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Investigating the effect of Teaching Games for Understanding (TGfU) models on motivation and academic learning time in physical education

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ABSTRACT

Background Problems: Motivation and academic learning time are the most important factors for students to achieve their learning goals. **Research Objective:** This study aims to determine the effect of the TGfU learning model on students' motivation and academic learning time (ALT). **Methods:** This type of research used the experimental method by using a control class and an experimental class, with research design using a randomised control group pre-test and post-test. The population of this study consisted of vocational high school students who took physical education subjects. The sample was randomly selected with a total of 68 students from 2 classes, with 34 students per class. The experimental (treatment) class used the TGfU learning model with student-centred approaches, strategies, and games. Meanwhile, the control class used the cooperative model, and the approach used was the student-centred approach. The research instruments were pre-test and post-test questionnaire instruments to measure students' learning motivation and systematic observation through duration recording techniques using observation sheets by paying attention to four categories of activities in physical education learning, namely management (M), learning activities (A), instructional (I), and waiting (W). The pre-test and post-test data analysis techniques were analysed using a homogeneity test, a normality test, and a Mann-Whitney test using SPSS version 25. **Finding/Result:** This study showed significant differences between the control and experimental classes in learning motivation, particularly in intrinsic motivation, identified regulation, and amotivation, with the TGfU approach exerting a significant effect. However, there was no significant difference between the Introjected Regulation and External Regulation categories. In addition, TGfU also improved academic learning time (ALT) and engagement in learning activities (A), but the control class was superior in waiting (W). **Conclusion:** These findings suggest that TGfU encourages students' active participation and extends overall learning time. Future research could investigate this by using in-depth interviews to elaborate on the factors underlying motivation and student participation through the implementation of TGfU models.

Keywords: TGfU; learning motivation; academic learning time; physical education

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INTRODUCTION

Physical education (PE) is believed to have several benefits for students. These advantages include improving students' social and personal development (Opstoel et al., 2020) and mental health (Mandolesi et al., 2018). Achieving the goals of physical education is influenced by several factors, including learning motivation. Motivation is an

encouragement given to individuals to achieve those benefits. Motivation is an essential psychological factor in learning (Harahap et al., 2021). Motivation can also be interpreted as an impetus directing individuals to take specific actions to achieve a goal (Rojo-Ramos et al., 2022). Motivation is essential for the learning process to be successful (Filgona et al., 2020).

Motivation to learn is associated with educational achievement. Motivation is the primary key to students' success if there is a dominant will to achieve learning success (Cenic et al., 2019). It will also affect the behavior of students following educational goals; motivation can also be used to measure the success of students in achieving achievements in the world of education (Heynoek et al., 2020). However, the current students' motivation to learn is still arguably not good, and it can be due to inappropriate learning models and less innovative learning packaging patterns, so that students are less enthusiastic about learning (Sobandi, 2017; Syahidah et al., 2023). Decreased motivation will result in weak student learning activities, impacting learning outcomes obtained later (Barus & Sinuraya, 2021).

Academic learning time (ALT) is the amount of time spent by a student on a learning duty with a high level of accomplishment (Martinek et al., 2019). Active learning time is the time students use to utilise the available learning time (Suntoda, 2017). Academic learning time is the amount of time used by learners involved in academic tasks that can be done successfully (Brodhagen & Gettinger, 2012). Conducive learning is a teaching and learning condition that can run smoothly where students are comfortable and receive lessons well (Nugraha, 2020). Active learner activities, competences, and appropriate time allocation can all contribute to effective physical education learning (Widarini et al., 2018). Active learning time can be optimally implemented if students can freely access various sources to be discussed in the classroom learning process and can find answers to the tasks given by the teacher (Anjani et al., 2023).

In this case, the Teaching Games for Understanding (TGfU) learning model is very appropriate when used in physical education learning at school. TGfU is a learning model that contains elements of tactics and techniques in the game (Pill et al., 2023). The Tactical Games model, only referred to as TGfU, is arguably new; only a few educators in Indonesia use this learning model. The implementation of the TGfU model in physical education learning aims to achieve positive learning outcomes (Cocca et al., 2020; Harvey et al., 2020). Relevant learning models like TGfU encourage disengaged pupils to achieve optimal experiences when studying (Bracco et al., 2019). Problem-solving skills and the opportunity to explore TGfU's approach enable students to achieve their goals (Aquino, 2023).

Previous research has underscored the profound influence of the TGfU on academic learning time (ALT) by enhancing student engagement and extending their participation within the overall learning process (Indrayogi, 2021; Tangahu, 2019). Studies by Chan and Indrayeni (2018), Hasmarita (2018), and Sebila et al. (2020) corroborate this, highlighting the positive impact of the TGfU model on student motivation and achievement. By fostering interactive and engaging learning experiences, this model has shown promising results in achieving learning objectives effectively. However, as noted by Karisman (2020), limitations in sample size call for further research with larger cohorts. Although extensively utilised (Karisman, 2020), and in high schools (Sebila et al., 2020).

The application of the TGfU model remains relatively unexplored in vocational high schools. Consequently, this study delves deeper into the TGfU model's impact, specifically within vocational high schools. Additionally, apart from enhancing motivation, research

suggests that TGfU also enhances performance skills (Aryanti et al., 2022; Batez et al., 2021) and fosters enjoyment in physical education classes (Batez et al., 2021). However, more research is necessary to fully understand the effective influence of the TGfU model on ALT.

Based on the background described above, there are two research questions proposed in this study: 1) does the Teaching Games for Understanding (TGfU) learning model influence students' learning motivation; 2) does the Teaching Games for Understanding (TGfU) learning model influence students' academic learning time (ALT)? The importance of this research is to find out how influential the TGfU learning model is on students' learning motivation and ALT and to create a practical and fun learning model in vocational high school. In addition, it aims to arouse students' learning motivation so that the learning objectives of physical education can be adequately achieved.

METHOD

Research Design and Procedures

This research used an experimental method, using a randomised control group pre-test-post-test design. This experimental method uses two classes: the control class (conventional) and the experimental class (treatment). The experimental class (treatment) used the TGfU learning model with a student-centred approach, strategy, and games. Then, the learning method used is a pedagogical-based game method that uses techniques that focus on the game. Meanwhile, the control class (conventional) used cooperative strategies, and the approach used was student-centered. In addition, the method used in learning is the discussion method, which uses active response learning techniques. This research was conducted for four weeks (Artha et al., 2020; Tangahu, 2019), from August to September 2023. This research was conducted at State Vocational High School 7 Malang.

Participants

The population of this study consisted of vocational high school students who took physical education. The sample used random sampling with a total sample of 2 classes (XI) with 34 students per class. We used random sampling as the sampling technique. We randomly selected two classes, each consisting of 34 students, from the population. Thus, the total sample included 68 students. The experimental class (treatment) used the TGfU learning model with a student-centred approach, strategy, and games. Meanwhile, the control class used a cooperative model, and the approach used was student-centred.

Data Collection

Data collection methods used questionnaires and systematic observations. The research instrument on learning motivation uses a pre-test-post-test questionnaire instrument containing 20 question items regarding intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation, as well as items from the amotivation that already have validity (0.2126) and reliability (0.882) (Goudas et al., 1994). Systematic observation through duration recording techniques that use observation sheets by paying attention to four categories of activities in physical education learning, namely management (M), learning activities (A), instructional (I), and waiting (W) (Suherman, 2009), aims to determine the active learning time spent by students during the learning process.

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Data Analysis

The pre-test and post-test data analysis techniques were analysed using a homogeneity test, a normality test, and a Mann-Whitney test using SPSS version 25.

RESULTS AND DISCUSSION

The independent T-test, pre-conditional normality, and homogeneity data analysis were performed to determine the differences in learning effects between the TGfU and the control groups. Based on the results of the data processing and data analysis that have been carried out, the following results are obtained:

Table 1. Normality Test of Experimental Group and Control Group

Class	Motivation Category	Data	Statistics	df	Sig.	Description
Experiment	Intrinsic Motivation	Pre-test	0.210	34	0.001	Not Normally
		Post-test	0.098	34	0.200	Normal
	Identified Regulation	Pre-test	0.236	34	0.000	Not Normally
		Post-test	0.214	34	0.000	Not Normally
	Introjected Regulation	Pre-test	0.172	34	0.012	Not Normally
		Post-test	0.182	34	0.006	Not Normally
	External Regulation	Pre-test	0.186	34	0.004	Not Normally
		Post-test	0.131	34	0.150	Normal
	Amotivation	Pre-test	0.104	34	0.200	Normal
		Post-test	0.187	34	0.004	Not Normally
Control	Intrinsic Motivation	Pre-test	0.212	34	0.000	Not Normally
		Post-test	0.180	34	0.007	Not Normally
	Identified Regulation	Pre-test	0.175	34	0.010	Not Normally
		Post-test	0.161	34	0.025	Not Normally
	Introjected Regulation	Pre-test	0.218	34	0.000	Not Normally
		Post-test	0.192	34	0.003	Not Normally
	External Regulation	Pre-test	0.177	34	0.009	Not Normally
		Post-test	0.228	34	0.000	Not Normally
	Amotivation	Pre-test	0.245	34	0.000	Not Normally
		Post-test	0.216	34	0.000	Not Normally

In the table above, it is explained that all categories of motivation, pre-test-post-test of the experimental group and control group, obtained insignificant results or < 0.05 , which is not normally distributed, but except for the intrinsic motivation category of the experimental class post-test, external regulation of the experimental class post-test and amotivation of the experimental class pre-test, which shows significant results or > 0.05 , so the data is normally distributed.

Table 2. Homogeneity Test of Experimental Group and Control Group

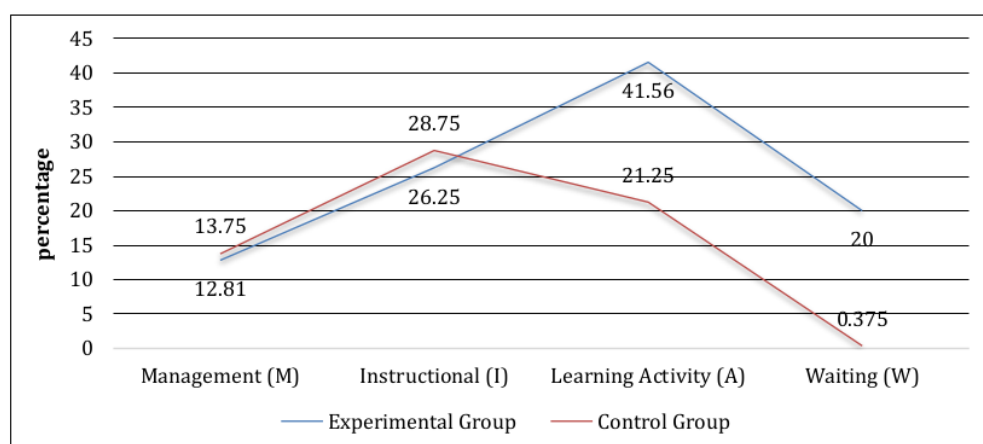
	Motivation Category	Data	Levene Statistic	df1	df2	Sig.	Description
Based on Mean	Intrinsic Motivation	Pre-test	0.34	1	66	0.56	Homogeneous
		Post-test	4.256	1	66	0.04	Not Homogeneous
	Identified Regulation	Pre-test	0.677	1	66	0.41	Homogeneous
		Post-test	0.124	1	66	0.73	Homogeneous
	Introjected Regulation	Pre-test	0.998	1	66	0.32	Homogeneous
		Post-test	1.017	1	66	0.32	Homogeneous
	External Regulation	Pre-test	0.022	1	66	0.88	Homogeneous
		Post-test	1.283	1	66	0.26	Homogeneous
	Amotivation	Pre-test	0.475	1	66	0.49	Homogeneous
		Post-test	1.907	1	66	0.17	Homogeneous

In the table above, it is explained that all categories of motivation—pre-test and post-test—of the experimental group and control group obtained significant results or > 0.05 , which is homogeneously distributed, but except for the intrinsic motivation category, the post-test of the experimental class obtained results that were not significant or < 0.05 , so the data was not homogeneously distributed.

Table 3. Test of Differences using the Mann-Whitney Test

	Intrinsic Motivation	Identified Regulation	Introjected Regulation	External Regulation	Amotivation
Mann-Whitney U	260.500	297.500	549.000	528.500	340.500
Wilcoxon W	855.500	892.500	1144.000	1123.500	935.500
Z	-3.934	-3.471	-.361	-.615	-2.938
Asymp. Sig. (2-tailed)	<.001	<.001	.718	.538	.003

Based on the data above, it is known that the Asymp. Sig. (2-tailed) category value of intrinsic motivation is < 0.001 , identified regulation is < 0.001 , and amotivation is 0.003 or equal to < 0.05 . Thus, the hypothesis is accepted, meaning there is a significant difference between the experimental and control classes in the intrinsic motivation, identified regulation, and amotivation categories. Meanwhile, for the Introjected Regulation and External Regulation categories, the Asymp. Sig. (2-tailed) of 0.718 and 0.538 is equal to > 0.05 . With that, the hypothesis is not accepted or insignificant, meaning there is no difference between the experimental class post-test and the control class post-test.



Graph 1. Achievement of Active Learning Time

Based on the amount of active learning time achieved, the results in the experimental class's management category (M) were 12.81%. The control class was 13.75%, the instructional category (I) of the experimental class was 26.25%, and the control class was 28.75%; the learning activity category (A) of the experimental class was 41.56%, and the control class was 21.25%; the waiting category (W) of the experimental class was 20%, and the control class was 0.375%.

The result of this study is critical in providing support for improving student motivation to learn through the implementation of the TGfU model. This study would also involve further studies on the benefits of TGfU in enhancing students' academic participation in physical education.

Effect of TGfU on Learning Motivation

Based on the research results, the TGfU learning model influences learning motivation and students. This is evidenced by the results of the Mann-Whitney Test on the experimental class post-test and control class post-test, where there are significant differences, namely in the intrinsic motivation, identified regulation, and amotivation categories. Meanwhile, in the Introjected Regulation and External Regulation categories, there was no significant difference between the experimental class post-test and the control class post-test. Intrinsic motivation is a natural process that occurs within learners, allowing them to establish their own objectives (Ryan & Deci, 2020). Intrinsic motivation is held within a person, and the person will act for the enjoyment inherent in the conduct itself (Kurniawan et al., 2022; Ryan et al., 2021). The control and experimental classes' post-tests in this study had significant differences. This happened because there were different treatments in the experimental class and the control class. The results of this study are reinforced by research from Kurniawan et al. (2021), who discovered that the intrinsic motivation category is more prominent than other motivation categories.

1 Identified regulation is a behaviour that involves personal interest, awareness of appreciating activities, and support for what you want to achieve (Ryan & Deci, 2020). In the control class post-test and the experimental class post-test in this study, there was a significant difference between the control class and the experimental class. This demonstrates that the identified regulation category of motivation can enable students to feel enthusiastic about acquiring new abilities and growing their knowledge, resulting in student achievement. This is consistent with a study conducted (Kurniawan, 2022), explaining that when students have the desire to improve their skills and knowledge, there is hope that their learning outcomes will be better too, and students' learning motivation increases. Introjected Regulation involves a person's emotional feelings in their work, such as feeling pride if they can complete their tasks well or shame and guilt if they fail to do their duties (Trépanier et al., 2023). In this study, there was no significant difference between the control class and the experimental class. This is because students need encouragement from the surrounding environment to learn. In this situation, pupils just want to catch the attention of their teachers and peers in order to participate in learning. Motivated learners are not motivated of their own accord; thus, there is coercion from within them, not from others but because of a duty (Koka et al., 2019).

External regulation arises because there is encouragement from outside the learners, or it is said that the second party plays an active role in the psychological process (Kurniawan et al., 2021). There was no difference between the two class. This is demonstrated by students' poor drive to obtain inspiration from others, which is influenced by emotions of inner pressure and conflict with externally regulated students. External regulation might take the form of punishment or reward, compliance, or opposition to the learning process (Ryan & Deci, 2020). This is in line with some studies that show that external encouragement in the form of rewards or punishments can increase students' learning motivation and enthusiasm to learn well (Kusumawati et al., 2023).

2 Amotivation is characterized as something that has no sense or drive to achieve a goal (Kurniawan et al., 2021). There was a difference between the control class and the experimental class. Lack of achievement of required capabilities, lack of value, and irrelevance to the learning process are some examples of amotivation (Ryan & Deci, 2020). However, from the research results in this category, the TGfU can change students'

motivation. This is also reinforced by research results showing that motivation could decrease after implementing a tactical game approach (Harvey et al., 2017).

This shows that the TGfU can increase the learning motivation of PE students. The TGfU provides new innovations in PE learning so that students do not feel monotonous and bored during learning. The TGfU is new to students, so during the learning process through the game-drill-game system, students feel happy and motivated to participate in learning. The TGfU applied to students can make students actively involved in the game, and they can perform the basic techniques they have through simple and fun game patterns.

The research results above support the theory of Bunker and Thorpe in 1982, developed by Butler and Griffin (2010), explaining that TGfU is designed for students to develop skills and motivation to participate and experience fun and excitement in sports. This is also supported by the results of research by Qohhar and Pazriansyah (2019), explaining that using the TGfU has an influence on the development of students' skills, level of knowledge, and playing performance. The results of the study by Andirianto (2023) and Artha et al. (2020) also explain that the learning model using TGfU is an ideal way to provide freedom to students in the learning process through more significant involvement in learning and can increase the level of learning motivation, which results in higher motivation.

The Effect of the TGfU on Students' ALT

Based on the graph of the achievement of the amount of ALT above, it can be seen that the learning activity category (A) spent by the experimental class with a percentage of 41.56% is higher than the control class with a percentage of 21.25% of the total learning time. Meanwhile, for the difference in the waiting time category (W), the control class, with a percentage of 37.5%, is higher than the experimental class, with 20% of the total learning time. This is because control class students are less enthusiastic, and some students tend to be passive in the learning presented. In contrast, the experimental class is more enthusiastic and uses more active learning time. Thus, the amount of active learning time the experimental class spends has increased, and learning objectives can be achieved as expected. ALT is a feasible place to provide opportunities for children and adolescents to participate in physical activity and ALT in PE class environments. It has been extensively researched as a measure of instructional effectiveness and student learning accomplishment in school sports environments (Fu et al., 2017).

The TGfU has an effect on ALT; a significant change between the control class and the experimental class clarifies it. The application of the TGfU is very suitable to be used to see the active learning time of students because it allows them to use the skills and techniques they have in a fun learning atmosphere by simulating the actual game and allowing students to develop essential skills to be successful in playing the actual game. This aligns with research from Sebila et al. (2020) that demonstrates how using the TGfU helps students improve their game and become more passionate about engaging in the PE learning process. In addition, Indrayogi (2021) stated in his research that children's involvement in physical education learning using the TGfU was greater in percentage than children's involvement before using the TGfU model. The research results are supported by Tangahu (2019), who states that the TGfU significantly affects ALT and is a more effective model for students.

This research has its limitations in designing control groups and experiments. Although it has been used for random sampling for individuals to create a new class, it is not allowed due to school regulations regarding schedules that can affect the overall learning activity of students. Nevertheless, the factors did not affect the study's outcome.

So, future research should establish a new class for both sample groups. Although this study has an effect of the TGfU model on learning motivation and ALT, it still explores quantitative research methods. To support the result of this study, a qualitative research methodology using in-depth interviews with the student should be implemented. Further research on the TGfU model of ALT conducted in elementary school or junior high school is needed.

CONCLUSION

In conclusion, this study highlights a significant disparity between the post-test results of the control and experimental classes in terms of learning motivation, specifically in the categories of intrinsic motivation, identified regulation, and amotivation, where the Teaching Games for Understanding (TGfU) approach demonstrated notable effects. However, the categories of internal regulation and external regulation showed no significant difference between the control and experimental classes.

Furthermore, the findings underscore the positive impact of TGfU on increasing academic learning time (ALT). The experimental class exhibited greater engagement in learning activities (A) compared to the control class. Conversely, in terms of waiting time (W), the control class surpassed the experimental class. These results indicate that TGfU effectively fosters active participation among students, thereby extending their overall learning time.

This study contributes to the existing body of research by reaffirming the benefits of employing TGfU, which significantly enhances student motivation and fosters active participation in learning. Physical education (PE) teachers can leverage this model to facilitate students' attainment of various objectives, including the development of game competence skills, problem-solving abilities, and critical thinking skills. Moreover, TGfU promotes inclusive learning practices, ensuring that all students are actively involved in the learning process.

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CONFLICT OF INTEREST

The author declared that there was no conflict of interest in writing this article.

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