SPORT TK-EuroAmerican Journal of Sport Sciences

https://sportk.eu Online ISSN: 2340-8812

Received: **23/04/2026.** Accepted: **30/07/2026.** Published: **28/11/2026**

Learning football through TGfU: developing technical skills and game performance in a short time

Agus Santosa[1*], Subagyo Subagyo[1], Yudanto Yudanto[1], Indra Sholehudin[2], Tian Kurniawan[3]

[1] Department of Sports Education, Universitas Negeri Yogyakarta, Indonesia.

[2] Department of Sport Education, Sekolah Tinggi Keguruan Dan Ilmu Pendidikan Pasundan, Indonesia.

[3] Department of Sport Science, Universitas Pendidikan, Indonesia.

* Correspondence: Agus Santosa; santosagus2715@gmail.com

ABSTRACT

This quasi-experimental study examined the effectiveness of a four-month Teaching Games for Understanding (TGfU) intervention in improving football skills and gameplay performance among 90 physical education students without prior formal football training. Participants were randomly allocated into experimental, regular physical activity, and control groups (n = 30 each). All completed the intervention and posttest, assessing shooting accuracy, long-passing distance, successful passes, and ball control. A 25% increase in shooting accuracy, a 20% improvement in passing distance, and a 30% rise in successful passes were recorded. Students also demonstrated improved dribbling and first-touch control. Biomechanical video analysis revealed better body alignment and more efficient force application during key techniques, with statistically significant improvements in body posture ($p<0.001$) and movement efficiency ($p<0.001$). Gameplay outcomes, evaluated using a standardized rubric, confirmed enhanced tactical awareness and decision-making, with significant improvements in gameplay performance ($p<0.01$). These findings support TGfU as an effective method for skill development, even under time constraints. The results challenge assumptions about age or instructional time as primary barriers to skill acquisition and offer valuable implications for physical education curricula and coaching practices. TGfU not only facilitates technical growth but also empowers future educators to teach football confidently, regardless of their prior experience.

KEYWORDS

TGFU; Motor Educability; Physical Education; Decision Making; University Students

1. INTRODUCTION

Motor skill development is a fundamental aspect of education, extending beyond childhood into higher education, particularly for university students pursuing physical education (Mariati et al., 2024). However, traditional teaching methods often fail to provide sufficient opportunities for holistic physical-cognitive development, especially in the context of team sports like football (García-Angulo et al., 2019), physical education curricula have often prioritized fitness over motor skill development (Clark, 2007). Despite advancements in sports pedagogy, many educators continue to rely on outdated instructional methods, resulting in suboptimal learning outcomes, particularly in complex sports requiring multifaceted skills (Rodríguez Fernández et al., 2016). Football, as a highly dynamic and cognitively demanding sport, necessitates for superior physical conditioning (Filgueira & Greco, 2008). For university students in physical education programs, mastering these skills can be particularly challenging, especially when learning time is limited to just one 100-minute session per week. This constraint is further compounded by the fact that motor skill acquisition becomes more difficult with age, as adults often struggle to learn new physical skills compared to children (Fezzani et al., 2010). The interplay between limited instructional time and age-related learning constraints underscores the necessity for innovative pedagogical approaches that maximize skill development efficiency within a short timeframe.

In Indonesia, a pervasive social stigma persists, associating physical activity and sports education with lower cognitive abilities. Sports schools are often derogatorily referred to as "Schools Without Brains," reflecting the misguided belief that physical education lacks intellectual rigor (Supandri, 2009). This stereotype not only undermines the value of sports education but also places psychological pressure on students, potentially hindering their confidence and performance (English & Kruger, 2016). Research has shown that such stereotypes can negatively impact academic and athletic performance, creating a barrier for students to reach their full potential (Fuller, 2017).

The Teaching Games for Understanding (TGfU) approach offers a promising solution to these challenges. Unlike traditional methods that focus on repetitive technical drills, TGfU emphasizes understanding game tactics and strategies, fostering a deeper comprehension of the sport (Doozan & Bae, 2016). This method has been shown to enhance critical thinking, autonomy, and physical literacy, making it particularly effective for developing both motor skills and cognitive abilities (Ortiz et al., 2023). Research indicates that TGfU can increase student motivation and achievement in physical education compared to traditional technical approaches Alcalá & Garijo, 2017). Studies have demonstrated that TGfU improves decision-making, tactical awareness, and game performance,

even in students with limited prior experience in the sport (Balakrishnan et al., 2011; Stephanou & Karamountzos, 2020). However, most research on TGfU has focused on children or adolescents, leaving its potential for university students—especially those with limited learning time—largely unexplored.

This study aims to address this gap by investigating how TGfU can help university students in physical education programs master football skills within a short time frame. By focusing on technical skills such as shooting accuracy, long-passing distance, successful passes, and ball control, as well as tactical understanding and gameplay performance, this research seeks to demonstrate the effectiveness of TGfU in a constrained learning environment. Additionally, video analysis will be used to evaluate biomechanical aspects of skill execution, providing deeper insights into the students' progress.

The findings of this study are expected to challenge the stigma surrounding sports education by demonstrating that physical activity and cognitive development are not mutually exclusive. By showcasing the dual benefits of TGfU—improving both motor skills and tactical understanding—this research aims to validate TGfU as a comprehensive educational tool for physical education curricula. Ultimately, this study aspires to empower educators with evidence-based teaching methodologies that optimize skill acquisition and enhance learning efficiency, while simultaneously promoting a more inclusive and intellectually rigorous approach to sports education in Indonesia and beyond.

By comparing the motor performance of students who exercise regularly, students who exercise infrequently, and students who use the Teaching Games for Understanding (TGfU) approach, it will be possible to investigate and empirically demonstrate the benefits of physical activity for motor skills and dispel the myth that students who participate in sports have inferior cognitive abilities.

2. METHODS

2.1. Design

This study employs a quasi-experimental design to evaluate the impact of the Teaching Games for Understanding (TGfU) approach on football skill development among university students enrolled in a physical education program. The research involves three groups:

1. Experimental Group: Receives football instruction using the TGfU approach.
2. Regular Physical Activity Group: Participates in conventional football learning methods.

3. Control Group: Comprises students who engage minimally in physical activity and do not receive structured football instruction.

The intervention lasted for fourteen weeks, with each group attending one 100-minute session per week, amounting to a total of fourteen sessions. The experimental group engaged in TGfU-based activities, while the regular physical activity group followed a traditional skill-based training regimen. The control group did not receive structured football training throughout the study.

2.2. Participants

A total of 100 students were initially assessed for eligibility; 10 were excluded due to prior football experience or scheduling conflicts. Ninety students were included and randomly allocated into three groups (n = 30 each). All participants completed the intervention and posttest, with no dropouts reported. The flow of participants through the study is presented in Figure 1. The inclusion criteria required that students had no prior formal football training and were free of significant physical or cognitive impairments. All participants provided informed consent before the study, and ethical approval was obtained from the institutional review board.

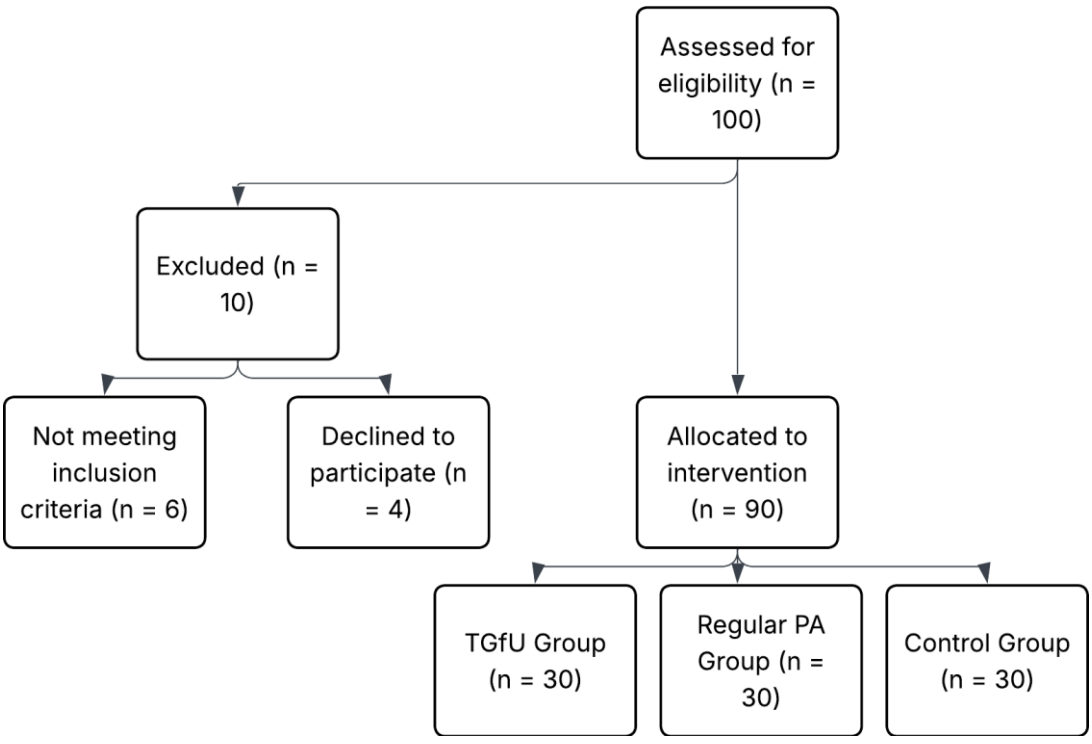


Figure 1. Flow diagram of participant recruitment and allocation

2.3. Procedure

The study evaluated technical football skills, including shooting accuracy, long-passing distance, pass success rate, and ball control, alongside gameplay performance. Video analysis was used to assess biomechanical factors such as body alignment and movement efficiency during skill execution. Additionally, the Game Performance Assessment Instrument (GPAI) was employed to evaluate tactical awareness and decision-making during game scenarios. Data collection involved:

- Pretest: Administered before the intervention to determine baseline skill levels.
- Posttest: Conducted after the eight-week intervention to assess skill improvements.
- Direct Observation: Researchers recorded engagement, skill execution, and tactical decision-making during training sessions.

2.4. Intervention

The TGfU program followed six core components (game form, game appreciation, tactical awareness, decision-making, skill execution, and performance). Each 100-minute session for the experimental group was structured as follows:

- Warm-up & Modified Game (15 min): Small-sided games (3v3 or 4v4) introducing tactical problems.
- Tactical Awareness (20 min): Constraint-based activities such as “keep-away” and “limited touches” to develop spatial awareness and decision-making.
- Skill Application in Context (30 min): Integrated drills emphasizing passing under pressure, shooting after limited touches, and positioning in constrained zones.
- Game Play & Feedback (30 min): Full or modified games where tactical principles learned were applied, followed by guided reflection.

Weekly Emphasis

The regular physical activity group received drill-based instruction focusing on isolated technical skills (e.g., repeated passing, shooting without tactical constraints). The control group continued their usual academic activities without structured football practice.

- Weeks 1–2: Ball control, dribbling, and passing accuracy.
- Weeks 3–4: Offensive principles (creating space, attacking combinations).
- Weeks 5–6: Defensive strategies (marking, covering).

- Weeks 7–8: Transition play and tactical integration.

Regular Physical Activity Group

Participants in this group received traditional drill-based football instruction focusing on isolated technical skills without explicit tactical integration. Each 100-minute session included:

- Warm-up (15 min): Static and dynamic stretching, light jogging.
- Technical Drills (60 min): Repetitive passing, shooting, and dribbling exercises performed in predetermined sequences. Activities were conducted without decision-making constraints (e.g., fixed target passing, set-piece shooting).
- Scrimmage (15 min): Unstructured small-sided play without guided tactical feedback.

Instructional approach was teacher-centered, emphasizing repetition and precision rather than game-based problem-solving. Tactical principles, decision-making, and reflective discussion—core to TGfU—were not included.

Test Protocol

The following performance variables were measured:

- Shooting Accuracy: Assessed based on the number of successful shots on target from a designated distance.
- Long-Passing Distance: Measured as the maximum distance achieved in accurate long passes.
- Pass Completion Rate: Evaluated during small-sided games to determine passing efficiency.
- Ball Control: Assessed through standardized dribbling and first-touch control tests.
- Gameplay Performance: Analyzed using the GPAI, focusing on decision-making, tactical execution, and overall game intelligence.

Several validated instruments were used:

- Technical Skill Tests (Koopmann et al., 2020): Standardized tests for shooting, passing, and ball control.
- Game Performance Assessment Instrument (GPAI) (Oslin et al., 1998): A validated tool for assessing tactical understanding and decision-making in gameplay.
- Video Analysis (Puig-Diví et al., 2019): Used to evaluate biomechanical aspects of skill execution, such as body alignment and movement efficiency.

- Observation Checklist: A structured framework for recording students' engagement and performance during learning sessions.

The reliability of the instruments was confirmed through pilot testing, with Cronbach's alpha values exceeding 0.80, ensuring consistency and accuracy.

2.5. Statistical Analysis

The study utilized multiple data sources, including pretest and posttest scores to quantify technical skill development, video recordings for the biomechanical assessment of skill execution, field notes to document observations related to group interactions and learning processes, and structured observation sheets to systematically evaluate student engagement and performance.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Independent-samples t-tests were conducted to compare skill performance between groups, while paired-samples t-tests were used to assess within-group improvements from pretest to posttest. Analysis of Variance (ANOVA) was performed to examine differences between groups and interaction effects. A significance level of $p < 0.05$ was established for all statistical analyses.

3. RESULTS

The findings of this study indicate that the Teaching Games for Understanding (TGfU)-based learning approach significantly improved students' football skills and gameplay performance compared to the regular physical activity group and the control group. The results are organized into four key sections: technical skills, gameplay performance, biomechanical analysis, and statistical analysis, as detailed below.

Technical Skills

Students in the TGfU experimental group showed substantial improvements across all measured technical skills. The largest gains were observed in ball control (35%), successful passes (30%), and shooting accuracy (25%). In contrast, the regular physical activity group showed only modest improvements, while the control group demonstrated negligible change. These results are summarized in Table 1.

Table 1. Pretest–posttest improvements in technical skill performance across the three study groups

Skill	Experimental Group (Pretest → Posttest)	Regular Physical Activity Group (Pretest → Posttest)	Control Group (Pretest → Posttest)
Shooting Accuracy	60% → 85% (+**25%**)	55% → 65% (+**10%**)	58% → 59% (+**1%**)
Long-Passing Distance	25m → 30m (+**20%**)	24m → 26.5m (+**10%**)	25m → 25m (**0%**)
Successful Passes	70% → 90% (+**30%**)	65% → 75% (+**15%**)	68% → 69% (+**1%**)
Ball Control	65% → 85% (+**35%**)	60% → 70% (+**15%**)	63% → 64% (+**1%**)

Gameplay Performance

Analysis using the Game Performance Assessment Instrument (GPAI) showed notable improvements in decision-making, skill execution, and tactical awareness among students in the experimental group. For example, decision-making improved by 40%, from 50% to 90%. The regular physical activity group improved moderately, while the control group showed minimal change. The results are presented in Table 2.

Table 2. Improvements in gameplay performance

Aspect	Experimental Group (Pretest → Posttest)	Regular Physical Activity Group (Pretest → Posttest)	Control Group (Pretest → Posttest)
Decision-Making	50% → 90% (+**40%**)	55% → 75% (+**20%**)	52% → 54% (+**2%**)
Skill Execution	60% → 95% (+**35%**)	58% → 73% (+**15%**)	59% → 60% (+**1%**)
Tactical Awareness	55% → 85% (+**30%**)	50% → 60% (+**10%**)	53% → 54% (+**1%**)

Biomechanical Analysis

Biomechanical video analysis revealed significant improvements in both body posture alignment and movement efficiency among students in the TGfU group. These changes suggest enhanced motor control and coordination as a result of the structured, game-based learning process. See Table 3 for details.

Table 3. Biomechanical improvements

Aspect	Experimental Group (Pretest → Posttest)	Regular Physical Activity Group (Pretest → Posttest)	Control Group (Pretest → Posttest)
Body Posture (Alignment)	60% → 90% (+**30%**)	55% → 65% (+**10%**)	58% → 59% (+**1%**)
Movement Efficiency	65% → 95% (+**30%**)	60% → 70% (+**10%**)	63% → 64% (+**1%**)

Statistical tests confirmed that the improvements observed in the experimental group were statistically significant. The independent samples t-tests showed significant differences between the TGfU group and both comparison groups ($p < 0.01$ and $p < 0.001$). Additionally, paired t-tests indicated significant pretest-to-posttest improvements within the TGfU group ($p < 0.001$). ANOVA tests further supported the interaction effects between the intervention and improvements in both skill performance and gameplay. The full statistical summary is shown in Table 4.

Table 4. Results of statistical analyses comparing groups and assessing intervention effects

Test	Comparison	p-value
Independent t-test	Experimental vs. Regular Physical Activity	$p < 0.01$
Independent t-test	Experimental vs. Control	$p < 0.001$
Paired t-test	Experimental Group (Pretest vs. Posttest)	$p < 0.001$
ANOVA	Interaction Effects (TGfU vs. Skills)	$p < 0.001$
ANOVA	Interaction Effects (TGfU vs. Performance)	$p < 0.01$

4. DISCUSSION

The results of this research clearly demonstrate that the Teaching Games for Understanding (TGfU) approach significantly improves university students' football skills, even with limited learning time. This includes enhancements in technical skills (e.g., shooting accuracy, long-passing distance, successful passes, and ball control) and gameplay performance (e.g., decision-making, skill execution, and tactical awareness). These improvements occurred within a relatively short time frame (14 weeks), underscoring TGfU's pedagogical efficiency in physical education settings with limited instructional time. These findings align with previous studies, such as those by Mazzardo et al. (2022), who emphasized the potential of TGfU to enhance motor coordination, technical skills, and overall game performance.

A key factor contributing to TGfU's success is its basis in constructivist learning theory, which emphasizes active engagement in authentic contexts. This approach aligns with educational neuroscience findings, which suggest that learning is enhanced when cognitive and motor systems are activated simultaneously (Osgood Campbell, 2015). By embedding skill acquisition within tactical scenarios that require real-time decision-making, TGfU stimulates higher-order thinking while fostering motor competence. Fitrianto et al. (2023) similarly reported that TGfU supports both cognitive and motor skill development, creating a synergistic effect across learning domains.

From an interdisciplinary perspective, TGfU aligns with 21st-century educational priorities, including the STEAM framework (Drake & Reid, 2018). Its emphasis on problem-solving, tactical creativity, and biomechanical awareness parallels integrated learning models that combine physical education with cognitive and artistic dimensions. Similarly, Gillani (2013) emphasized that embedding strategy into physical education accelerates motor learning and promotes engagement.

Moreover, while the regular physical activity group also exhibited improvements in football skills compared to the control group, the gains were not as pronounced as those observed in the TGfU group. This suggests that while general physical activity contributes positively to skill development, the absence of strategic and decision-making components may limit its effectiveness. Martins & da Rocha (2020) explained that activities involving problem-solving and decision-making, as seen in TGfU, are more likely to stimulate brain regions associated with motor planning and execution. This reinforces the notion that structured physical education programs like TGfU offer superior benefits compared to unstructured or less cognitively demanding activities.

These findings also challenge the pervasive stigma in Indonesia that associates physical education and sports with lower cognitive and motor abilities. The stereotype of "Schools Without Brains" undermines the potential of sports programs, particularly those adopting innovative approaches like TGfU, to contribute to students' overall development. By demonstrating that students in TGfU-based programs achieved significant gains in football skills, this research directly counters the misconception that physical activity detracts from intellectual or educational outcomes. On the contrary, the structured nature of TGfU appears to bridge the gap between physical and cognitive domains, offering a more comprehensive developmental framework.

The results further demonstrate evidence of positive transfer of learning (Pan & Rickard, 2018). Skills and strategies acquired in TGfU contexts were successfully adapted to gameplay situations, indicating that this approach facilitates the transfer of tactical knowledge and motor

coordination beyond isolated practice. Ortiz et al. (2023) also noted that TGfU strengthens metacognitive abilities by encouraging reflection and strategic adjustment during play, which are essential for decision-making and overall performance. Our findings add to this body of evidence by demonstrating how TGfU, when applied in a structured physical education program, contributes to students' holistic development.

From a broader perspective, this study underscores the importance of incorporating innovative approaches like TGfU into physical education curricula. The significant improvements observed in football skills among the TGfU group highlight the potential of such methods to address gaps in traditional physical education. By combining physical activities with strategic gameplay, TGfU fosters a dynamic learning environment that engages students both physically and mentally. This aligns with Antunes et al. (2006), who noted that integrating cognitive and physical tasks in educational settings can enhance students' overall learning experiences.

While this study focused primarily on football skills, it also provides insights into the interconnectedness of physical and cognitive development. The strategic decision-making involved in TGfU-based exercises likely contributes to improved executive functions, such as planning and problem-solving. Haapala (2012) emphasized that physical activities that challenge cognitive processes can lead to better attention, memory, and learning outcomes. Although these cognitive benefits were not the primary focus of this study, they provide valuable insights into the broader implications of TGfU for educational practices.

Good motor coordination is essential for developing fundamental football skills. A related study conducted in West Sumatra, Indonesia, analyzed the relationship between fundamental motor skills and motor coordination among elementary school students aged 7 to 9 years (Oktarifaldi et al., 2024). The study highlighted that students with access to structured physical education programs, particularly those led by trained teachers, demonstrated better motor coordination. These findings emphasize the importance of pedagogically sound approaches like TGfU in promoting motor development.

TGfU also addresses individual differences in learning, an important consideration for inclusive education (Tomlinson, 2014). Its flexible, game-centered design accommodates diverse learning styles, prior experiences, and physical abilities, enabling personalized engagement. This contrasts with drill-based approaches that often prioritize uniformity over adaptability. Notably, classroom-based research has shown TGfU to enhance higher-order thinking skills (HOTS),

including decision-making and player support, through repeated game-based cycles (Wahidah, 2019). This is consistent with our findings, where students engaged in TGfU not only exhibited improved football skills but also demonstrated better problem-solving abilities and situational decision-making. These elements are essential for integrating motor development with cognitive skills, as observed in their superior Skill Execution Index (SEI) scores during gameplay.

Although our research focused on physical and motor aspects, the results highlight that game-based approaches like TGfU also contribute to cognitive development. Through play involving strategic decisions, students practice motor and cognitive skills related to decision-making, problem-solving, and critical thinking, supporting overall cognitive abilities (Yudanto, 2020).

From a social perspective, this research holds significant potential to reshape public perceptions of the link between sports and intelligence. Traditionally, there's been a stigma that suggests athletes or students who engage in sports aren't as cognitively adept. Importantly, these findings challenge prevailing misconceptions in Indonesia that undervalue physical education, often epitomized by the stereotype of "Schools Without Brains." Evidence from this study indicates that TGfU-based programs foster both cognitive and motor development, positioning physical education as a critical component of holistic education. McGregor (2007) further supports this claim, noting the role of structured physical education in promoting cognitive resilience and social intelligence.

Despite its strengths, this study has several limitations. First, the research was conducted within an Indonesian university context, which may limit generalizability to other cultural or educational settings where approaches to physical education differ. Second, the sample consisted exclusively of students from a physical education program, most of whom were male. This gender imbalance and academic specialization may introduce bias, as these participants might have higher baseline physical literacy compared to non-PE students or female counterparts. Future studies should include more diverse samples, both in terms of gender and academic background, to examine whether TGfU's benefits are consistent across populations. Additionally, the study did not account for socioeconomic factors or prior exposure to football outside of formal instruction, which could influence skill development and learning outcomes.

The implications of this research are far-reaching. By demonstrating the effectiveness of TGfU in enhancing football skills, this study advocates for the integration of game-based learning approaches into physical education programs. Such methods not only improve motor skills but also promote a more inclusive and engaging learning environment. Policymakers and educators should

consider adopting TGfU as a standard practice in schools to address the dual goals of physical and cognitive development, ultimately fostering more well-rounded students prepared for both academic and physical challenges.

5. CONCLUSIONS

This study demonstrates that TGfU is an effective pedagogical approach for accelerating football skill acquisition within limited instructional time. Participants exposed to TGfU-based learning achieved notable improvements in technical execution, tactical awareness, and biomechanical efficiency compared to peers receiving traditional drill-based instruction. These findings highlight the potential of TGfU as an innovative and efficient method for teaching football skills in higher education, particularly in contexts where learning time is constrained.

TGfU's strength lies in its integration of decision-making, tactical problem-solving, and skill performance in authentic game contexts. By promoting both motor proficiency and cognitive engagement, TGfU supports holistic student development, challenging persistent stereotypes that separate physical education from intellectual growth. This dual impact directly counters the enduring misconception in Indonesia that physical education lacks intellectual merit—often encapsulated in the derogatory label "Schools Without Brains". Instead, this research underscores the value of integrating physical and cognitive tasks in educational settings, promoting a more balanced and inclusive approach to learning.

Moreover, the study highlights the importance of structured and pedagogically sound approaches in physical education. While traditional methods may improve physical skills to some extent, TGfU's integration of strategic thinking and problem-solving components consistently yields superior learning outcomes. This aligns with previous research, such as that by Ortiz et al. (2023), which found that TGfU enhances metacognitive abilities and critical thinking, further supporting its effectiveness as a comprehensive educational tool.

The implications of this research extend beyond the classroom. By demonstrating that students can achieve significant skill development in a short time frame, this study provides a strong case for the adoption of TGfU in physical education curricula. Policymakers and educators should consider incorporating TGfU into their programs to address the dual goals of physical and cognitive development, ultimately fostering more well-rounded students who are prepared for both academic and physical challenges.

While these findings are promising, future research should address limitations related to gender representation, cultural specificity, and potential sampling bias. Broader investigations incorporating neurocognitive metrics and varied populations would further clarify TGfU's role as a transformative educational model. Future studies should not only investigate TGfU's long-term effects but also explore its application across various educational levels, age groups, and socio-cultural backgrounds.

In conclusion, this research reinforces TGfU as a transformative and multidimensional pedagogical approach. By bridging the gap between physical and cognitive development, TGfU not only enhances students' football abilities but also empowers them to become confident and competent educators as such, TGfU is not merely a tool for sports instruction—it is a catalyst for holistic education and character development.

6. REFERENCES

1. Antunes, H. K. M., Santos, R. F., Cassilhas, R., Santos, R. V. T., Bueno, O. F. A., & De Mello, M. T. (2006). Reviewing on physical exercise and the cognitive function. *Revista Brasileira de Medicina Do Esporte, 12*(2), 97-103. https://doi.org/10.1590/S1517-86922006000200011
2. Balakrishnan, M., Rengasamy, S., & Aman, M. S. (2011). Effect of teaching games for understanding approach on students' cognitive learning outcome. *World Academy of Science, Engineering and Technology, 77*, 961–963.
3. Clark, J. E. (2007). On the Problem of Motor Skill Development. *Journal of Physical Education, Recreation & Dance, 78*(5), 1-58. https://doi.org/10.1080/07303084.2007.10598023
4. Doozan, A., & Bae, M. (2016). Teaching Physical Literacy to Promote Healthy Lives: TGfU and Related Approaches. *The Physical Educator, 73*(3), 471-487. https://doi.org/10.18666/tpe-2016-v73-i3-6364
5. Drake, S., & Reid, J. (2018). Integrated Curriculum as an Effective Way to Teach 21st Century Capabilities. *Asia Pacific Journal of Educational Research, 1*(1), 31-50. https://doi.org/10.30777/apjer.2018.1.1.03
6. English, J. A., & Kruger, A. C. (2016). Appreciative advising: Six phases to mitigate stereotype threat among student athletes. *Journal of Appreciative Education, 3*(1), 18–29.
7. Fezzani, K., Albinet, C., Thon, B., & Marquie, J. C. (2010). The effect of motor difficulty on the acquisition of a computer task: A comparison between young and older adults. *Behaviour and Information Technology, 29*(2), 1-18. https://doi.org/10.1080/01449290701825139
8. Filgueira, F., & Greco, P. (2008). Futebol: um estudo sobre a capacidade tática no processo de ensino aprendizagem–treinamento. *Revista Brasileira de Futebol, 1*(2), 1-14.
9. Fitrianto, A. T., Habibie, M., & Prayoga, H. D. (2023). Teaching games for understanding (TGfU) developing gross motor skill In physical education. *Journal of Physical and Outdoor Education, 5*(2), 24-31. https://doi.org/10.37742/jpoe.v5i2.226
10. Fuller, R. D. (2017). Perception or Reality: The Relationship Between Stereotypes, Discrimination, and the Academic Outcomes of African American Male College Athletes. *Journal of Sport and Social Issues, 41*(5), 1-18. https://doi.org/10.1177/0193723517719664

11. García-Angulo, A., García-Angulo, F. J., Torres-Luque, G., & Ortega-Toro, E. (2019). Applying the new teaching methodologies in youth football players: Toward a healthier sport. *Frontiers in Physiology, 10,* 1-9. https://doi.org/10.3389/fphys.2019.00121
12. Gillani, B. (2013). Cognitive theory and the design of education to work connection. ACM International Conference Proceeding Series. https://doi.org/10.1145/2501907.2501938
13. Haapala, E. (2012). Physical Activity, Academic Performance and Cognition in Children and Adolescents. A Systematic Review. *Baltic Journal of Health and Physical Activity, 4*(1), 147-155. https://doi.org/10.2478/v10131-012-0007-y
14. Hortigüela-Alcalá, D., & Hernando-Garijo, A. (2017). Teaching Games for Understanding: A Comprehensive Approach to Promote Student's Motivation in Physical Education. *Journal of Human Kinetics, 59*(1), 17-27. https://doi.org/10.1515/hukin-2017-0144
15. Koopmann, T., Faber, I., Baker, J., & Schorer, J. (2020). Assessing Technical Skills in Talented Youth Athletes: A Systematic Review. *In Sports Medicine, 50*(13), 1594-1611. https://doi.org/10.1007/s40279-020-01299-4
16. Mariati, D. S., Sumaryanti, S., Nugroho, S., Yassin, A., & Budayati, E. S. (2024). Movement reinforcement factors related to children's motor skills: a review study in sports education. *Tanjungpura Journal of Coaching Research, 2(*1), 37–45. https://doi.org/10.26418/tajor.v2i1.74751
17. Martins, F. B., & da Rocha, H. P. A. (2020). A Narrative Review on Student- Athletes in Higher Education: Barriers, Solutions and Satisfactory Post-Sport Career Transition. https://api.semanticscholar.org/CorpusID:237561814Mazzardo, T., Ribas, S., Greco, P. J., Monteiro, G. N., da Silva, W. J. B., Araújo, N. D., & Aburachid, L. M. C. (2022). TGfU in the teaching of handball at school: impacts on the motor coordination and technique in the game. *Motriz. Revista de Educacao Fisica, 28,* 1-16. https://doi.org/10.1590/S1980-657420220017121
18. McGregor, D. (2007). Developing Thinking Developing Learning. *British Journal of Educational Studies, 55*(4), 466-468.
19. Oktarifaldi, O., Nopembri, S., Yudanto, & Bin Shahril, M. I. (2024). The fundamental motor skills and motor coordination performance of children in West Sumatera Province, Indonesia. *Pedagogy of Physical Culture and Sports, 28*(1), 4-15. https://doi.org/10.15561/26649837.2024.0101
20. Ortiz, M., Meroño, L., Morales-Belando, M. T., Vaquero-Cristóbal, R., & González-Gálvez, N. (2023). Teaching Games for Understanding in Game Performance and Psychosocial Variables: Systematic Review and Meta-Analysis of Randomized Control Trial. *Children, 10(*3), 1-16. https://doi.org/10.3390/children10030573
21. Osgood-Campbell, E. (2015). Investigating the educational implications of embodied cognition: A model interdisciplinary inquiry in mind, brain, and education curricula. *Mind, Brain, and Education, 9*(1), 1-17. https://doi.org/10.1111/mbe.12063
22. Oslin, J. L., Mitchell, S. A., & Griffin, L. L. (1998). The Game Performance Assessment Instrument (GPAI): Development and preliminary validation. *Journal of Teaching in Physical Education, 17*(2), 231-243. https://doi.org/10.1123/jtpe.17.2.231
23. Pan, S. C., & Rickard, T. C. (2018). Transfer of test-enhanced learning: Meta-analytic review and synthesis. *Psychological Bulletin, 144*(7), 710–756. https://doi.org/10.1037/bul0000151
24. Puig-Diví, A., Escalona-Marfil, C., Padullés-Riu, J. M., Busquets, A., Padullés-Chando, X., & Marcos-Ruiz, D. (2019). Validity and reliability of the Kinovea program in obtaining angles and distances using coordinates in 4 perspectives. *PLoS ONE, 14*(6), 1-14. https://doi.org/10.1371/journal.pone.0216448
25. Rodríguez Fernández, J. E., Mato Cadórniga, J. Á., & Pereira Mariño, M. C. (2016). Análisis de los métodos tradicionales de enseñanza-aprendizaje de los deportes colectivos en Educación Primaria y propuestas didácticas innovadoras. Sportis. *Scientific Journal of School Sport,*

Physical Education and Psychomotricity, *2*(2), 303-323. https://doi.org/10.17979/sportis.2016.2.2.1426
26. Stephanou, G., & Karamountzos, D. (2020). Enhancing Students' Metacognitive Knowledge, Metacognitive Regulation and Performance in Physical Education via TGFU. *Research in Psychology and Behavioral Sciences, 8*(1), 1-10. https://doi.org/10.12691/rpbs-8-1-1
27. Supandri, G. B. D. (2009). Seputar IKOR: Sejarah Fakultas Ilmu Keolahragaan. https://ilmukeolahragaan2007.blogspot.com/2009/05/sejarah-fakultas-ilmu-keolahragaan.html
28. Tomlinson, C. A. (2014). *The differentiated classroom: Responding to the needs of all learners.* Ascd.
29. Wahidah. (2019). Memahami perbedaan individu pebelajar dalam proses belajar mengajar. *At-Tarbawi, 11*(2), 108–123. https://doi.org/10.32505/tarbawi.v11i2.1261
30. Yudanto, Y. (2020). Pengaruh model aktivitas jasmani berbasis perseptual motorik terhadap gerak dasar manipulatif anak taman kanak-kanak. *Jurnal SPORTIF: Jurnal Penelitian Pembelajaran, 6*(1), 92-104. https://doi.org/10.29407/js_unpgri.v6i1.13976

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding.

COPYRIGHT

© 2026 by the authors. This is an open-access article distributed under the terms of the Creative Commons CC BY 4.0 license, meaning that anyone may download and read the paper for free. The use, distribution or reproduction in other forums is permitted, provided the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms. These conditions allow for maximum use and exposure of the work, while ensuring that the authors receive proper credit.