



Cooperative learning vs problem-based learning: which one is better for basketball learning?

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Abstract. One of the study materials in physical education is basketball. Based on several research results, there are several obstacles in implementing game learning in physical education (PE): low enthusiasm, motivation, and students' seriousness. This research aims to determine the effect of cooperative learning and problem-based learning methods applied to basketball learning in PE. The type of research used in this research is quasi-experimental research with a pre-test – post-test control group design. This study employed 96 students obtained using a purposive sampling technique considering the class that was implementing the basketball learning. The research was carried out from March to August 2023 at SMP N 9 Yogyakarta. The data in this study was obtained by testing mastery of the learning material for the game of basketball in PE. The questions that be used for the test were valid and reliable. The data were analyzed using quantitative data analysis through ANOVA statistical analysis. Before the data was analyzed, normality and homogeneity tests were carried out using Kolmogorov Smirnov analysis and showed that the data were normal and homogeneous. Based on the results of ANOVA analysis ($\text{sig} < 0.05$), there were differences between students who use cooperative learning, problem-based learning, and conventional learning. The Post Hoc Test used for further analysis and shows that the average understanding of students with cooperative learning and problem-based learning models is significantly different from students with conventional learning. It can be concluded that cooperative learning and problem-based learning have a positive effect on basketball learning in PE.

Keywords: cooperative learning, problem-based learning, basketball, PE.

1 Introduction

The learning process in educational units takes place in an interactive, inspiring, fun, stimulating manner, motivates students to participate actively and has sufficient space to foster initiative, creativity, independence depending on the students' talents, interests, and physical and psychological development. Learning from an interaction theory perspective is defined as a process of interaction between students, educators, and learning resources in the learning environment. According to this concept, learning is said to be of good quality if the interaction is multidimensional: teacher-student, stu-

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dent-teacher, student-student, student learning resources, students, and the learning environment. Active learning is also emphasized in the learning process, where active learning will encourage students to learn actively, meaning students dominate learning activities. Therefore, the current curriculum requires the use of a scientific approach in the learning process, because one of the methods that is considered student-centered is science. One of the distinguishing characteristics of the scientific method is that it encourages and inspires students to think critically, analytically, and carefully to identify, understand, solve problems, and apply learning material.

One of the subjects taught at school is physical education (PE). PE is a useful theme to increase the adherence to exercise playing sports among students and thus get a better quality of life, better health, motor skills, better academic results, or grades education [1], [2]. PE is an educational process that utilizes physical activity and health as a medium to produce holistic changes in overall individual development [3]. One of the study materials in PE is learning games consisting of basketball games learning. Based on several research results, there are several obstacles in implementing basketball game learning in PE, including low enthusiasm, motivation, and students' seriousness in carrying out game learning [4]. Apart from that, the presentation of material that seems monotonous and the limitations of media and teaching models in learning games are obstacles in basketball learning games [5], [6].

There are various learning methods that can be used to carry out game learning in PE. Two of them are cooperative learning and problem-based learning. Cooperative learning is a learning model where students learn and work in small groups collaboratively consisting of several people with a heterogeneous group structure, while problem-based learning is a learning model with an approach that emphasizes exposure to problems as a trigger for learning, so that learning is no longer fragmented according to fields of science but integrated as a whole. In implementing PE learning, both methods have a positive impact on increasing the effectiveness of PE learning, both in increasing motivation, self-awareness, and general student learning outcomes in PE learning [7], [8]. In this case, the researcher intends to determine the influence of cooperative learning and problem-based learning methods applied to basketball games learning in PE. It is hoped that this can provide input on learning models that can be applied by teachers in the process of learning games in physical education to achieve effectiveness in basketball games learning in PE.

2 Method

2.1 Study Design

The type of research used in this research was quasi-experimental research with a pre-test – post-test control group design. In this research, there were experimental and control groups chosen randomly. The experimental group was the group treated with cooperative learning and problem-based learning models, while the control group was the group treated with conventional learning models.

Table 1. Research design

Group	Pre-test	Treatment	Post-test
Group A	A1	Cooperative learning	A2
Group B	B1	Problem-based learning	B2
Group C	C1	-	C2

This research began by giving a pretest to the control class and experimental class. The experimental class was treated by applying problem-based learning and cooperative learning models, while the control class continued to use conventional learning. After giving different treatments, a post-test was given to determine mastery of material related to games in physical education. Based on the post-test results, the data obtained was used to compare learning outcomes between the experimental and control classes

2.2 Research Participants

The population in this study were 9th grade students at SMP N 9 Yogyakarta. The number of students taken as research samples was 96 students who were obtained using random sampling techniques to carry out learning material for the game of basketball in physical education. 96 students were divided into 3 groups, each group applying basketball learning using cooperative learning, problem-based learning, and conventional methods.

2.3 Data Collection and Instrumentation

The instrument used in the research was a material mastery test regarding learning material for basketball games learning. The basketball learning outcomes test is measured based on cognitive tests and psychomotor tests based on core competencies and basic competencies for 9th grade in junior high school. The instruments used have been validated by experts and their validity has been determined through content validity or professional validity. The reliability of the instrument was obtained from the results of Cronbach's Alpha analysis with a reliability value of 0.932.

Table 2. Research instrument indicator

Construct	Factor	Indicator
Cognitive tests	Understand the variations and combinations of specific moves in various simple and/or traditional big ball games	Explains how to carry out variations and combinations of dribbling movements in the game of basketball
		Explain the skills of various combinations of specific movement of passing in the game of basketball
		Explains the skills of various combinations of specific shooting movements in the game of basketball

2.4 Statistical Analysis

The normality test statistics which have been carried out using the Kolmogorov Smirnov test. All pretest and posttest data on PE learning outcomes for basketball game material have a data normality value with a significance value of $p > 0.05$, which means the data is normally distributed. Based on the statistical analysis of homogeneity tests which have been carried out using the Levane Test, the research data has similar or homogeneous variants. Then, the data were analyzed using quantitative data analysis through ANOVA statistical analysis.

Table 3. Homogeneity and normality test results

Group	Data	Sig. value
Group of cooperative learning	Pre-test	0.16
	Post-test	0.069
Group of problem-based learning	Pre-test	0.556
	Post-test	0.083
Control group	Pre-test	0.225
	Post-test	0.075

Test data	Sig. value
Pre-test	0.619
Post-test	0.366

3 Result

The data from this research was pretest and posttest data on basketball learning outcomes regarding basketball games. The research process took place in three stages, the first stage was conducting a pretest to obtain initial data on basketball learning outcomes for basketball game material, the second stage of this research activity was conducting treatment, research, and the third stage was conducting a posttest. Pretest and posttest data on PJOK learning outcomes for basketball material are presented in table 4.

Table 4. Data pre-test and posttest

No.	Cooperative learning		Problem-based learning		Conventional	
	Pre-test	Posttest	Pre-test	Posttest	Pre-test	Posttest
1	50	80	65	85	65	77
2	65	65	70	75	65	86
3	65	80	75	75	70	72
4	75	75	75	75	75	72
5	70	75	70	80	75	77
6	65	70	60	65	65	86
7	60	60	70	75	70	77
8	60	70	80	85	65	82

9	60	80	60	75	70	67
10	65	70	80	80	65	72
11	60	75	75	75	60	62
12	75	90	50	70	60	77
13	85	85	60	70	65	72
14	70	70	75	70	85	77
15	80	80	75	65	90	72
16	60	75	75	75	55	62
17	75	75	90	90	65	67
18	55	85	70	65	60	67
19	65	80	55	75	70	82
20	55	90	75	85	65	86
21	70	70	80	85	70	77
22	60	70	80	70	65	67
23	70	70	70	65	70	67
24	80	90	50	65	60	67
25	60	65	75	75	70	82
26	60	70	80	80	70	72
27	65	65	75	70	85	72
28	70	70	70	75	80	77
29	90	90	65	85	65	67
30	65	70	70	85	60	72
31	70	80	80	85	70	77
32	75	80	70	75	65	72

Based on the statistical analysis of normality tests which have been carried out using the Kolmogorov Smirnov test, it shows that all pretest and posttest data on PE learning outcomes for basketball game material have a data normality value of significance value of $p > 0.05$, which means the data is normally distributed. Based on the statistical analysis of homogeneity tests which have been carried out using the Levene Test, the research data has similar or homogeneous variants.

Table 5. Anova test result

	Sum of Squares	Df.	Mean Square	F	Sig.
Between Group	223.333	2	111.667	6.637	0.3
Within Group	706.667	42	16.825		
Total	930.000	44			

From the results of the Anova test, the F value is 6.637 and the significance value of p is $0.3 < 0.05$, meaning that H_0 is rejected. Thus, there is a difference in the average level of understanding of the basketball game among students who carry out learning using cooperative learning, problem-based learning, and conventional methods. Based on the results of the Anova test, a further Post Hoc Test was carried out.

Table 6. Post-Hoc test result

Learning Model		Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower bound	Upper bound
Cooperative learning	PBL	-1.667	1.497	.514	-5.305	1.972
	Conventional	3.667*	1.497	.049	.0278	7.305
PBL	Cooperative Learning	1.667	1.497	.514	-1.972	5.305
	Conventional	5.33*	1.497	.004	1.695	8.972
Conventional	Cooperative learning	-3.667	1.497	.049	-7.305	-0.278
	PBL	-5.33*	1.497	.004	-9.972	-1.695

*The mean difference is significant at the 0.05 level

The results of the Post Hoc analysis show that the average mastery of basketball game material for students using the PBL learning model is significantly different from the understanding of mathematical concepts for students using the conventional learning model. The average mastery of the basketball game material for students using the cooperative learning model is significantly different from the mastery of the material for students using the conventional learning model, while the average mastery of the basketball game material for students using cooperative learning and PBL learning is not significantly different.

4 Discussions

The influence of cooperative learning and PBL on basketball game material can be caused by teachers not dominating learning activities, as well as teachers providing the widest possible opportunities for students to be actively involved in learning [9]. Students can develop concepts individually and in groups in learning activities. Students learn by actively discussing and working together, discovering principles in solving problems in learning [10]–[12]. The cooperative learning model focuses on using small groups of students to work together to maximize learning situations to achieve learning goals. In cooperative learning there are several positive elements that are very important students' lives, having personal and groups responsibility, mutual trust between individuals and other individuals, interacting with each other, solving problems together and evaluating each other in groups [13], [14]. According to Hill & Hill, the cooperative learning model has several advantages, including (1) it can improve students' academic achievement, (2) it can deepen students' understanding of the material provided by the teacher, (3) it is a fun learning model because it involves an atmosphere. group learning, (4) helping students develop leadership skills through small groups, (5) can develop positive attitudes in students, (6) can develop students' attitudes to respect each other for all the potential that exists within themselves, (7)

helps students to make the learning atmosphere more inclusive, (8) helps students develop an attitude of belonging to each other, (9) helps students to develop skills that will be needed in the future, one of which is social skills [15].

In addition, students are trained to solve problems to be able to solve problems faced by students in real situations in the form of simulations and real problems that exist in the real world. The significant difference between the average level of understanding of students with cooperative learning and conventional learning can be caused by differences in learning steps and delivery of material. The cooperative learning model allows students to experience learning carried out by students, can strengthen, expand, and apply academic knowledge and skills in various kinds of life challenges both at school and outside of school through student independence in constructing understanding in the game of basketball [16]. In PBL learning, students are assisted by the process of developing analytical skills which includes the process of defining and solving problems in learning the game of basketball. Apart from that, PBL also helps students make decisions when solving problems [17], [18].

5 Conclusion

Based on the research results, it was concluded that the cooperative learning and PBL models had a significant impact on mastery of basketball game learning material compared to conventional learning models. On the other hand, there is no significant difference between students' material mastery results with cooperative learning and PBL learning models. This provides input to PJOK teachers that teaching basketball game material will be better with learning that provides scientific learning experiences for students. Teachers can choose either cooperative learning or problem-based learning models, which are able to provide better learning results compared to conventional learning.

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