

Game-Based and Teaching Games for Understanding Approaches in Badminton Learning at School: A Systematic Review

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ABSTRACT

Badminton is a net/wall game commonly taught in school physical education. It requires not only technical proficiency but also tactical awareness, decision-making, spatial understanding, and meaningful game performance. However, badminton instruction in schools is still often dominated by isolated technical drills, which may limit students' ability to transfer skills into authentic game situations. Game-Based Approaches and Teaching Games for Understanding (TGfU) offer a pedagogical alternative by placing modified games, tactical problems, questioning, and contextualized skill execution at the center of learning. This systematic review aims to synthesize recent evidence on the implementation and learning outcomes of game-based and TGfU approaches in school badminton learning. The review was guided by PRISMA 2020. An exploratory search was conducted for articles published between January 2021 and April 2026 using combinations of keywords related to badminton, TGfU, game-based learning, modified games, school students, and physical education. After duplicate removal and title-abstract screening, four potentially relevant studies were examined in full text for preliminary synthesis. The available evidence suggests that game-based and TGfU-related approaches are promising for integrating technical skill development, tactical understanding, decision-making, game performance, and student engagement. The most directly relevant study showed that situated game teaching through set plays produced greater improvement in tactical knowledge, technical ability, and badminton game performance than a technique-focused approach. Game-based and TGfU approaches are pedagogically relevant for badminton learning in schools because they connect skill learning with tactical meaning and active student participation. Nevertheless, the number of recent badminton-specific studies remains limited, indicating the need for more rigorous, transparent, and sport-specific intervention research.

Keywords: badminton learning; Teaching Games for Understanding; game-based learning; physical education; school students

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INTRODUCTION

Badminton is a game widely taught in physical education because it is easily modified, relatively safe, requires adaptable equipment, and has educational value for the development of motor skills, fitness, coordination, agility, and lifelong sports participation. As a game, badminton requires students to master basic techniques, such as serving, lobbing, dropshots, smashes, netting, and footwork. However, mastering technique alone is not enough. In a fast-paced game, students also need to read their opponents' positions, understand space, choose the direction and type of shot, and make the right decisions during each rally.



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In school learning practices, badminton is often taught using a technique-centered approach. Students are typically asked to imitate the teacher's demonstration, repeat the movements individually, and then play at the end of the lesson. This pattern can help students recognize the form of the movement, but it doesn't always help them understand the primary function of the movement. Students may be able to execute a forehand or serve in a practice situation, but they may not necessarily know when to use it against an opponent. This gap between technique practice and game performance is one of the main criticisms of overly technical game learning.

Teaching Games for Understanding (TGfU) was introduced by Bunker and Thorpe (1982) in response to game learning that overemphasized technique. TGfU places game understanding, tactical awareness, decision-making, and problem-solving at the core of learning. In this model, students don't have to wait until they have mastered techniques perfectly before playing. Instead, they learn through modified games, identifying problems, discussing them, and developing technical skills as a means to solve problems within the game.

The game-based approach has a strong presence in badminton learning. The game demands quick, repetitive decisions: whether to direct the shuttlecock far back, drop it over the net, hit it quickly and horizontally, or return it to maintain a rally. These decisions cannot be fully learned if the lesson consists solely of repeating techniques. Through TGfU and a game-based approach, teachers can simplify game situations, for example by reducing the playing area, limiting the types of shots, providing target areas, or changing the scoring system to help students understand the principles of specific playing strategies.

Recent empirical studies reinforce the importance of game-based approaches. González-Valero et al. (2024) demonstrated, through a systematic review and meta-analysis, that TGfU positively impacts decision-making skills in sports learning. Manninen et al. (2025) also reported that game-based approaches have a positive effect on decision-making in game situations and motor skills as measured by skills tests. These findings are relevant to badminton because playing performance depends not only on technique but also on the ability to choose appropriate actions according to the situation.

Specifically, in the badminton context, Devrilmez et al. (2024) examined the effects of Situated Game Teaching Through Set Plays on secondary school students in Turkey. The study demonstrated that game-based learning improved badminton knowledge, technical skills, and performance better than a technique-focused approach. Furthermore, Wang et al. (2025) demonstrated that a 10-week modified badminton curriculum positively impacted physical fitness and sustained attention in elementary school students. These two studies demonstrate that badminton learning in schools has ample room for development through more contextual, active, and student-centered learning designs.

However, literature specifically addressing game-based learning and TGfU in badminton learning in schools is still limited. Most previous studies discuss TGfU or game-based learning approaches in physical education in general, not specifically badminton. Yet, badminton has characteristics that distinguish it from other game sports. Its distinctive features are evident in its continuous rally-point system, rapid transitions, court control, varied shuttlecock strokes, and the close relationship between quick decisions and highly effective technique placement.

This limited literature highlights the need for a systematic review that maps the latest evidence on the application of game-based approaches and TGfU in badminton learning in schools. This review is crucial not only to determine whether the approach is effective, but

also to understand how it is implemented, what learning outcomes are assessed, and what aspects need further development in future research. Thus, this study is expected to provide theoretical contributions to the development of sports pedagogy and practical contributions for physical education teachers in designing more meaningful, inclusive, and student-centered badminton lessons.

Based on this description, this systematic review aims to gather empirical evidence regarding the implementation and learning outcomes of game-based and TGfU approaches in badminton learning in schools. Specifically, this study aims to answer four questions: (1) what are the characteristics of the application of game-based and TGfU approaches in badminton learning in schools; (2) what learning outcomes are studied; (3) how does this approach contribute to technical skills, tactical understanding, decision-making, game performance, motivation, and student engagement; and (4) what methodological limitations and future research directions can be identified.

METHOD

Study Design

This study used the SLR method to identify, assess, and collect articles related to the implementation of game-based approaches and TGfU in badminton learning in schools. The reporting of this study adheres to PRISMA 2020, as these guidelines help researchers explain the rationale for the research, the search process, study selection, data extraction, and synthesis of results transparently (Page et al., 2021).

This review focused on articles published within the last five years, from January 2021 to April 2026. This timeframe was chosen to capture the latest developments in game learning, physical education pedagogy, and game-based badminton learning. Earlier articles and searches outside this timeframe were used to a limited extent in the introduction and discussion as a theoretical foundation, but were not counted as primary articles in the five-year literature search.

Data Sources and Search Strategy

The initial search was conducted through ERIC, SpringerLink/Human Kinetics, PubMed/PMC, Scientific Reports/Nature, Google Scholar, Semantic Scholar, and a manual search of relevant article bibliographies. Keywords were developed from three conceptual clusters: badminton, game-based learning approaches, and the context of school physical education.

The primary search terms used were: ("badminton" OR "badminton learning" OR "badminton instruction") AND ("Teaching Games for Understanding" OR "TGfU" OR "game-based learning" OR "game-based approach" OR "tactical games approach" OR "modified games" OR "game-centered approach") AND ("physical education" OR "school" OR "students" OR "secondary school" OR "elementary school" OR "middle school" OR "high school"). Additional searches used the terms "net/wall games", "racket sports", "tactical awareness", "decision-making", and "game performance" to capture articles that did not specifically use TGfU terms but had conceptual similarities to game-based approaches.

Literature Criteria

Table 1. Literature Search Criteria

Aspect	Meets Criteria	Does not meet criteria
Year of publication	Articles published between January 2021 and April 2026	Articles published before January 2021, except as theoretical foundations
Document Type	Peer-reviewed journal articles or full-text scientific articles	Theses, dissertations, editorials, opinion pieces, blogs, teaching modules without a scientific process
Context	Learning in school or physical education	Elite athlete training, performance clubs, or college contexts as the primary focus
Participants	Elementary, middle, or high school students	College students, professional athletes, coaches, or non-school populations
Sports	Badminton or netball games relevant to badminton	Other sports without an explicit connection to badminton
Approaches	TGfU, game-based learning, tactical games, modified games, set plays, or game-based approaches	Traditional technical approaches without clear game/tactical elements
Learning outcomes	Techniques, tactics, decision-making, game performance, motivation, engagement, fitness, or attention	Does not report analytical learning outcomes

Study Selection Process

All search results were collected and then reviewed to remove duplicates. Screening was conducted in two stages. The first stage was a selection of titles and abstracts based on relevance to badminton, game-based/TGfU, and the school context. The second stage was a full-text reading to ensure compliance with the inclusion and exclusion criteria. Articles that were not available in full text or did not provide sufficient information on interventions and outcomes were excluded from the main synthesis.

Table 2. Article selection flow based on initial search

PRISMA Stage	Number	Description
Identified articles	14	Obtained from initial database searches and manual searches
Removed similar articles	5	Some records appeared in more than one source
Filtered articles based on title and abstract	9	Filtered based on topic relevance, context, and outcomes
Irrelevant articles	5	Not relevant to the school context, not specific to badminton, or not using a game-based/TGfU approach
Assessed full-text articles	4	Potential articles were read in full for initial processing
Articles in initial synthesis	4	Articles most relevant to the review focus and/or supporting the conceptual context

Data Collection and Synthesis

The extracted data included article identity, study country, school level, number and characteristics of participants, study design, treatment type, learning duration, badminton material, measurement instruments, learning outcomes, key findings, and study limitations. Given the limited and heterogeneous number of badminton-specific studies, the synthesis was conducted using a thematic narrative. Findings were grouped into the

domains of technique, cognitive tactics, game performance, and student engagement attitudes.

Methodological Quality Assessment

Methodological quality assessment focuses on clarity of objectives, appropriateness of design, sample characteristics, clarity of interventions, instrument validity, analytical procedures, and transparency of results reporting. For articles with diverse designs, the Mixed Methods Appraisal Tool (MMAT) can be used because it can assess qualitative, quantitative, and mixed methods studies within a single assessment framework (Hong et al., 2018). In this study, the quality assessment is presented as a narrative review due to the limited number of studies and the preliminary nature of the search.

RESULTS AND DISCUSSION

Findings

Article Selection Results

The initial search yielded 14 articles. After five similar articles were removed, nine records were screened based on title and abstract. Of these, five articles were excluded because they did not meet the inclusion criteria, primarily because they were not set in a school context, did not specifically address badminton learning, or did not use a game-based approach. Four articles were then processed to the full-text stage and used as the initial data base. These results demonstrate that recent research directly linking badminton, game-based learning (TGfU), and school physical education remains relatively limited.

Characteristics of the Studies Reviewed

The most directly relevant article is the study by Devrilmez et al. (2024), which examined Situated Game Teaching Through Set Plays (SGTSP)-based badminton learning among middle school students. This study involved 158 sixth-grade students from two middle schools in Turkey and compared a game-based model with a technique-focused approach during a 10-session learning unit. The learning outcomes measured included tactical knowledge, technical ability, and game performance.

Another relevant study in terms of learning modification is Wang et al. (2025). This study designed a 10-week modified badminton curriculum for fifth-grade elementary school students in China. The learning sessions were conducted three times per week for 40 minutes each and were compared to a traditional badminton curriculum. The primary outcomes of the study were physical fitness and sustained attention. Although not specifically using the TGfU approach, this study is relevant because it positions activity modification as a strategy to make badminton learning more appropriate to the characteristics of elementary school students.

In addition to these two studies, supporting literature from Aryanti et al. (2021) demonstrated the use of the TGfU approach to improve badminton forehand serve learning in school students. This study took the form of classroom action research, thus making a stronger contribution to the context of learning practices. Overall, the characteristics of the studies reviewed indicate a variety of research designs, ranging from classroom experiments, quasi-experiments, to action research. This difference is the reason data collection was conducted narratively, rather than simply analytically.

Table 3. Summary of relevant studies in the initial synthesis

Author/Year	Context and Participants	Approach	Main Outcomes	Main Findings
Devrilmez et al. (2024)	158 sixth-grade students from a secondary school in Türkiye	Situated Game Teaching Through Set Plays compared with a technical approach	Tactical knowledge, technique, and game performance	The game-based group showed greater improvements in tactics, technique, and game performance.
Wang et al. (2025)	106 fifth-grade students from an elementary school in China	A 10-week modified badminton curriculum	Physical fitness and sustained attention	The modified curriculum had a better impact than the traditional curriculum on several aspects of fitness and attention.
Aryanti et al. (2021)	Students from a school in Palembang, Indonesia	TGfU in teaching the forehand serve	Learning outcomes for the forehand serve	The TGfU reportedly helped improve service learning through game activities.
Supporting game-based/TGfU literature	A cross-sport physical education study	TGfU and game-based approaches	Decision-making, knowledge, and motor skills	Supports the argument that game-based learning is particularly beneficial for decision-making and technique-tactical learning.

Review of Technical Learning Outcomes

Technical learning outcomes are the most easily observed aspect of badminton learning. The studies reviewed show that a game-based approach does not eliminate technical learning. Instead, technical knowledge is learned within the context of the game, allowing students to understand the function of each badminton shot. Devrilmez et al. (2024) revealed that both groups improved in skills such as the forehand long serve, forehand clear, smash, and drop shot, but the SGTSP group improved more significantly than the technical group. This suggests that a game-based approach can support technical skills when the game is designed to present tactical problems requiring the use of specific techniques.

Review of Tactics and Decision-Making Learning Outcomes

Understanding tactics and decision-making in learning are the most frequently encountered findings in the TGfU approach literature. In badminton, this aspect includes students' ability to determine shot direction, anticipate opponent movements, choose offensive or defensive strategies, and create and close space within the court. Several articles have shown that the game-based approach and TGfU provide greater space for students to think during play. Modified games and reflective questions help students connect technical actions with tactical objectives. These findings align with González-Valero et al. (2024), who demonstrated that TGfU is effective in improving decision-making in sports learning.

Review of Learning Outcomes on Game Performance

Game performance reflects a student's ability to use techniques, tactics, and decisions in a game situation. In badminton learning, game performance can be measured by the ability to master the game, effectively place the shuttlecock, move efficiently, choose the right shot technique, and adapt strategy to the opponent's position. Devrilmez et al. (2024) showed that a game-based model significantly improved game performance compared to a technical approach. This finding is important because the goal of badminton learning in schools is not only to develop technically correct movements but also to develop intelligent and efficient playing skills.

Review of Affective Learning Outcomes and Student Engagement

While not all literature studies specifically measure student motivation and engagement, game-based approaches have strong potential in the affective domain. Modified games provide greater opportunities for students to achieve success, actively participate, and understand the meaning of badminton. Repetitive technique practice often leads to passive students waiting for their turn; in reality, small-scale or conditional games can increase student engagement in learning. In school settings, this is crucial because students have varying levels of initial abilities, sports experience, and self-confidence.

Discussion

Pedagogical Significance of Game-Based and TGfU Approaches

This study demonstrates that game-based and TGfU approaches are relevant to badminton learning because they both define the game as the primary learning space, not simply a closing activity after technical practice. In badminton, almost every technical decision has tactical significance. A lob is not simply a high, backward stroke, but a strategy to impede the opponent and create space for attack. A dropshot is not simply a smooth shot that lands in front of the net, but rather a way to place the shuttlecock in an empty area. A smash is not just a powerful shot, but an attacking technique when a rally situation favors the student. Therefore, technical learning should not be separated from its tactical context.

TGfU helps teachers shift the learning paradigm from "how to perform a movement" to "why and when to use a movement." This shift is crucial in physical education because students are expected not only to imitate technical movements but also to understand how to play the game, make decisions, and enjoy the learning experience. This model also provides opportunities for students to be active learners. They not only receive instructions, but are invited to read situations, try to solve problems, discuss, and reflect on playing decisions.

Application to Technique, Tactics, and Game Learning

A challenge for teachers when using a game-based approach is that students' technical development is not optimal. However, some literature suggests that students' technical development can be enhanced if teachers design learning appropriately. This approach doesn't eliminate technical practice, but rather integrates it into actual games. Teachers can begin with modified games, identify emerging tactical issues, and then provide short technical drills directly linked to real-life game situations. Afterward, students return to the game to practice the techniques in a more meaningful context.

This principle can be applied to a variety of learning materials. When the learning objective is to create opportunities for students, teachers can design a front-back target game in badminton. When the learning objective is to maintain the flow of the game, teachers can create a game that awards extra points if students successfully execute at least five badminton strokes. When the learning objective is to strike and place the shuttlecock in the opponent's empty side, teachers can mark specific areas on the court as specific targets. In this way, students learn that technique is not simply a form of movement, but a way to solve game problems.

Alignment with School Characteristics

Physical education in schools has different characteristics than competitive sports training. Teachers face limited learning time, large classes, facilities that are not always ideal, and a wide range of student abilities. In these circumstances, game-based and TGfU approaches become relevant because they are easily modified. Teachers can adjust the court size, number of players, type of shuttlecock, game rules, target areas, and scoring format to keep learning challenging but not make students feel like failures.

A game-based approach can also support inclusive learning. Students who lack skills can still engage in learning because the game is modified to suit their abilities. More skilled students are challenged through additional rules or more complex tactical objectives. Thus, badminton learning not only provides a space for learning techniques but also builds confidence, cooperation, responsibility, and positive experiences with physical activity.

Limitations of the Available Literature

The main limitation identified in this review is the paucity of recent studies directly addressing game-based approaches and TGfU in badminton instruction in schools. Many articles discuss TGfU in general or in other sports, while badminton has received less attention. Consequently, generalizations of the findings should be made with caution. Although evidence from other sports supports the effectiveness of game-based approaches, the characteristics of badminton as a net game still require more specific study.

A second limitation is the variation in design and instruments. Some studies measured technique, some tactical knowledge, and others fitness or attention. This variation makes quantitative synthesis difficult. Furthermore, not all studies detailed game design modifications, teacher reflective questions, or assessment procedures. This information is crucial for replicating the learning model by other teachers and researchers.

Future Research Directions

Future research should develop more robust intervention studies on game-based badminton instruction and TGfU. Quasi-experimental or experimental designs with control groups, larger sample sizes, longer intervention durations, and validated instruments are essential. Research should also report the learning process in detail, including modified game formats, teacher question scenarios, differentiation strategies, and assessment rubrics. In addition to technical and tactical outcomes, future studies should include student motivation, enjoyment, self-confidence, physical activity, and perceptions of learning.

CONCLUSION

This systematic review demonstrates that game-based and TGfU approaches have strong pedagogical relevance in badminton learning in schools. These approaches help connect technique with tactical meaning, provide space for student decision-making, and make learning more contextual and participatory. Preliminary evidence suggests that game-based models can improve tactical knowledge, technical skills, and badminton performance better than approaches that focus solely on technique.

However, the number of recent studies specifically addressing badminton, game-based learning, and TGfU in the school context is still limited. Therefore, the findings of this review should be read as an initial synthesis that suggests opportunities for development,

rather than as definitive conclusions. Future research should strengthen the evidence through better methodological designs, transparent reporting of interventions, and assessments that encompass technical, tactical, cognitive, affective, and game performance domains.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest in conducting this research.

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