



TGfU in Basketball Learning: Impacts on Active Engagement and Learning Outcomes of Middle School Students

Muhammad Ishak^{1*}, Suharjo¹, Raswi¹, Bessy Sitorus Pane², Amir Supriadi¹, Ade Ros Riza¹, Muhammad Reza Destya³

¹Physical Education, Healty and Recreation, Universitas Negeri Medan, Indonesia.

²Physical Coaching and Sport, Universitas Negeri Medan, Indonesia.

³Sport Science, Universitas Negeri Medan, Indonesia

*Correspondence: E-mail: muhammadishak@unimed.ac.id

ABSTRACT

This study examined the effect of the Teaching Games for Understanding (TGfU) model on the student active engagement and basketball learning outcomes. A quantitative quasi-experimental with a pretest–posttest control group design was applied. The sample consisted of 64 eighth-grade students, divided into a TGfU group (n = 32) and a conventional learning group (n = 32). The intervention was conducted over eight sessions. Data were collected using an active engagement observation sheet, basic skill tests (passing, dribbling, shooting), and the Game Performance Assessment Instrument (GPAI). Data were analyzed using ANCOVA with pre-test scores as covariates. The results showed that the TGfU group achieved significantly higher post-test scores than the conventional group in active engagement (F = 28.60; p < 0.001), passing (F = 14.10; p < 0.001), dribbling (F = 10.92; p = 0.002), shooting (F = 16.80; p < 0.001), and GPAI (F = 24.50; p < 0.001). This study concludes that TGfU is effective for improving learning outcomes.

ARTICLE INFO

Submitted/Received March 2026

First Revised March 2026

Accepted March 2026

Publication Date April 2026

Keyword:

active engagement,
basketball, learning
outcomes, TGfU

INTRODUCTION

Physical education in junior high schools aims to develop student holistic competencies through meaningful movement experiences, which encompass psychomotor, cognitive, and affective domains. In the context of basketball learning, instructional practices should not only emphasize the mastery of fundamental techniques, such as passing, dribbling, shooting, and lay-ups, but also the enhancement of student understanding of game tactics, decision-making abilities, and teamwork within authentic game situations. However, in practice, basketball instructions in many junior high schools remain predominantly drill-based, focusing on repetitive technical exercises isolated from real game contexts. This approach potentially limits the quality of learning as students have fewer opportunities to apply skills in meaningful situations, resulting in reduced engagement and suboptimal learning outcomes.

Active student engagement is a key indicator of effective physical education instructions. Engagement in physical education extends beyond mere physical participation and includes cognitive involvement in understanding game dynamics and making appropriate decisions during play (Tomporowski et al., 2015; Giguere, 2022; Sinulingga et al., 2020; Schumacher et al., 2024). In team sports such as basketball, student engagement is often uneven due to differences in skill levels, the dominance of more skilled players, and limited variations in instructional strategies (Indrayana et al., 2021; Bangun et al., 2024). These conditions may lead to reduced participation among less skilled students, lower motivation, and widened learning disparities. Therefore, an instructional model that promotes inclusive participation while simultaneously enhancing learning outcomes across multiple domains is required.

One pedagogical approach that addresses these challenges is the Teaching Games for Understanding (TGfU) model. TGfU positions games as the central context for learning by using modified game forms to facilitate tactical understanding, decision-making, and skill development. Within this model, technical skills are acquired in response to game-related problems rather than through isolated drills. Consequently, TGfU is considered to have strong potential to improve both the quality of student engagement and learning outcomes across psychomotor, cognitive, and affective domains.

Despite its growing adoption, several gaps remain in the literature regarding the implementation of TGfU, particularly in junior high school basketball contexts. Many previous studies tend to evaluate learning effectiveness primarily based on technical skill outcomes, while active student engagement, both physical and cognitive engagement, during the learning process has not been systematically measured. In addition, assessments of learning outcomes in TGfU research are often not comprehensive, as they do not fully integrate psychomotor skills, tactical understanding, and affective aspects such as teamwork and sportsmanship. Also, the application of TGfU in school settings requires contextual adaptation to constraints such as limited instructional time, facility availability, and heterogeneous student abilities. As a result, empirical evidence regarding the effectiveness of TGfU in enhancing both engagement and multidimensional learning outcomes in junior high schools remains limited.

In addition, few studies have employed rigorous analytical approaches that control for baseline differences when examining the effectiveness of TGfU. The use of quasi-experimental design combined with statistical techniques such as Analysis of Covariance (ANCOVA) is still relatively limited, particularly in studies focusing on middle school students.

This methodological limitation reduces the strength of causal inferences regarding the impact of TGfU on student learning.

Based on these gaps, the novelty of this study lies in its integrated examination of the effects of the TGfU model on student active engagement during basketball learning as well as on comprehensive learning outcomes across multiple domains. Active engagement is operationalized through systematically observed indicators, including participation in game phases, involvement in transitions between attack and defense, frequency of decision-making actions, and contributions to team play. Meanwhile, learning outcomes are assessed using a multidimensional framework that encompasses technical skills, such as passing, dribbling, and shooting, alongside tactical understanding and overall game performance as measured by the Game Performance Assessment Instrument (GPAI). Furthermore, this study offers practical contributions by implementing a TGfU-based instructional design adapted to the junior high school context, including the use of modified small-sided games, simplified rules, and guided questioning techniques to stimulate the student tactical thinking.

Therefore, this study aimed to examine the effect of the Teaching Games for Understanding (TGfU) model on student active engagement and basketball learning outcomes in junior high schools. Using a quasi-experimental design with pretest–posttest measures and ANCOVA analysis to control for initial differences, this study sought to provide robust empirical evidence on the effectiveness of TGfU. The findings are expected to contribute both theoretically, by strengthening the multidimensional understanding of game-based learning, and practically, by offering evidence-based recommendations for physical education teachers to implement more meaningful, participatory, and student-centered instructional strategies.

METHODS

Research Design

This study employed a quantitative approach using a quasi-experimental method with a pretest–posttest control group design (Creswell, 2017). Two comparable classes were assigned as the experimental and control groups. Both groups completed an initial measurement (pre-test). After pre-test, the experimental group received basketball instructions using the Teaching Games for Understanding (TGfU) model, while the control group was taught using conventional drill-based methods focusing on technical skills.

The intervention was conducted over eight instructional sessions. At the end of the treatment period, both groups completed a post-test to assess changes in active engagement and learning outcomes.

Participants

The participants were eighth-grade junior high school students enrolled in physical education classes during the second semester of the academic year. A total of 64 students participated in the study, consisting of 32 students in the experimental group and 32 students in the control group.

Inclusion criteria required students to be actively enrolled in the selected classes, participate in all basketball learning sessions, and complete both pre-test and post-test assessments. Students who were absent for more than one session or failed to complete either assessment were excluded from the analysis.

Sampling Procedures

A cluster sampling technique was employed, with classes serving as the sampling units. Two parallel classes with similar physical education schedules were selected. The assignment of classes to experimental and control groups was conducted randomly at the class level to minimize selection bias. Baseline equivalence between groups was confirmed through comparison of pre-test scores using descriptive statistics, including mean and standard deviation.

Materials and Instruments

Instructional Design

The experimental group was taught using a TGFU-based instructional approach, which followed a structured sequence of game form, tactical awareness, decision-making, skill execution, and performance. Learning activities incorporated modified small-sided games and guided questioning techniques to stimulate student tactical thinking.

In contrast, the control group received conventional instruction emphasizing isolated technical drills (passing, dribbling, and shooting), followed by game play at the end of each session without structured tactical guidance.

Active Engagement Instruments

Active engagement was measured using an observation sheet designed to capture both physical and cognitive involvement during learning activities. The observed indicators included participation in gameplay, involvement in transitions between attack and defense, communication and cooperation, decision-making (such as selecting passing, dribbling, or shooting), and adherence to rules. Each indicator was rated on a four-point scale ranging from very low to very high. Observations were conducted by two trained observers using a standardized rubric.

Learning Outcome Instruments

Learning outcomes were assessed through a combination of skill-based tests and game performance evaluation. Technical skills were measured through passing accuracy, dribbling control, and shooting success. Game performance was evaluated using the Game Performance Assessment Instrument (GPAI) within modified game situations. The GPAI components included decision-making, support (off-the-ball movement), and skill execution in game contexts.

Content validity was established through expert judgment to ensure that the instructional materials and measurement instruments accurately represented the constructs under investigation. Three experts, two experienced physical education teachers and one academic in sport pedagogy, evaluated each item based on relevance, clarity, and measurability using a four-point scale. The validity of each item was quantified using Aiken's V coefficient. Items with coefficients of 0.80 or higher were considered acceptable. Items that did not meet this threshold were revised according to expert feedbacks and re-evaluated prior to data collection.

The inter-rater reliability was assessed to ensure consistency between observers. Two trained observers independently evaluated a subset of participants under the same conditions. Reliability coefficients were calculated using the Intraclass Correlation Coefficient (ICC) with a two-way random-effects model and absolute agreement. Cohen's Kappa was also considered for categorical or ordinal data analysis. Reliability values were interpreted according to standard criteria, with coefficients above 0.75 indicating good reliability.

Procedures

The intervention was implemented over eight physical education sessions in accordance with the school schedule. In the experimental group, each session began with modified gameplay to introduce tactical problems, followed by guided questioning, targeted skill reinforcement, and the application in subsequent gameplay.

In the control group, the instruction focused on repetitive technical drills before concluding with unstructured gameplay. Throughout the study, the teacher maintained consistent instructional time and learning objectives across both groups.

Data Analysis

Data analysis was conducted in several stages. Descriptive statistics were administered to summarize the mean, standard deviation, and score distribution for all variables. Assumptions of normality and homogeneity were tested using the Shapiro–Wilk and Levene’s tests, respectively. To examine within-group changes, paired-samples t-tests were conducted. Differences between groups were analyzed using Analysis of Covariance (ANCOVA), with post-test scores as the dependent variable, groups as the independent variable, and pre-test scores as the covariate. The level of significance was set at $\alpha = 0.05$.

Effect sizes were calculated using partial eta squared for ANCOVA results and Cohen’s d for within-group comparisons. Inter-rater reliability results were also reported to ensure the consistency and credibility of observational data.

RESULTS

Descriptive Statistics

Descriptive analysis was conducted to describe the active engagement scores and basketball learning outcomes in the TGfU group and the conventional group in the pre-test and post-test.

Table 1. The Descriptive Analysis Result of Active Involvement

Group	n	Pre-test (Mean \pm SD)	Post-test (Mean \pm SD)	Approval Criteria
TGfU	32	2.12 \pm 0.39	3.18 \pm 0.36	+1.06
Conventional	32	2.09 \pm 0.41	2.55 \pm 0.40	+0.46

Table 2. The Descriptive Analysis Result of Learning Outcomes

Variable	Group	n	Pre-test (Mean \pm SD)	Post-test (Mean \pm SD)
Passing (0-20)	TGfU	32	10.8 \pm 2.1	15.6 \pm 2.0
	Conventional	32	10.6 \pm 2.0	13.0 \pm 2.2
Dribbling (seconds)	TGfU	32	18.4 \pm 1.8	15.9 \pm 1.6
	Conventional	32	18.2 \pm 1.9	17.2 \pm 1.7
Shooting (0-10)	TGfU	32	3.1 \pm 1.2	6.2 \pm 1.3
	Conventional	32	3.0 \pm 1.1	4.8 \pm 1.2

Descriptively, the TGfU group showed an increase in active engagement from pre-test (M = 2.12, SD =0.39) to post-test (M = 3.18, SD = 0.36). The improvement was also seen in the conventional group, from pre-test (M = 2.09, SD = 0.41) to post-test (M = 2.55, SD = 0.40). In terms of learning outcomes, there was an increase in passing and shooting scores, as well as a decrease in dribbling time in both groups, with a greater increase of mean in the TGfU group

(Table 1). The result of descriptive analysis of learning outcomes (technical test) can be seen in Table 2.

Prerequisite Analysis Test

Normality (Shapiro–Wilk) and homogeneity of variance (Levene) tests were performed before the inferential test. In general, the pre-test and post-test data in both groups were distributed according to the assumptions of normality ($p > 0.05$) and homogeneity of variance ($p > 0.05$), so parametric analysis was performed.

Table 3. Summary of Prerequisite Tests

Variable	Normality (p)	Homogeneity (p)	Results
Active Involvement	0.081	0.233	Fulfil
Passing	0.120	0.190	Fulfil
Dribbling	0.067	0.145	Fulfil
Shooting	0.090	0.201	Fulfil
Total GPAI	0.058	0.172	Fulfil

Score Improvement in Each Group

Paired-sample t-test was used to examine changes in scores from pre-test to post-test in each group.

Table 4. Paired T-Test

Variable	Group	t	p	Cohen's d
Active Involvement	TGfU	12.10	<0.001	2.14
	Conventional	5.48	<0.001	0.97
Passing	TGfU	8.92	<0.001	1.58
	Conventional	5.10	<0.001	0.90
Dribbling	TGfU	9.01	<0.001	1.59
	Conventional	3.88	<0.001	0.69
Shooting	TGfU	10.32	<0.001	1.82
	Conventional	6.14	<0.001	1.09
Total GPAI	TGfU	11.05	<0.001	1.95
	Conventional	6.40	<0.001	1.13

The results showed that both groups experienced improvements in most variables, but the improvement in the TGfU group tended to be greater than in the conventional group.

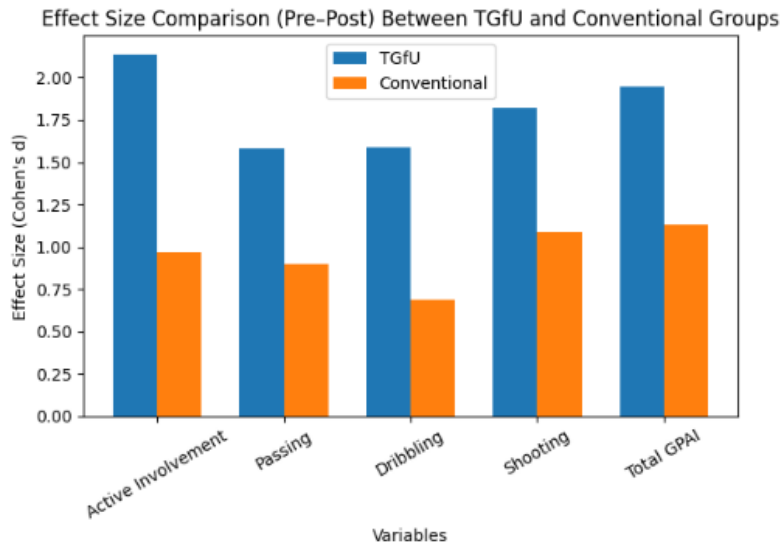


Figure 1. Effect Size Comparison (Pre-Post) between TGfU and Conventional Groups

Effect Differences between TGfU and Conventional Groups

To test the effect of treatment by controlling for initial differences, ANCOVA was used with post-test scores as the dependent variable and pre-test scores as the covariate.

Table 5. Results of ANCOVA Intergroup

Variable (post-test)	F	P	η^2p
Active Involvement	28.60	<0.001	0.32
Passing	14.10	<0.001	0.19
Dribbling	10.92	<0.001	0.15
Shooting	16.80	<0.001	0.22
Total GPAI	24.50	<0.001	0.29

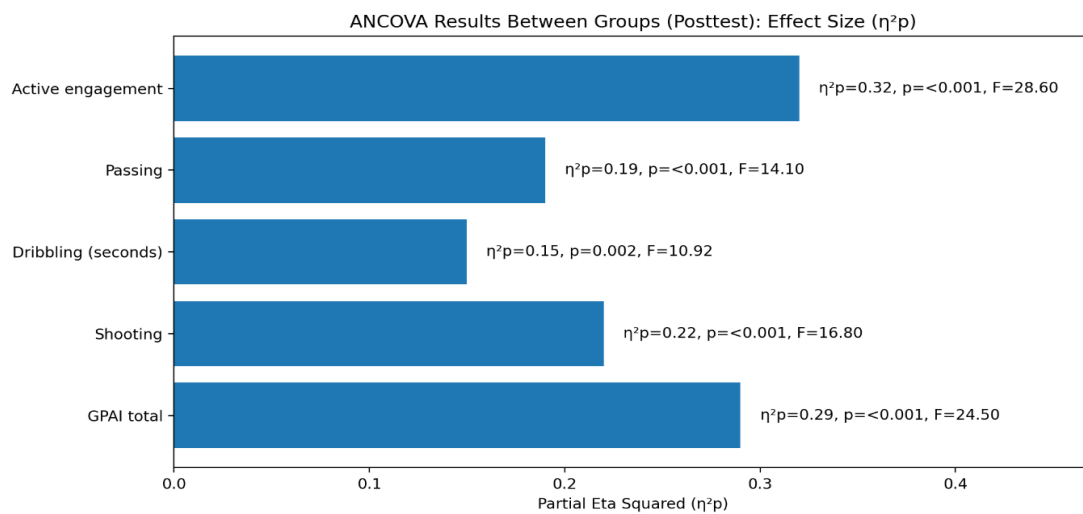


Figure 2. Effect Size (η^2p)

The interpretation shows that there are significant differences between the TGfU and conventional groups in all tested variables ($p < 0.05$). The partial eta squared (η^2p) indicates a medium to large effect size, especially on active engagement and game performance (GPAI).

Reliability of Observation Assessments

Inter-rater reliability was tested for the active engagement observation instrument and the GPAI.

Table 6. Inter-Reliability Appraisers

Variable (post-test)	Method	Coefficient	Interpretation
Active Involvement	ICC (absolute agreement)	0.86	Good
Total GPAI	ICC (absolute agreement)	0.83	Good

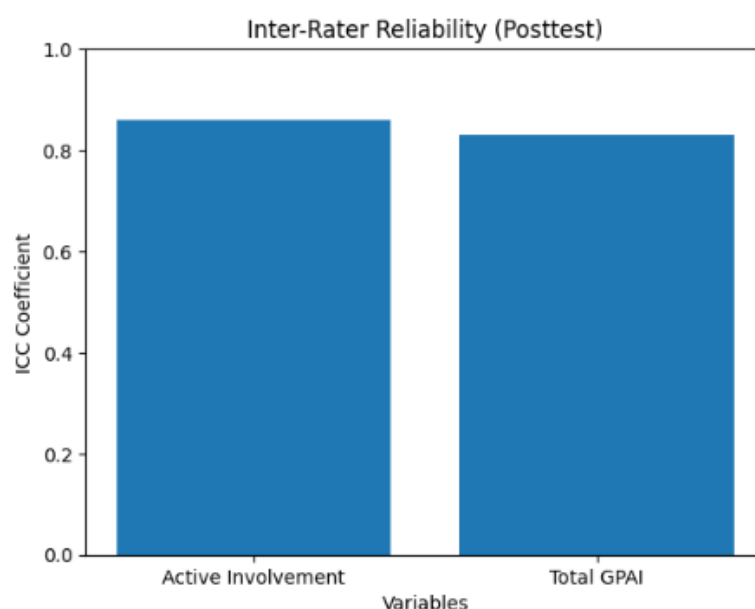


Figure 3. Inter-Rater Reliability (Post-Test)

The results show that the reliability coefficient is in the good category, so that the observation instrument is considered consistent between assessors.

Overall, basketball learning using the TGfU model resulted in greater improvements in active student engagement during learning, basic technique test results (passing, dribbling, shooting), and game performance based on GPAI compared to conventional learning. These findings support that TGfU is effective in optimizing engagement in the learning process as well as the achievement of basketball learning outcomes in junior high schools.

DISCUSSION

The findings of this study demonstrate that the Teaching Games for Understanding (TGfU) model is more effective than the conventional instruction in enhancing the student active engagement and basketball learning outcomes. These results provide empirical support for the superiority of game-based pedagogical approaches over traditional drill-based methods

in physical education. The observed improvements are consistent with recent international evidence indicating that TGfU significantly enhances student engagement and game performance compared to technique-centered instructions (Mahardhika et al., 2024).

From a theoretical standpoint, the increase in active engagement can be interpreted through the lens of constructivist learning theory, which posits that knowledge is actively constructed through meaningful interactions with the learning environment. TGfU situates learning within authentic game contexts, enabling students to engage in continuous perception-action coupling. This perspective is further supported by ecological dynamics, which emphasizes that learning emerges from the dynamic interaction between the learner, the task, and the environment. In this study, the use of modified games and guided questioning appeared to have created learning conditions that encouraged active exploration, decision-making, and sustained participation. These findings align with prior studies demonstrating that TGfU enhances engagement, extends academic learning time, and increases student motivation (Pan et al., 2023; Gaspar et al., 2021; Romadhona et al., 2024).

The improvement in technical skills observed in this study challenges the long-standing dominance of drill-based instructions in basketball learning. Unlike conventional approaches that isolate skill practice, TGfU embeds technical execution within tactical contexts, allowing skills to develop in response to game demands. This finding supports the constraints-led approach, which suggests that skill acquisition is shaped by the interaction of task, environmental, and individual constraints. By situating skill learning within meaningful game situations, TGfU facilitates functional skill development and enhances the transfer of learning to actual gameplay. This result is consistent with previous experimental studies reporting that TGfU significantly improves fundamental skills and their application in game contexts (Mazzardo et al., 2022; Santoso et al., 2024; Ritonga et al., 2024).

In terms of game performance, the significant improvements in GPAI components, particularly decision-making, support, and skill execution, indicate that TGfU effectively integrates cognitive and motor processes during gameplay. This integration is often lacking in traditional instructions, where technical proficiency is emphasized without sufficient attentions to tactical understanding. The present findings are in line with earlier research showing that TGfU could enhance decision-making quality and overall game performance in authentic contexts (Jarrett et al., 2014; Saputri et al., 2025). Moreover, the relatively large effect sizes observed in this study suggest that the structured implementation of TGfU, including the use of small-sided games and guided questioning, successfully operationalizes its core pedagogical principles.

From a theoretical perspective, this study contributes to the growing body of literature supporting game-centered pedagogies as an effective approach to bridging the gap between technical skill acquisitions and tactical understanding. The findings reinforce the paradigm shift from teacher-centered to learner-centered instructions, positioning learning as an adaptive, contextual, and meaning-making process. By simultaneously examining active engagement and multidimensional learning outcomes, this study also extends previous research that has often focused on isolated aspects of learning effectiveness.

Despite these contributions, several limitations should be acknowledged. The use of a quasi-experimental design may limit the strength of causal inferences due to potential selection bias, although statistical controls were applied. The relatively short duration of the intervention restricts conclusions regarding the long-term retention of learning outcomes. In addition, the use of observational instruments, while systematically designed, may introduce a degree of subjectivity despite the established inter-rater reliability.

Future research is recommended to adopt longitudinal designs to examine the sustainability of TGfU effects over time. The integration of mixed-method approaches could also provide deeper insights into the underlying mechanisms of learning, particularly in relation to the student cognitive and affective experiences. Furthermore, exploring additional mediating variables, such as motivation, tactical awareness, and affective outcomes, would contribute to a more comprehensive understanding of how TGfU influences student development across diverse educational contexts.

CONCLUSION

This study demonstrates that the Teaching Games for Understanding (TGfU) model is more effective than the conventional instruction in enhancing student active engagement and basketball learning outcomes. Improvements were evident not only in technical skills but also in overall game performance, highlighting the effectiveness of game-centered approaches in fostering integrated learning processes. These findings support theoretical perspectives that emphasize the coupling of cognition, decision-making, and skill execution within authentic learning environments.

This study contributes to the existing literature by providing empirical evidence on the multidimensional impact of TGfU, integrating behavioral engagement and performance outcomes within a single analytical framework. The results reinforce the pedagogical value of game-based instruction as an effective strategy for promoting meaningful, participatory, and holistic learning in physical education.

Practically, these findings suggest that physical education teachers should consider adopting TGfU-based instructional strategies, such as modified small-sided games and guided questioning, to enhance student engagement and optimize learning outcomes in basketball instruction. However, several limitations should be acknowledged. The relatively small sample size and short duration of the intervention may limit the generalizability of the findings. Future research is recommended to employ longitudinal designs and explore additional mediating variables, such as motivation and tactical awareness, to better understand the mechanisms underlying TGfU effectiveness across diverse educational contexts.

ACKNOWLEDGMENT

The researcher would like to express his gratitude to the research samples at SMP Negeri 11 Medan and to all research members who have helped a lot in writing this article.

AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

REFERENCES

- Bangun, A. K., Nasuka, N., Hartono, M., & Akhiruyanto, A. (2024, July). The Impact of Using Audio-Visual Media on Learning Outcomes of Basketball Dribbling Skills. In *Proceedings of International Conference on Physical Education, Health, and Sports* (Vol. 4, pp. 180-187).
- Brooker, R., Kirk, D., Braiuka, S., & Bransgrove, A. (2000). Implementing a game sense approach to teaching junior high school basketball in a naturalistic setting. *European Physical Education Review*, 6(1), 7–26.

- Chiang, T. H. C., Yang, S. J. H., & Yin, C. (2019). Effect of Gender Differences on 3-on-3 Basketball Games Taught in a Mobile Flipped Classroom. *Interactive Learning Environments*, 27(8), 1093–1105.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- Febrianta, Y. (2017). An alternative in learning basketball game using tgfu (teaching games for understanding). 308–314.
- Gaspar, V., Gil-Arias, A., Del Villar, F., Práxedes, A., & Moreno, A. (2021). How TGfU influence on students' motivational outcomes in physical education? A study in elementary school context. *International Journal of Environmental Research and Public Health*, 18(10), 5407.
- Gherghiță, P., & Florin, C. (2011). Study on specific skills of middle school evaluating basketball game. *Journal of Physical Education and Sport*, 11(3), 365–368.
- Giguere, M. (2022). Social, emotional and cognitive engagement in dance for children: An examination through the lens of equity and racial justice. *International Journal of Education & the Arts*, 23(Special Issue 1.8).
- González-Valero, G., Ubago-Jiménez, J. L., Melguizo-Ibáñez, E., & Fernández García, R. (2024). Application of the teaching games for understanding model to improve decision-making in sport learning: a systematic review and meta-analysis. *BMC Psychology*, 12(1).
- Holt, N. L., Strean, W. B., & García Bengoechea, E. (2002). Expanding the Teaching Games for Understanding Model: New Avenues for Future Research and Practice. *Journal of Teaching in Physical Education*, 21(2), 162–176.
- Jarrett, K., Eloi, S., & Harvey, S. (2014). Teaching Games for Understanding (TGfU) as a positive and versatile approach to teaching adapted games. *European Journal of Adapted Physical Activity*, 7(1), 6-20.
- Keinänen, M., Hetland, L., & Winner, E. (2000). Teaching cognitive skill through dance: Evidence for near but not far transfer. *Journal of Aesthetic Education*, 34(3/4), 295-306.
- Kemeryte-Ivanauskienė, E., Brandisauskienė, A., Česnavičienė, J., & Daugirdienė, A. (2022). The Significance of Students' Physical Activity for Their Engagement in Learning Activities During the Covid-19 Pandemic. *Теорія Та Методика Фізичного Виховання*, 22(4), 522–529.
- Kirk, D., & MacPhail, A. (2002). Teaching Games for Understanding and Situated Learning: Rethinking the Bunker-Thorp Model. *Journal of Teaching in Physical Education*, 21(2), 177–192.
- Mahardhika, D. B., Pelana, R., Sulaiman, I., Samsudin, S., Asmawi, M., Tannoubi, A., ... & Setiawan, E. (2024). Effect of Game-based Instructional on Learning Engagement and Game Performance of Students in Physical Education. *Studia sportiva*, 18(01), 161-172.
- Mazzardo, T., Ribas, S., Greco, P. J., Monteiro, G. N., Silva, W. J. B. D., 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 Educação Física*, 28, e10220017121.

- Memmert, D., Almond, L., Bunker, D., Butler, J., Fasold, F., Griffin, L. L., Hillmann, W., Hüttermann, S., Klein-Soetebier, T., König, S., & Nopp, S. (2015). Top 10 Research Questions Related to Teaching Games for Understanding. *Research Quarterly for Exercise and Sport*, 86(4), 347–359.
- Nkala, B., & Shehu, J. (2016). Effect of Teaching-Games-for-Understanding (TGfU) Approach on High School Students's Basketball Performance. 6(3), 86–96.
- Olosová, G., & Zapletalová, L. (2015). School basketball: teaching games for understanding or technical approach ? *FIEP Bulletin On-Line*, 85(1).
- 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 (Basel)*, 10.
- Pan, Y., Huang, C., & Hsu, W.-T. (2023). A comparison of the learning effects between TGfU-SE and TGfU on learning motivation, sport enjoyment, responsibility, and game performance in physical education. *Frontiers in Psychology*.
- Pelana, R. (2014). Fun Learning Management for Physical Education, Sport and Health. *Asian Social Science*, 10(5), 85.
- Risjanna, M. R., Lubay, L. H., & Awwaludin, P. N. (2019). The Effect of Cooperative Learning Model Type Team-Games-Tournament on Improving Basketball Game Learning Outcome. 4(2), 160–164.
- Ritonga, I., Gusril, G., Kiram, Y., Lanos, M. E. C., & Festiawan, R. (2024). Designing an innovative learning model for fundamental throwing and catching skills using the teaching games for understanding (tgfu) approach in elementary education. *Retos*, 61, 448-454.
- Romadhona, N. S., Kurniawan, R., & Darmawan, A. (2024). Investigating the effect of Teaching Games for Understanding (TGfU) models on motivation and academic learning time in physical education. *Edu Sportivo: Indonesian Journal of Physical Education*, 5(1), 82-93.
- Santoso, N., Pambudi, A. F., Prayadi, H. Y., Utami, N. S., Yudhistira, D., & Virama, L. O. A. (2024). How do the learning models of teaching game for understanding and problem-based learning influence fundamental football skills in physical education? Conducting an analysis in the elementary school context. *Physical Education Theory and Methodology*, 24(5), 793-798.
- Saputri, P. M., Lubay, L. H., & Slamet, S. (2025). Implementation of Teaching Games For Understanding (TGFU) Through Soccer Like Games on the Decision-Making Level of Elementary School Students. *Journal of Physical Education Health and Sport*, 12(1), 226-230.
- Schumacher, N., Zaar, C., Kovar, J., Lahmann-Lammert, L., & Wollesen, B. (2024). Relation of general-perceptual cognitive abilities and sport-specific performance of young competitive soccer players. *European Journal of Sport Science*, 24(9), 1270-1277.
- Sinulingga, A. (2020). EFFECT OF BASIC MOVEMENT SKILLS IN THE GAME OF ABILITY EARLY CHILDREN'S COGNITIVE. *Jurnal Physical Education, Health and Recreation*, 5(01), 72-77.
- Sucipto, A., Gumilar, & Burhan, H. (2023). A Comparison of Tactic and Technical Approaches to Student Basketball Skills. *Kinestetik: Jurnal Ilmiah Pendidikan Jasmani*.

- Tangkudung, A. W. A., & Mahyudi, Y. V. (2022). Teaching Game for Understanding (TGfU) Learning Design for Basketball Games in Physical Education. *International Journal of Human Movement and Sports Sciences*, 10(3), 619–625.
- Tomprowski, P. D., McCullick, B. A., & Pesce, C. (2015). Enhancing children's cognition with physical activity games. *Human Kinetics*.
- Triggs, A. O., Causer, J., McRobert, A. P., & Andrew, M. (2025). Perceptual-cognitive skills and talent development environments in soccer: A scoping review. *Plos one*, 20(7), e0327721.
- Turner, A. P., & Martinek, T. J. (1995). Teaching for Understanding: A Model for Improving Decision Making During Game Play. *Quest*, 47(1), 44–63.
- Werner, P., Thorpe, R., & Bunker, D. (1996). Teaching Games for Understanding: Evolution of a Model. *The Journal of Physical Education, Recreation & Dance*, 67(1), 28–33.