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# Is teaching Game for Understanding an efficient pedagogy to impact the different dimensions of physical literacy in the context of physical education?

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## ABSTRACT

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The purpose of this study is to examine the impact of the teaching games for understanding (TGfU) pedagogy on four key dimensions of student learning in physical education: psychological, motor, cognitive, and social. Through a systematic literature review, this study synthesises empirical findings on TGfU-based interventions in primary and secondary education. The results indicate that TGfU consistently enhances motivation and autonomy, with strong evidence supporting its role in improving decision making and tactical awareness. The pedagogy also shows moderate effectiveness in developing motor skills and social collaboration, particularly when combined with questioning strategies or hybrid approaches such as TGfU/sport education. Furthermore, TGfU aligns with the concept of physical literacy, fostering lifelong engagement in physical activity by promoting autonomy, problem solving, and adaptability. However, limitations in the study design, including small sample sizes and short intervention durations, suggest the need for further longitudinal research to assess its long-term impact. Future studies should explore scalability, gender-specific responses, and cross-cultural applications to maximise the potential of TGfU in modern physical education. This review highlights TGfU as an effective pedagogy that supports holistic learning and contributes to the development of physically literate individuals.

## INTRODUCTION

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The Teaching Game for Understanding (TGfU) pedagogy was created in 1982 in the UK by researchers Bunker and Thorpe.

The two fathers of this pedagogy had one simple priority when developing the approach: to “challenge the way coaches think” during sessions in response to dissatisfaction and disengagement from children and young people with traditional, technique-led approaches to teaching and learning (Rod and Levett, 2019). Moreover, from its inception, the epistemological development of TGfU has been from an educational perspective rather than sports science/skill acquisition (Phil and Shane, 2018). Indeed, in 1982, traditional pedagogy still dominated physical education in most educational systems. However, traditional pedagogy has been linked to many school failures (Donald et al., 2009), as it often overlooked children’s actual needs and interests; in response, educators have turned to TGfU, which emphasizes giving students greater control over their learning within a school environment that fosters key competencies and autonomy. The TGfU pedagogy is not limited to school settings, as it is also used in sports training, especially for the development and implementation of skills and strategies in sports games (Webb and Pearson, 2008). Although it was initially developed for teaching in the context of PE, its principles and methods have been applied in sports training, especially for young athletes and novice players.

Recently, TGfU has changed its name to the game-based approach (Gutierrez and Koekoek, 2023), but both name still persist in the literature.

In France, TGfU has been integrated into physical education (PE) and teacher training programs and is also used in some schools and colleges to teach physical activity (Forest et al., 2017). The implementation of this pedagogy may vary from region to region, depending on local pedagogical guidelines and teacher preferences. It remains confidential, but emerges in PE in France as a promising approach, like in many other countries, such as Spain, the USA, Canada, Sweden, and Norway.

### Approach and purpose of TGfU

TGfU is based on the idea that playing games can lead to a better understanding of the strategies, tactics, and principles of training and play. The purpose is to allow students to build knowledge and understanding of games, rather than just technical skills and competence development. It aims to allow students to become skilful players while also enjoying the game.



Figure 1: TGfU model of PE. Bunker and Thorpe, 1982

Within the TGfU model (Figure 1), students learn to play an often modified game while prioritising the understanding of tactics and strategies. Indeed, it is part of a broader trend of reflection on the teaching of sports and PSE, highlighting the cognitive dimension, decision-making, and understanding the game. TGfU aims to tap into children's inherent desire to play. The idea is that children can better comprehend them by playing games.

Therefore, it is a pedagogy that actively involves children in the learning process to increase their appreciation of games and improve their physical skills. Because of the social dimension it integrates, this model also strongly emphasizes collaborative learning.

Another characteristic of this pedagogy is the role of the learner. TGfU differs from directive pedagogy. It is more task than process oriented: instead of imposing a single way of doing a task, TGfU allows students to think for themselves and explore different solutions. In other words, the TGfU model uses the “what” before the “how.” In contrast to directive instruction, the teacher’s role is to guide students in decision-making and learning processes. His/her role will be to create some “problem situations” that encourage students to discover personal and appropriate solutions, as well as ask valuable questions to help students find a solution. For example, in basketball, when the teacher forbids the possibility of walking with the ball and then asks their students, “What other solution do you have to improve the quality of the throw?”, and provide space, in group, for student to find and explore solutions. In this regard, TGfU appears as an active pedagogy based on constructivist and socio-constructivist principles (Chiva-Bartoll et al. 2018).

However, the implementation of this strategy in PE classes is not always easy (Diaz-Cueto et al., 2010) because it requires creating authentic and meaningful lessons within school constraints. In addition, replicating game-like situations can be challenging because it requires creativity in the pedagogical design. Finally, assessing students' understanding of the principles and strategies (not only physical abilities but also cognitive comprehension of the game strategy) is quite challenging to practitioners.

### HOW TO IMPLEMENT TGfU IN THE CLASSROOM.

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TGfU lessons usually start with children playing a modified version of the game (exaggerated and representative versions of the game) that is adapted to their developmental and skill level. Most of the time, rules are changed to create a simplified version of an existing game to meet the developmental and skill levels of the learners. The games offered within the modified activities can be different and plural (invasion/territorial games, striking and fielding games, net and wall games, target games...).

### TGfU: A PEDAGOGICAL FORMAT FOR DEVELOPING PHYSICAL LITERACY?

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The concept of physical literacy, as defined by Keegan et al. (2019) as "lifelong holistic learning acquired and applied in movement and physical activity contexts", has been established as a goal for Physical Education by UNESCO (2015). Physical literacy encompasses continuous development across physical, psychological, cognitive and social capabilities. A physically literate individual can leverage their integrated physical, psychological, cognitive, and social capacities to engage in health-promoting and fulfilling movement and physical activity throughout their lifespan relative to their specific situation and context. Mandigo et al. (2019) proposed that TGfU could serve as a catalyst for developing physical literacy. Bunker and Thorpe (1982) designed TGfU to enhance learners' physical and cognitive health, while also positively impacting social and emotional development and fostering skills such as collaboration, teamwork, and resilience. Through this approach, students should gain experience, becoming more adept at decision-making and more competent as game players. Consequently, TGfU appears to be particularly effective in boosting students' motivation and cognitive, physical, and social abilities.

However, its superiority over more traditional teaching methods in developing physical literacy and its four dimensions has not yet been thoroughly analysed.

Therefore, this literature review seeks to determine whether 1. TGfU impacts the four dimensions of physical literacy: psychological, social, physical, and cognitive and 2. To what extent TGfU provides results superior to traditional top-down teaching models often used in PE.

## METHODS

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To examine the impact of TGfU pedagogy on psychological, motor, cognitive, and social dimensions, a systematic literature review was performed. This review synthesised empirical studies comparing TGfU with traditional or alternative pedagogical models in physical education. Relevant articles were identified through Google Scholar, PubMed, and existing systematic reviews, using keywords such as “TGfU,” “motivation,” “relatedness,” “cognitive skills,” “motor skills,” “knowledge and competence,” and “decision making.”

### INCLUSION AND EXCLUSION CRITERIA

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#### Inclusion Criteria:

1. Studies that explicitly identified TGfU as an intervention method in the methodology section. This included studies using TGfU alone or in combination with other pedagogical models (e.g. hybrid TGfU/Sport Education).
2. English-language studies published between 1982 and 2023.
3. Experimental studies, qualitative studies or mixed methods approach
4. Studies have been conducted with participants aged between 6 and 18 years old.
5. Studies that assessed at least one of the following dimensions: psychological (motivation, engagement), motor (skill execution, decision-making), cognitive (knowledge acquisition, tactical understanding), or social (cooperation, relatedness) dimensions.

#### Exclusion Criteria:

1. Studies that primarily focused on other game-based teaching models without explicitly using TGfU.
2. Studies in which the control group consisted of university students may have introduced bias due to their prior knowledge and cognitive development.

### DATA COLLECTION PROCESS

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The search was conducted using academic databases such as Google Scholar and PubMed, and other systematic literature reviews. A variety of keywords were used, including “TGfU”, “motivation”, “relatedness”, “cognitive skills”, “motor skills”, “decision making”, and “knowledge acquisition”.

### DATA EXTRACTION AND ANALYSIS

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Each selected study was reviewed and categorised based on the dimensions it evaluated. Data extraction focused on the following elements.

- **Study Design:** Experimental (pre-test/post-test, control-experimental group comparison), qualitative, or mixed-methods.
- **Sample Characteristics:** Number of participants, age groups, and prior exposure to TGfU.

- **Intervention Details:** Duration, sports or activities used, and implementation of TGfU principles (e.g. game modifications, problem-solving tasks, teacher questioning strategies).
- **Outcome Measures:** Psychological (motivation scales, self-determination theory components), motor (skill execution, game performance assessments), cognitive (knowledge tests, decision-making evaluations), and social (peer interaction observations, teamwork assessments) outcomes were assessed.
- **Key Findings:** Significance of the results, effect sizes, and comparison with traditional methods.
- **Potential Biases:** Sample size limitations, teacher experience, and methodological constraints.

## RELIABILITY AND VALIDITY CONSIDERATIONS

To ensure the robustness of the analysis:

- Studies with well-documented methodologies and validated instruments (e.g. motivational questionnaires and game performance assessment instruments) were prioritised.
- Biases such as small sample sizes, lack of control groups, and differences in teacher expertise were considered in the interpretation of the results.
- When applicable, effect sizes and p-values were extracted to assess the statistical significance of the findings.

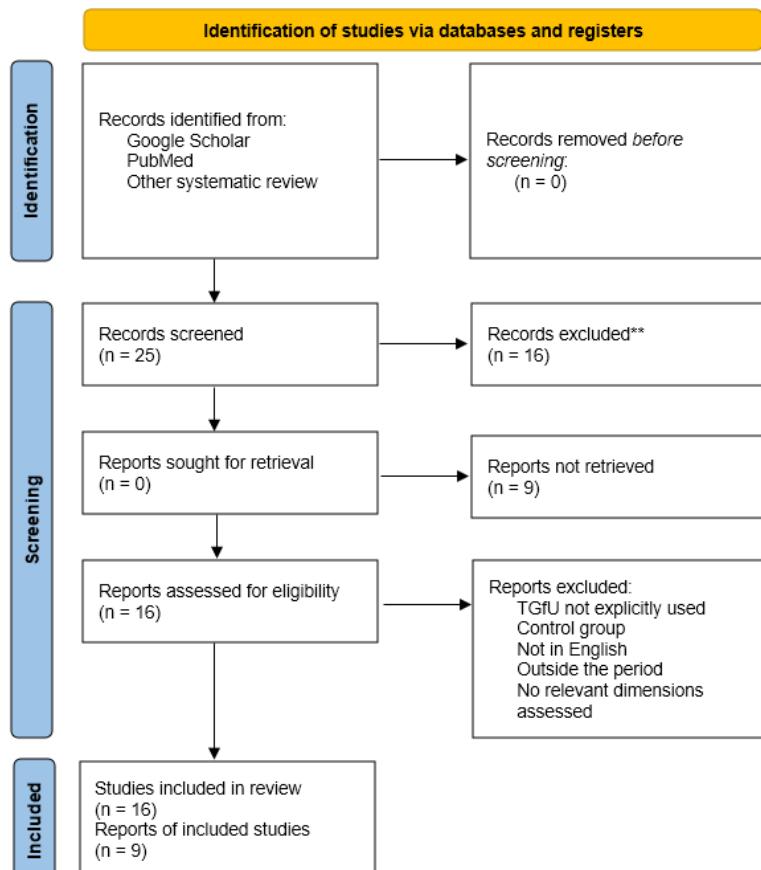


Figure 1: PRISMA of the selected articles

## RESULTS

A total of 25 studies were initially identified, of which 16 met the inclusion criteria and were selected for analysis. All articles were published between 1982 and 2023 and were in English. To ensure a balanced analysis, four to five studies were examined for each dimension. Table 1 summarizes the main findings of this study

TABLE 1. SYNTHESIS OF STUDIES ANALYZED BY DIMENSION

Author	Sample	Intervention	Sport/Activity	Duration n	Main Results	Limitations
<b>Psychological dimension</b>						
Gil-Arias et al. (2020)	53 secondary students (Spain)	Hybrid TGfU/SE	Volleyball	16 lessons	↑ Intrinsic motivation (especially girls), ↑ teacher support, ↑ psychological needs	Small sample, specially trained teacher
Gaspar et al. (2021)	111 primary students	TGfU with/without questioning	Not specified	1 trimester	TGfU+questioning : ↑ self-determined motivation ( $p<0.001$ )	Small sample, large confidence interval
Chiva-Bartoll et al. (2018)	96 students (15 years, Spain)	TGfU/cooperative learning	Handball	8 weeks	↑ Task involvement, ↓ ego involvement	Short intervention, small sample
Hortigüela Alcalá et al. (2017)	237 secondary students (Spain)	TGfU vs traditional	Team sports	8 lessons	High effect size (0.92), ↑ motivation	Difference in teacher experience
<b>Motor dimension</b>						
Arias-Esterro et al. (2020)	40 students (4th grade primary)	TGfU	Floorball	17 lessons	↑ Decision-making ( $p=0.0$ ), ↑ game performance ( $p=0.03$ )	No control group, small sample
López-Lemus et al. (2023)	137 high school students	Hybrid TGfU/SE	Handball	2x/week, 55min	↑↑ Tactical understanding ( $p<0.001$ ), large effect size	Hybrid method, medium groups

Author	Sample	Intervention	Sport/Activity	Duration	Main Results	Limitations
Gil-Arias et al. (2020)	55 students (4th secondary)	TGfU/SE vs direct instruction	Volleyball/Ultimate	8 lessons each	↑ Competence (p=0.02 hybrid-first group)	Different sports per model
Abad Robles et al. (2020)	Meta-analysis	TGfU vs technical models	Various	Variable	High effect size (0.89), p<0.01 for execution	Varied methodologies
<b>Social dimension</b>						
Koekoek & Noppers (2013)	25 students (12-13 years, Netherlands )	TGfU	Not specified	Not specified	↑ Collaboration, ↑ tactical discussions	Qualitative data only
Gaspar et al. (2021)	111 primary students	TGfU with/without questioning	Not specified	1 trimester	TGfU+questioning : ↑↑ sense of belonging	Internal TGfU comparison
Gil-Arias et al. (2017)	Not specified	Hybrid TGfU/SE	Not specified	Not specified	↑ Relatedness when hybrid applied first	Sequence effect
Chiva-Bartoll et al. (2018)	96 students (4th secondary, Spain)	Cooperative TGfU	Sports	Not specified	↓ Intra-team rivalry (-0.7)	Short intervention
<b>Cognitive dimension</b>						
Arias-Esterro et al. (2020)	40 students (4th grade primary)	TGfU	Floorball	8-14 lessons	↑ Decision-making (p=0.000), ↑ knowledge	No control group
Lopez et al. (2023)	46 students (14-15 years)	TGfU vs direct instruction	Basketball	9 lessons, 45min	↑ TGfU procedural knowledge (p<0.01)	Short duration, question difficulty
Zuffová & Zapletalová (2015)	66 girls (3 age groups)	TGfU vs traditional	Ultimate frisbee	12 lessons	↑ Procedural knowledge young group (p<0.05)	Poor description, small groups
Barba-Martin et al.	Systematic review	TGfU	Various	2014-2019	↑ Game understanding, ↑ cognitive abilities	Potential information bias

**Legend:** ↑ = significant improvement; ↓ = decrease; TGfU = Teaching Games for Understanding; SE = Sport Education

## PSYCHOLOGICAL DIMENSION

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The psychological dimension presents the most robust and convergent results of this review. The four studies analyzed systematically demonstrate the effectiveness of TGfU in improving student motivation, with particularly high effect sizes (0.92 in Hortigüela Alcala et al., 2017). The integration of questioning strategies appears as a determining factor, with Gaspar et al. (2021) revealing highly significant differences ( $p<0.001$ ) between TGfU with and without questioning. Hybrid TGfU/Sport Education approaches also show consistent positive effects on fundamental psychological needs (autonomy, competence, relatedness). A notable element concerns gender differences, with several studies reporting more pronounced effects in girls, suggesting TGfU's potential to reduce participation disparities. The main limitations identified concern small sample sizes and short intervention durations, limiting the generalization of results.

## MOTOR DIMENSION

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Results on the motor dimension reveal moderate but consistent effectiveness of TGfU, particularly for developing decision-making and tactical understanding. The meta-analysis by Abad Robles et al. (2020) confirms this trend with a high effect size (0.89) for skill execution. Hybrid TGfU/Sport Education approaches seem particularly effective, with López-Lemus et al. (2023) reporting highly significant improvements ( $p<0.001$ ) in tactical understanding in handball. However, results vary according to the sport studied and intervention duration, suggesting that TGfU effectiveness depends heavily on the application context. Recurring limitations include the absence of control groups in some studies and variability in measurement instruments, making inter-study comparisons difficult.

## SOCIAL DIMENSION

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The social dimension presents promising but methodologically more fragile results. Studies converge toward improved social interactions and reduced individualistic behaviors, with Chiva-Bartoll et al. (2018) reporting a significant decrease in intra-team rivalry (-0.7). The importance of teacher questioning also emerges, with Gaspar et al. (2021) demonstrating significant improvements in sense of belonging only in the TGfU with questioning group. Hybrid approaches seem to favor the development of affiliation and leadership, although sequence effects (order of application) influence results. The main weakness of this dimension lies in the predominance of qualitative data and small sample sizes, limiting the statistical robustness of conclusions.

## COGNITIVE DIMENSION

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Cognitive results show consistent effectiveness of TGfU in improving game understanding and procedural knowledge. Lopez et al. (2023) reveal significant improvements ( $p<0.01$ ) in procedural knowledge in basketball, contrasting with the absence of effect from direct instruction. Decision-making appears as a privileged area of improvement, with several studies reporting significant progressions. However, effects seem to vary according to age, with Zuffová & Zapletalová (2015) finding significant differences only in younger students. Systematic reviews confirm these positive

trends, although they highlight the need for longitudinal studies. Main limitations concern short intervention durations and lack of standardization of cognitive assessment instruments.

## DISCUSSION

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This review examined the impact of Teaching Games for Understanding (TGfU) on the psychological, motor, social, and cognitive dimensions which define physical literacy in physical education (PE). Our findings suggest that TGfU-based interventions generally lead to positive outcomes across all four dimensions of physical literacy, with varying degrees of effectiveness. The psychological dimension, particularly motivation and autonomy, has shown consistent and significant improvements across multiple studies (Gil-Arias et al., 2020; Gaspar et al., 2021). In the motor domain, TGfU improved decision-making and tactical understanding, although the effects on skill execution were less consistent (Arias-Estero et al., 2020; López-Lemus et al., 2023). Social interactions have benefited from TGfU, especially when combined with cooperative learning approaches (Koekoek & Noppers, 2013). Finally, cognitive improvements were evident in students' understanding of game strategies and rules, although further research is needed to assess long-term knowledge retention (Zuffová & Zapletalová, 2015).

### EFFECTIVENESS OF TGfU ACROSS DIMENSIONS BASED ON THE WEIGHT OF EVIDENCE

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#### Cross-Dimensional Synthesis

The analysis reveals a hierarchy of TGfU effectiveness across dimensions, ranked as follows: psychological > cognitive > motor > social. This pattern highlights TGfU's particular strength in supporting psychological and cognitive outcomes in sports and physical education. Motivation—operationalized through autonomy, competence, and relatedness—was significantly enhanced in most studies, supported by medium to high weights of evidence (Gil-Arias et al., 2020; Gaspar et al., 2021). Cognitive gains, especially in decision-making and tactical awareness, were also consistently reported (Barba-Martin et al.). In contrast, evidence for motor and social improvements was more variable and appeared to depend on factors such as intervention design, sport type, and assessment methods (Arias-Estero et al., 2020; Gil-Arias et al., 2017). Notably, the integration of questioning strategies and the use of hybrid models—such as combining TGfU with Sport Education (SE)—consistently enhanced effectiveness across multiple dimensions, suggesting their value as cross-dimensional optimization mechanisms. However, common methodological limitations, including small sample sizes, short intervention durations, and the absence of control groups, underscore the need for more rigorous studies to confirm these promising findings.

#### TGfU's Potential to Foster Physical Literacy

The concept of physical literacy extends beyond immediate physical and cognitive skill development, emphasising lifelong engagement in physical activity (Castelli et al. 2015). TGfU aligns with this framework by fostering autonomy, problem-solving, and adaptability, which are crucial for the sustained participation in physical activity. The reviewed studies suggest that TGfU enhances

students' motivation and engagement, which are key factors in developing self-determined behaviours that support lifelong physical activity (Whitehead, 2010). Additionally, TGfU's emphasis on game-based learning mirrors the principles of differentiated pedagogy, a key component in promoting inclusive physical literacy (Mandigo et al., 2009). However, more longitudinal research is needed to determine whether TGfU-induced behavioural changes persist beyond the school setting.

### Weaknesses of the Selected Studies

Despite these promising results, several methodological limitations were identified in the reviewed studies. One common issue was small sample sizes, which limited the generalisability of the findings (Gaspar et al., 2021). Additionally, short intervention durations (often a single trimester) may not capture the long-term effects on student learning and motivation (Chiva-Bartoll et al., 2018). Some studies lacked control groups or used non-equivalent comparisons, reducing the robustness of their findings (Hortiguera Alcalá et al., 2017). Another concern was teacher variability, as differences in training and instructional styles may have influenced the results (Arias-Estero et al., 2020). To strengthen future research, interventions should be conducted over longer periods with larger, more diverse samples, and consistent implementation protocols.

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## RESEARCH GAPS AND FUTURE DIRECTIONS

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Several gaps in the current literature highlight directions for future research.

- **Longitudinal Impact:** Few studies have tracked the long-term effects of TGfU on physical literacy, particularly in fostering lifelong engagement in physical activity.
- **Age-Related Differences:** More research is needed to assess how TGfU impacts different age groups, from 6 to 18 years old students.
- **Gender-Specific Outcomes:** Although TGfU appears beneficial for both boys and girls, its differential impact on engagement and motivation remains underexplored (Gil-Arias et al., 2020). Only two articles addressed this pedagogical model for girls, either with the aim of engaging disengaged girls (Bracco et al., 2019) or comparing their experience with ordinary PE (Lodewyk & Bracco, 2018).
- **Integration with Other Pedagogies:** TGfU's potential for combining differentiated instruction, technology-based interventions, and whole-school approaches warrants further investigation (Castelli et al., 2015).
- **Cross-Cultural Comparisons:** Most studies focus on Western educational settings; expanding research to diverse cultural contexts would provide a broader understanding of TGfU's effectiveness.

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## CONCLUSION

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This review confirms that the teaching games for understanding (TGfU) model positively impacts the psychological, motor, social, and cognitive dimensions that underlie physical literacy in students in physical education. Compared to traditional top-down pedagogical designs, TGfU has demonstrated strong effects on motivation and decision-making, moderate effects on motor skills and social collaboration, and notable cognitive benefits related to game understanding and tactical awareness. The results suggest that the TGfU enhances students'

engagement by fostering autonomy, competence, and relatedness, which are key components of self-determined motivation (Gil-arias et al., 2020; Gaspar et al., 2021).

Despite its advantages, limitations in study design, sample sizes, and intervention durations highlight the need for more longitudinal research to assess the long-term effects of TGfU on physical literacy. The integration of questioning strategies and hybrid models, such as TGfU/sport education, appears to enhance its effectiveness; however, further research is needed to compare the impact of TGfU across different populations, sports, and educational contexts.

From a broader perspective, TGfU aligns well with the physical literacy framework because it promotes lifelong physical engagement, adaptability, and problem-solving skills. However, its implementation in real-world PE settings remains a challenge, particularly in ensuring teacher training, assessment consistency and curricular integration. Future research should focus on scaling TGfU-based interventions, evaluating gender-specific responses, and exploring cross-cultural differences to maximise educational potential.

Overall, this review highlights TGfU as an effective and innovative pedagogy that enhances students' learning experiences beyond traditional skill-based approaches. With further refinement and strategic implementation, TGfU can play a pivotal role in modernising physical education and fostering active living.

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