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The Effect of Learning Models on Creativity, Knowledge, and Big Ball Game Skills in High School Students

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Abstract: This study analyzes the TGFU learning model for sports education, suitable for high, medium, and low achievement students. It compares it towards creativity, knowledge, and skills of big ball games in PE learning for high school students. The update is a continuation of the research suggested earlier. This is done using an experimental design in which the pre-test scores with existing groups can also be controlled. The subjects in this study are high school students of Class XI SMA N 1 Seyegan. The sample is the students of Class XI SMA Seyegan. The sample was divided into three groups: (1) the TGFU group of 64 students, (2) the Sport Education group of 58 students, and (3) the control group of 59 students. Given treatment is two times every week for eight weeks. The data is processed statistically using one-way analysis of variance (one-way ANOVA) and multiple linear regression analysis. For this reason, analysis prerequisite tests are needed, including normality test, variance homogeneity test, linearity test, and multicollinearity test. If it fulfills these prerequisites, it is continued with the parametric analysis, and if it does not meet the food requirements, non-parametric statistical analysis is used. The results of data analysis indicated (1) that the TGFU learning model was able to increase students' creativity by 17.76%, student knowledge by 87.18%, and student skills by 19.93%. (2) The SE learning model increases student creativity by 14.71%, student knowledge 64.08%, and skills by 24.28%. (3) There is a significant difference between the TGFU, sports education, and traditional (control) learning models in influencing creativity improvement in big ball games. The research concludes that (1) there is a significant effect on the TGFU learning model on increasing creativity, knowledge, and great ball game skills; (2) there is a significant influence on the Sport Education learning model to increase creativity, knowledge, and soccer skills; and (3) the TGFU learning model increases creativity and knowledge, while the Sport Education learning model is the most effective in improving ball game skills.

Keywords: model, learning, creativity, knowledge, skills.

學習模式對高中生創造力、知識和大型球賽技能的影响

摘要: 本研究旨在從，體育教育，適用於高中低成就學生的高中體育學習大球類運動的創造力，知識和技能的學習模式進行分析。作者獲得的研究更新試圖在先前研究人員建議的基礎上繼續研究，即使用一種實驗設計，其中也可以控制現有組的預測分數。本研究的對象是班的高中生。本研究的樣本是班的學生。樣本被分為 3 組，包括 (1) 組 64 名學生，(2) 體育教育組 58 名學生，(3) 對照組 59 名學生。每週給予治療 2 次，共 8 週。使用單向方差分析和多元線性回歸分析對數據進行統計處理；為此，需要進行分析前提檢驗，包括：正態性檢驗、方差齊性檢驗、線性檢驗和多重共性檢驗。如果滿足這些條件，則繼續進行參數分析，如果不滿足食品要求，則採用非參數統計分析。數據分析結果表明：(1) 學習模式能

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夠將學生的創造力提升 17.76%；學生知識 87.18%；和學生技能 19.93%。(2) 學習模式能夠將學生的創造力提高 14.71%；學生知識 64.08%；和學生技能 24.28%。(3)、體育教育和傳統（控制）學習模式對大型球類運動創造力提升的影響存在顯著差異。研究結果的結論可以得出以下結論：(1) 學習模型對增加創造力、知識和大型球賽技能有顯著影響。(2) 體育教育學習模式對提高創造力、知識和大足球技能有顯著影響。(3) TGFU 學習模式被證明在增加創造力和知識方面是有效的，而體育教育學習模式在提高大型球賽技能方面最有效。

关键词：模型、學習、創造力、知識、技能。

1. Introduction

Physical Education, Sports, and Health (PE) is one of the educational subjects focused on value-based learning to cultivate the skills needed in the 21st century. PE, in essence, is an educational process that utilizes physical activity to produce holistic changes in individual qualities, both in terms of physical, mental, and emotional. PE treats children as a unified society and social beings. PE helps develop skills, knowledge and build students' confidence and competence in facing challenges as individuals or groups through various learning activities.

PE features many learning models. These developments, of course, can make it easier for a teacher to carry out learning on various kinds of goals. However, many PE teachers do not understand it. This statement is per the results of [1] that in such an approach or learning model, PE is still limited in everyday practice because teachers do not recognize it as a typical pedagogical approach but as a teaching practice.

The learning model in PE is a conceptual framework that describes a systematic procedure in organizing learning experiences to achieve certain learning objectives. It serves as a guide for teachers in carrying out teaching and learning activities. Teaching Games for Understanding (TGFU) is a learning model that focuses on developing students' abilities to play games to improve physical activity performance [2, 3, 4]. Sport Education is a learning model, which gives students the freedom to take on roles in their interests and abilities.

The advantage of PE learning is improving students' psychomotor abilities and academic achievement [5]. Teachers use the TGFU and Sport Education models as a game approach to developing students' tactical skills and knowledge while engaging in physical activity. The above statement needs to be investigated more deeply related to the renewal of research on the TGFU learning model and sports education about effectiveness in knowledge. Physical education knowledge emphasizes the relationship between theory and practical skills.

In this case, the researcher tried to examine students with high, medium, and low PE scores, suitable for the PE learning model. It is necessary to study which learning model from TGFU, sports education, suits high, medium, and low achievement students towards creativity, knowledge, and skills of big ball games in PE learning.

2. Method

This is a 2x3 factorial-blinded randomized controlled study. The sample used is students at schools that represent the strata that have been made, namely high, medium, and low. To determine the student's physical education score, the researcher held a pre-test about knowledge about PE. After the test, the researchers grouped them based on high, medium, and low physical education scores.

Student creativity test developed by [6] with a Likert scale captured students' level of creativity in learning physical education. A person's level of creativity can be measured through the aptitude, non-aptitude, or affective or cognitive traits of creativity. The creativity test has a validity of 0.9414. The knowledge test in question is a physical education study field test. The instrument was tested, and then the items were analyzed. The knowledge test has a validity of 0.8365.

Existing skill tests were adapted to big ball game skills such as volleyball, basketball, and football. The test adjusts to the lesson plan at the time of learning. The skill test has a validity of 0.8876.

2.1. Data Analysis

Data analysis was performed using one-way analysis of variance (one-way ANOVA) and multiple linear regression analysis (multiple regression), using SPSS Statistics 16. A prerequisite analysis test was required to fulfill the assumption of one-way variance, namely, the normality test using the Kolmogorov Smirnov formula, homogeneity of variance test using Box's Test of Equality of Covariance Matrices, linearity test using Test for Linearity with a significance level of 0.05. Two variables can have a linear relationship if the significance (Linearity) is less

than 0.05, and the multicollinearity test is carried out by looking at Tolerance and VIF. If the tolerance is close to 1, and the VIF is not more than 10, it is concluded that there is no multicollinearity.

3. Discussion

The results showed very high creativity in the TGFU group, as much as 4.7%, in the sports education group as 3.4%, while in the control group, there was none (Table 1).

Table 1 Student creativity in the big ball game

Creativity	Pre-test			Post-test		
	TGFU (64)	SE (58)	Control (59)	TGFU (64)	SE (58)	Control (59)
Very High	0	0	0	3 (4.7%)	2 (3.4%)	0
High	11 (17.2%)	11 (19.0%)	10 (16.9%)	61 (95.3%)	51 (87.9%)	51 (86.4%)
sufficient	52 (81.3%)	79.3 (49%)	49 (83.1%)	0	0	8 (13.6%)
Low	1 (1.6%)	1 (1.7%)	0	0	0	0
Very low	0	0	0	0	0	0
Mean $\pm$ sd	129.27 $\pm$ 9.89	129.72 $\pm$ 9.14	129.54 $\pm$ 8.02	152.23 $\pm$ 9.52	148.81 $\pm$ 8.71	143.83 $\pm$ 8.19

Furthermore, knowledge was very high in the TGFU group – as much as 28.1%, in the sports

education group as 13.8%, and the control group – as much as 3.4% (Table 2).

Table 2 Student knowledge in the big ball game

Knowledge	Pre-test			Post-test		
	TGFU (64)	SE (58)	Control (59)	TGFU (64)	SE (58)	Control (59)
Very High	0	0	0	18 (28.1%)	8 (13.8%)	2 (3.4%)
High	2 (3.1%)	1 (1.7%)	3 (5.1%)	30 (55.2%)	32 (55.2%)	32 (54.2%)
Sufficient	35 (54.7%)	33 (56.9%)	29 (49.2%)	16 (25%)	18 (31%)	24 (40.7%)
Low	22 (34.4%)	24 (41.4%)	27 (45.8%)	0	0	1 (1.7%)
Very low	5 (7.8%)	0	0	0	0	0
Mean $\pm$ sd	9.75 $\pm$ 3.14	10.33 $\pm$ 2.89	9.97 $\pm$ 2.95	18.25 $\pm$ 3.40	16.95 $\pm$ 2.76	15.76 $\pm$ 2.72

Meanwhile, skills are in the very high category. In the TGFU group, there are 10.9% students, in the

sports education group – as many as 29.3%, while in the control group – as much as 3.4% (Table 3).

Table 3 Student knowledge in the big ball game

Skill	Pre-test			Post-test		
	TGFU (64)	SE (58)	Control (59)	TGFU (64)	SE (58)	Control (59)
Very High	0	0	0	7 (10.9%)	17 (29.3%)	2 (3.4%)
High	19 (29.7%)	24 (41.4%)	24 (41.4%)	54 (84.4%)	40 (69.0%)	48 (81.4%)
Sufficient	42 (65.6%)	32 (55.2%)	32 (55.2%)	3 (4.7%)	1 (1.7%)	9 (15.3%)
Low	3 (4.7%)	2 (3.4%)	2 (3.4%)	0	0	0
Very low	0	0	0	0	0	0
Mean $\pm$ sd	39.09 $\pm$ 4.14	40.16 $\pm$ 3.92	39.68 $\pm$ 3.72	46.88 $\pm$ 3.81	49.91 $\pm$ 3.20	45.27 $\pm$ 3.83

There was a significant difference in the increase in creativity between the TGFU treatment group and the Sport Education treatment group, with a mean difference of 3.88 and a p-value of 0.002 ($p < 0.05$). There was a significant difference in the increase in knowledge between the TGFU treatment group and the Sport Education treatment group, with a mean difference of 1.88 and a p-value of 0.000 ($p < 0.05$). This gives an understanding that learning with TGFU is better in increasing creativity and knowledge when compared to learning Sports Education. There is a significant difference in skill improvement between the TGFU treatment group and the Sport Education treatment group, with a mean difference of -1.98 and a p-value of 0.003 ($p < 0.05$). This gives an understanding that learning with Sport Education is

better in improving skills when compared to learning with TGFU (Table 4).

Table 4 Further test with LSD (least significant difference)

Data	Between groups	Mean differences	SE	p
Creativity Post-test	TGFU x Sport Education	3.42	1.640	0.034*)
	TGFU x Control	8.40	1.597	0.000*)
	Sport Education x Control	4.98	1.636	0.003*)
Enhancement	TGFU x Sport Education	3.88	1.251	0.002*)
	TGFU x Control	8.68	1.246	0.000*)
	Sport Education x Control	4.80	1.276	0.000*)
Knowledge Post-test	TGFU x Sport Education	1.30	0.543	0.018*)
	TGFU x Control	2.49	0.540	0.000*)
	Sport Education x Control	1.19	0.554	0.034*)

Enhancement	TGFU x Sport Education	1.88	0.380	0.000*)
	TGFU x Control	2.70	0.378	0.000*)
	Sport Education x Control	0.82	0.387	0.035*)
Skill Post-test	TGFU x Sport Education	-3.07	0.660	0.000*)
	TGFU x Control	1.60	0.657	0.016*)
	Sport Education x Control	4.64	0.673	0.000*)
Enhancement	TGFU x Sport Education	-1.98	0.649	0.003*)
	TGFU x Control	2.19	0.646	0.001*)
	Sport Education x Control	4.17	0.662	0.000*)

*) significant at the 5% significance level ($p < 0.05$)

4. Discussion

This study proves a significant positive effect of the TGFU learning model in PE on increasing creativity, knowledge, and skills in the big ball game. The TGFU learning model can increase students' creativity by 17.76%, knowledge by 87.18%, and skills by 25.29%. The results of this study are in line with [3, 4, 7, 8], which shows that students learning using the TGFU method can increase knowledge significantly higher. The application of the TGFU learning model has proven to be more effective for basketball games and knowledge.

A student who is taught using the TGFU model can think critically to apply the knowledge and strategies that have been learned in physical education [9]. This is useful for other PE materials, making it easier for teachers in the learning process. Therefore, increasing physical activity based on the knowledge gained in physical education classes can provide a healthier lifestyle.

TGFU learning model is student-centered in teaching the learning process, using games to improve students' cognitive abilities and skills [4, 10, 11, 12]. According to the underlying philosophy, students understand and successfully apply lesson principles and strategies, which is when students get game experiences that are appropriately modified to meet physical, social, and cognitive development. Based on the research results and a review of research journals, the authors can conclude that the TGFU learning model can increase creativity, knowledge, and skills in playing the big ball.

This study also proves a significant positive effect on the Sport Education learning model in PE, increasing creativity, knowledge, and skills in the big ball game. The Sport Education learning model can increase students' creativity by 14.71%, knowledge by 64.08%, and skills by 24.28%. The results align with [13] that the significance of learning PE using the sports education method increases cognitive and skills in games during one competition season. In general, 31 research studies [14, 15] have found a positive effect of the sports education model. The positive effect of

learning through the sports education method increases students' skills and cognitive abilities.

The impact of the sports education model in research on student perceptions is considered to improve skills [7, 9, 16]. Although research has shown improvement in students during learning, starting from a low level of student skills, it can increase. The results of this study indicate that sports education is very beneficial for students of lower skill levels. The sports education model allows a holistic and deeper understanding of student learning (knowledge and skills).

Based on the research results and previous research journal reviews, the authors can conclude that the Sport education-learning model can increase creativity, knowledge, and skills to play the big ball.

5. Conclusion

This study proves a significant positive effect of the TGFU learning model in PE on increasing creativity, knowledge, and skills in the big ball game. An appropriate model application is needed, namely by combining the TGFU and sport education models by paying attention to learning mechanisms and class organization so that the achievement of learning outcomes can be obtained optimally to achieve the desired learning objectives, which consist of the affective, cognitive, and psychomotor domains, especially sports games.

This study proves a significant positive effect of the sports education-learning model in PE on increasing creativity, knowledge, and skills in the big ball game. TGFU and sports education learning models are highly recommended for PE learning to improve students' cognitive abilities, affecting students' playing skills.

This study proves significant differences between the TGFU, sports education, and traditional (control) learning models in influencing the increase in creativity in the big ball game. The TGFU learning model in PE has proven to be the most effective in increasing creativity and knowledge, while the Sport education-learning model is most effective in improving big ball game skills. Application of the TGFU and sports education learning models in physical education subjects, teachers and sports practitioners also pay attention to differences in individual abilities so that learning objectives will be achieved optimally.

The limitation of this research is that this research still uses a small research sample. Therefore, it is expected to involve a large sample of more than one school to strengthen the generalization process of research related to the TGFU and sports education-learning models. For researchers, it is also possible to develop the research further with a wider scope. In this regard, this research can be used as a recommendation for further research.

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