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Effectiveness of Teaching Games for Understanding (TGfU): Using a modified Kasti game to stimulate elementary school students' motor skills

[1abcde]Uray Gustian*, [1abc]Fatima Maharani Gandasari, & [2acd]Agus Mahendra

[1]Department of Sports Coaching Education, Faculty of Teacher Training and Education, Universitas Tanjungpura, Pontianak, Indonesia
[2]Department of Primary School Teacher Education-Physical Education, Faculty of Sport and Health Education, Universitas Pendidikan Indonesia, Bandung, Indonesia

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ABSTRACT

Background Problems: Teaching Games for Understanding (TGfU) is still a challenge for Physical Education (PE) teachers. Teachers are still weak in applying the concept of TGfU to learning and lacking in improving motor skills, so it requires a study to apply the model of TGfU based on the characteristics of the school, the abilities of the students, and the ease of application by the teacher. **Research Objectives**: The study aims to test the use of the TGfU model using Kasti games to stimulate elementary school students' motor skills. **Methods**: The research design uses pre-expression with one-group pretest and posttest designs involving 24 students. The experiment implemented field games modified according to the TGfU's concepts and steps. The experiment conducted five meetings with a duration of 80 minutes each. Data collection was done using the Test of Gross Motor Development-2 (TGMD-2) and analysed using descriptive, quantitative, and different tests. **Findings/Results**: Based on the results of the statistical analysis, it shows that there has been a significant increase in students' motor skills stimulated by applying learning with the TGfU model and using the Kasti game. **Conclusion**: The implementation of the TGfU model with the Kasti game approach can be used as an approach to stimulate students' motor skills. Further studies are needed to enhance the potential of TGfU in encouraging teachers to organise PE teaching according to the implemented curriculum, with the aim of encouraging students to actively participate in sports and learn motor skills.

Keywords: Teaching games for understanding; motor skill; physical education

***Corresponding Author**
Email: uray.gustian@fkip.untan.ac.id

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INTRODUCTION

Game-centred approaches (GCAs) are an approach that is currently mandatory to be used in the learning of physical education (PE) (Barba-Martín et al., 2020). GCAs are an attempt to respond to the demands of education to develop a person who is autonomous, critical, responsible, and capable of adapting to rapidly changing circumstances (Gubacs-Collins, 2015). Learning using the GCAs approach shows an improvement in student learning outcomes that covers several dimensions that significantly influence the recognition of student involvement in participating in PE related to their motivation, participation, and effort (Gil-Arias et al., 2017). GCAs used in PE can improve learning,

perceived competence, enjoyment and motivation, decision-making, and increased cardiorespiratory capacity (Cocca et al., 2020; Morales-Belando et al., 2022), improve students' game performance (game-play decision-making and skill execution), and correlate positively with students' understanding (Farias et al., 2019; Araujo et al., 2016). GCAs also have positive implications for improving moderate and vigorous physical activity categorically and in the cognitive and psychomotor domains (Wang & Wang, 2018).

GCAs can encourage teachers to develop learning and student involvement in learning by developing game-based teaching activities concerning more transversal and general tactical principles and concepts (Barba-Martín et al., 2020). One GCA approach that can give a strong emphasis on the basics of the game emphasises the enhanced ability to identify tactical problems that arise during the game, and the correct response is through the Teaching Games for Understanding Model (TGfU) (Mitchell et al., 2020). TGfU is an instructional model that was introduced by Bunker and Thorpe in 1982 as an alternative model for effective game teaching that encourages students to learn the game and gain understanding related to the philosophy and way of playing, its rules and tactics, as well as student skill development (Papagiannopoulos et al., 2023). In its application, students are involved in learning the discovery of tactical, technical, and strategic solutions adequate to game problems (Hastie & Mesquita, 2016), and have demonstrated efficacy in raising students' performance in physical education classes and metacognition (Robles et al., 2020).

Previous research has shown that the application of GCA using the TGfU model can improve students' motor skills. The results of a study conducted by Batez et al. (2021) show that the application of TGfU effectively improves volleyball skills. TGfU showed significant improvements in game performance and game involvement (Farias et al., 2019; Guijarro et al., 2022), by increasing students' capacity to develop technique, evaluate game situations, make decisions, and develop their tactical reasoning (Harvey et al., 2020; Robles et al., 2020). In addition, TGfU can improve skill execution and a successful game performance by allowing students the opportunity to count the number of decisions made, the number of game involvements, and their intention to be physically active (Barquero-Ruiz et al., 2021). It can also improve students' cognitive abilities to be applied to sports and games (Rinaldo et al., 2021; Farias et al., 2019). The interventions available at the TGFU can be used as a medium to promote an active lifestyle and fitness through learning activities in the classroom (Wang & Wang, 2018), and most importantly, be able to encourage the development of physical literacy in students (Mandigo et al., 2019).

Implementing TGfU in the teaching practice in the classroom for teachers is a challenge that definitely affects its implementation (García-López et al., 2019). There are still many teachers who are weak at translating the concept of TGfU into learning (Goodyear et al., 2017). Furthermore, learning is still focused on improving motor and cognitive learning through play but still lacks improvement in motor skills (Barba-Martín et al., 2020), and requires further study (Ortiz et al., 2023). In addition, it must be based on the student's background, school or club, and country characteristics (Hordvik et al., 2019), and adapted to the curriculum of physical education that exists in each country (Kinnerk et al., 2019). Thus, it requires a study that can apply the TGFU model according to the school's characteristics and students' abilities and is easy to apply by teachers.

Kasti is a game that resembles baseball, except that the way to play it is slightly different. Besides that, kasti is classified as a traditional game in Indonesian society in general. Using traditional games is the best way to form effective, easy, and inexpensive communication to implement (Ibrahim et al., 2021). The target study was carried out on

elementary school students of the upper class because the students are still at the stage of developing movement skills, in particular fundamental movement (Goodway et al., 2019). The study aims to test the use of the TGfU model using a modified Kasti game to stimulate elementary school students' motor skills. This experiment was conducted to test whether the use of TGfU by utilising modified Kasti games can improve students' motor skills. Furthermore, the study is expected to provide an overview and an alternative for PE teachers to implement a modified Kasti game-based TGfU.

METHOD

Type of Research

The type of research used was pre-expressive with the type of One Group Pretest Posttest Designs. The research involved only one experimental group without a control group. The research was carried out by implementing CGAs with TGfU models using field games modified for regular PE learning in primary schools. The experiment was asked to perform a game according to the rules and fields modified to enable students to engage in the game to actively improve their motor skills. Before the game, students measured their motor skills. Likewise, a short time after the completion of the course of study, according to the stage of study that had been prepared.

Participant

The study involved 24 fourth-grade elementary school students from two classes in a school located in West Kalimantan Province, Indonesia. Subject selection employed random sampling techniques among all male fourth-grade students in one of the elementary schools. We selected participants from a total of fifty-eight students in two classes based on specific criteria: ideal body condition, absence of physical or mental disabilities, and overall fitness, to ensure their ability to fully engage in and complete the experiment. A structured game concept guided the selection process, resulting in the inclusion of twenty-four students as participants.

Research Procedure

Experiments have used a game-centric approach emphasising learning to understand the game so that students can become intelligent in a game, better known as teaching games for understanding (TGfU). As for the game used, the field games are modified by the field's size and the game's rules.

The research was carried out by asking students to experiment by playing a modified Kasti game. The learning phase adopted from the revised TGfU model by Barquero-Ruiz and Kirk (2024) consists of six stages: (i) preparing games to be played by students; (ii) the students perform games to form students' understanding and appreciation; (iii) encouraging tactical awareness and strategic thinking; (iv) problem-solving and decision-making related to what to do and how to do; (v) execution of moves according to the selected decisions; and (vi) formation of playing skills demonstrated by improved student performance in playing skills.

The study is divided into four phases, eight sessions, and as many as five meetings (see Table 1). The first phase is the introduction, which is aimed at explaining the purpose and introducing the game implemented in one meeting. Each meeting takes 80 minutes. The second phase is pretest data collection. The third phase consists of four sessions and is held in two meetings. Phase three is the core phase of the implementation of the learning; the fourth phase is the data collection for the posttest.

Table 1. Learning Schedule

Phase	Session	Scope	Stage	Meeting
Game Form Introduction	1	Introduction and Explanation of Learning Objectives	Game Form Introduction	1
	2	Games Introduction	Game Form Introduction	1
Pre-Test	3	Motor Skill Test	Performance Test	2
Intervention	4	Games Play	Understanding the Game Concept	3
	5	Games Play	Making Decision	3
	6	Games Play	Skill Execution	4
	7	Games Play	Games Performance	4
Post-Test	8	Motor Skill Test	Performance Test	5

Data Collection Instrument

Data collection using the Test of Gross Motor Development-2 (TGMD-2) covers locomotive movement and object control skills covering twelve components (Ulrich, 2000). The component measured in the TGMD-2 instrument emphasises the qualitative aspects of movement and the way students carry out movements. Aspects measured in TGMD-2 include locomotor movement skills and object control, which have twelve components of fundamental movement skills, including movements.

Data Analyse

The data analysis was performed with a descriptive-quantitative approach. Data analysis involved analysing the results of measuring motor skills using TGMD-2. Data analysis of motor skills (TGMD) was done by giving a score for each activity students performed. These scores were then summed up, converted to standard scores, and converted into table quotients. We matched the results of these conversions to the descriptive ratings in the table. Finally, the data analysis used the t-test to determine the difference between the pretest results and the posttest measurement of motor skills and playing comprehension. These results form the basis for assessing the effectiveness of applying the TGfU model to improve students' motor skills.

RESULTS AND DISCUSSION

The results showed an improvement based on measuring students' motor skills using TGMD-2 (see Table 1). These results can be seen by comparing the TGMD 2 Sum of Standard Scores calculations and the Quotient posttest, which was higher than the pretest, and the results occurred for all students. The improvement can be observed from the excellent average protest value of the performance of the TGMD2 Sum of Standard Scores (21.88 > 18.08) and the Quotient (105.72 > 94.50).

Measurement of the motor skills of students at the time of the pretest (see Table 2) the dominant results obtained by students are in the category of average, with a total of 20 students (83.33%). Three (12.5) students are still in the below-average category, and one student (0.4) is in the poor category. Reviewed from the gross motor quotient, the average of students achieved at the moment of the pretest is 94.50, with a standard deviation of 7.34. The results showed that at the time of the pretest, the student's motor mixture was still in the average category, and there were still those in the poor category, so it was necessary to improve his motor skills.

Based on the results of the student's motor skills measurement at the time, the posttest showed that there had been an improvement. This result can be seen in 8 (33.33%) students who have already reached the above-average category, and there are still 16 (66.67%) in the average category. Reviewed from the gross motor quotient average that

the student achieved (see Tables 3 and 4) at the time of the posttest, it was 105.71 (there has been an increase of 11.21 points) with a standard deviation of 7.34. These results show that there has been an increase in the category of students' abilities-no more students at a level below the average.

Table 2 Measurement Results of Student Motor Skills

		N	Minimum	Maximum	Mean	Std. Deviation
TGMD 2 Sum of Standar Scores	Pretest	24	11	22	18.08	2.55
	Posttest	24	18	25	21.87	2.61
Quotient	Pretest	24	73	105	94.5	7.34
	Posttest	24	95	115	105.71	7.62
	Valid N (listwise)	24				

Table 3 . Recapitulation Qoutinent Results of Student Motor Skills

Gross Motor Quotient	Pretest	Posttest	Descriptive Ratings
> 130	0	0	Very Superior
121-130	0	0	Superior
111-120	0	8	Above Average
90-110	20	16	Average
80-89	3	0	Below Average
79-79	1	0	Poor
< 70	0	0	Very Poor
Total	24	24	

Based on the results of the homogeneity test on the pre-test and posttest data using SPSS 22, the significance value is 0.251 or greater than 0.05 (see Table 4). Thus, the data obtained from the results of the study belongs to the homogeneous category and can be subsequently tested. Effectiveness results are performed using the t-test with the criterion of accepted hypothesis (H_0) if $t_{count} > t_{table}$. When the test results are obtained, there is a difference in the mean value of 11.21, which means that the posttest value is improved compared to the pretest value. Thus, Ho was accepted, and Ha was rejected. This statistically shows that there has been a mean difference between the pretest and the posttest. Whether, based on the test of significance performed, a result of 0.00 or less of the determination of the significance level of 0.05. For that, information can be obtained that the increase is significant.

Table 4. Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Test	**Based on Mean**	1.350	1	46	.251

Table 5. t-Test Result

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	**Posttest - Pretest**	11.21	6.08	1.24	8.64	13.77	9.03	23	.000

The study aims to measure the effectiveness of the TGfU model in improving students' motor skills. This result can be seen from an increase in students' average motor skill test output by 11.21 with a standard deviation spread of 6.08 (see Tables 3 and 4). The improvement already shows that students' motor skills can be enhanced by

implementing learning with the TGFU model and using Kasti games. The findings are in line with previous research by Johnson et al. (2019), showing that interventions using games can improve students' motor skills. In addition, a game-based approach can improve the physical performance characteristics of young soccer players in the pre-competitive season (Karahan, 2020). According to a study conducted by (Nur & Malik, 2021), learning that uses a game-based approach improves students' fitness and, obviously, has an impact on the improved achievement of students' motor skills. Adi et al. (2022) revealed that the use of Kasti games is a feature that can be used to improve motor skills so that they can be integrated into learning.

Increased motor skills of students due to using the TGfU model can encourage students to develop critical thinking abilities through logic games, an effective and efficient tool for developing reasoning skills (Barba-Martín et al., 2020), and acquiring a sense of achievement (Jia, 2021). In addition, the degree to which the TGfU unit was successful in helping students create long-term memory adaptations that enhanced their tactical knowledge across all three levels of analysis (conceptual content, sophistication, and structure) (Harvey et al., 2020). Kokstejn and Musalek (2019) also revealed that game-specific motor skills can achieve adequate development and include both fine and gross fundamental motor skills.

Learning done through TGfU can motivate students to find novel solutions to motor tasks, which is probably more suitable for facilitating motor creativity (Marinšek & Lukman, 2022). The TGfU model is implemented with an approach to the student as a whole to get a learning experience that leads to improved participation and motivation for students in learning (Bracco et al., 2019). Other advantages of TGfU are that they enable students to enjoy learning and acquire knowledge in a fun, inspiring, creative, and gamified way (Jia, 2021).

TGfU supports improving play engineering skills by providing a positive affective impact and promoting personal and social development (Kinnerk et al., 2018). Affective formation becomes essential because students can learn to be responsible for their actions and improve through movement experiences and games (Gil Madrona et al., 2014). For GCAs, the TGfU model becomes an appropriate pedagogical approach to supporting teaching that can help active students move with competence and confidence (Estevan et al., 2021). Based on the results of the study, using the TGfU model is one of the best ways to improve the motor skills of students, in particular elementary school students. This result also makes TGfU a pedagogical approach that can be considered to implement movement learning in students.

CONCLUSION

The TGfU model, based on the modified Kasti game, statistically proved capable and effective in improving the motor skills of students. The TGfU model, based on the Kasti game, brought about improvement through its fun, inspiring, creative, and collaborative approach. It encourages active students' engagement, tactical awareness, and decision-making and positively impacts student behavioural formation. This study was conducted only to strengthen the teaching idea done with the TGfU as an approach that can be used to improve students' motor skills. Further studies are necessary to enhance the potential of TGfU and encourage teachers to align PE teaching with the applied curriculum. It became a critical factor in encouraging students to actively participate in sports and learn motor skills. Furthermore, this study only included male students as participants, allowing for the implementation of subsequent studies on female students or a combination of both.

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CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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