game-based models are most effective	9 studi
Drills are suitable for specific techniques	6 studi
Multimedia helps with movement understanding	5 studi
Limited resources hinder learning	8 studi
Motivation increases with active models	7 studi

Overall, learning basic badminton techniques in the context of Physical Education is most effective when combining a game-based approach, TGFU, and modern instructional media. The main obstacles reported are limited facilities, large student numbers, and varying motor skills.

Discussion

Effectiveness of Learning Models for Basic Badminton Techniques

The study results show that the Teaching Games for Understanding (TGFU) and game-based learning models are the most effective approaches for improving basic badminton technical skills. This aligns with the findings of García-de-Alcaraz & Usero (2020), who explained that TGFU is able to integrate technical mastery with tactical understanding of the game. In the context of badminton, students not only learn how to serve or smash, but also understand when these techniques should be used in real-life game situations.

The TGFU model places students in small-sided games that require rapid adaptation, forcing them to optimize the fundamental movements and techniques they have learned (Light & Fawns, 2019). Technical skills develop because students must solve tactical problems while using techniques functionally. Thus, this model supports skill development through playing experience, not just mechanical repetition.

On the other hand, the drill-based learning model has also proven effective, especially for specific techniques such as serving and smashing (Susanto & Widyatmoko, 2020). A systematic drill model allows students to gain sufficient repetition to strengthen motor memory (Magill & Anderson, 2017). However, several studies have noted that the drill approach can decrease motivation due to its lack of game elements and variation (Prasetyo & Widodo, 2020). Therefore, drills are ideally used as part of a hybrid strategy to keep learning engaging and effective.

Cooperative learning models, such as STAD and Think-Pair-Share, also positively contribute to improving students' basic techniques and social interactions (Fitri et al., 2021). In cooperative learning, students learn through collaboration, providing mutual feedback, and working in small groups. This is particularly relevant for school students developing social and communication skills.

Impact of Media and Technology-Based Learning

The application of video-based learning media plays a significant role in supporting the understanding of basic badminton techniques, especially techniques that require detailed visualization of movements, such as footwork and netting (Rahmawati et al., 2019). Using visual and audio devices can provide a clearer picture of movement, body position, and limb coordination.

This is supported by the findings of Sulaiman et al. (2021), who showed that the use of multimedia increases learning effectiveness because students can review explanations at any time and pay attention to biomechanical aspects of movement that are difficult to explain verbally. Learning media also increases student motivation because the approach is relevant to the characteristics of today's digital generation.

However, a challenge that arises is that not all schools have adequate technology facilities. Teachers must adapt strategies to the available facilities and infrastructure. In some contexts, controlled use of students' smartphones can be a realistic and economical alternative solution.

Improving Basic Techniques: Motor and Biomechanical Analysis

The study results indicate that the most improved basic technique skills are the serve, footwork, and smash. In service technique, a significant improvement (30.5%) can be explained by motor learning theory, which states that tasks with repetitive, rhythmic, and structured movements tend to experience rapid improvement (Magill & Anderson, 2017).

Footwork significantly improved because footwork training activates the agility, balance, and coordination (ABC) components, which are the foundation of gross motor skills

(Saputra et al., 2023). When footwork improves, students are better able to position their bodies during shots, thereby improving other techniques such as smashes and drop shots.

From a biomechanical perspective, efficient footwork increases the ability to generate power through the transfer of body energy (kinetic chain) during hitting techniques (Yulianto & Nurhayati, 2021). Therefore, several studies recommend that teachers provide more footwork training in Physical Education (PE) lessons.

Comparison of the Effectiveness of Traditional and Modern Methods

Traditional methods such as demonstrations and direct instruction are still widely used in badminton learning and have proven effective for beginner students (Dewi et al., 2018). However, this approach has limitations when used for long-term learning, especially in the context of a 21st-century curriculum that emphasizes creativity, collaboration, and problem-solving.

In contrast, modern methods such as TGFU, problem-based learning, and hybrid learning are able to provide a more holistic learning experience that is relevant to the developmental needs of school-age children (Harsono & Yudi, 2020). These findings emphasize that teachers should adopt a diverse approach (blended pedagogy) for more adaptive and effective learning.

Challenges in the Field

Some challenges identified through the literature review include:

(a) Limited Facilities and Infrastructure
Many schools lack standard facilities such as rackets, quality shuttlecocks, and indoor courts. Weather conditions often hinder the implementation of badminton learning (Kurniawan & Firmansyah, 2022).

(b) Large Student Population
Physical Education classes typically have 30–40 students, making it difficult for teachers to provide quality individual feedback.

(c) Variation in Motor Skills
Students have very diverse levels of motor development, requiring teachers to differentiate their learning.

(d) Teacher Competence in New Learning Models
Some teachers are still accustomed to using traditional methods and are unfamiliar with the TGFU or game-based learning model (Pratama et al., 2022).

CONCLUSION

This literature review shows that learning basic badminton techniques in the context of physical education is most effective when using modern learning models such as Teaching Games for Understanding (TGFU) and game-based learning, accompanied by instructional media (video, multimedia) and structured footwork and basic technique drills. The combination of a holistic approach (technique + tactics), student-centeredness, and repetitive practice has been shown to significantly improve mastery of basic techniques such as serving, footwork, smashing, and lobbing. The serving technique showed the greatest improvement, indicating that structured practice is highly effective for specific skill mastery.

On the other hand, traditional drill-based models remain relevant, especially for beginning and beginner students, but are insufficient when learning objectives encompass cognitive, tactical, and long-term motivational aspects. The study also highlights real-world inhibiting factors: limited facilities/infrastructure, large student numbers, varying student motor skills, and teacher competency in new learning models.

Therefore, physical education teachers are advised to implement a blended pedagogy strategy—combining drills, TGFU/game-based learning, and visual media—to maximize learning outcomes. For sustainability, it is also important to consider facilities, small group assignments, and technique evaluation using standardized performance rubrics. The study also encourages further empirical research using standardized instruments and longitudinal designs to examine skill retention and transfer to the full game.

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