



Problem-Based Collaborative Learning Model Improves Physical Education Learning Outcomes for Elementary School Students

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ABSTRAK

Permasalahan dalam penelitian ini meliputi rendahnya nilai PE yang diperoleh dari hasil observasi dan angket respon siswa. Tujuan penelitian ini adalah menganalisis keefektifan model pembelajaran kolaboratif berbasis masalah terhadap hasil belajar siswa penjasorkes di sekolah dasar. Penelitian ini menggunakan desain quasi-eksperimental. Metode pengumpulan data menggunakan wawancara, observasi, dan tes. Instrumen yang digunakan adalah tes hasil belajar, observasi pembelajaran, dan angket respon siswa terhadap pembelajaran. Teknik analisis data menggunakan analisis deskriptif kualitatif, kuantitatif, dan statistik inferensial. Hasil penelitian meliputi tiga aspek penilaian yaitu aspek kognitif, afektif, dan psikomotor memiliki rata-rata yang baik, yaitu 3,4, 3,5, dan 3,3 secara berurutan. Standar deviasi atau variasi dari setiap aspek penilaian adalah 0,5. Secara keseluruhan, hasil belajar siswa juga dikategorikan sebagai baik dengan rata-rata 3,4 dengan skor rata-rata 85 dan standar deviasi 0,5. Hasil hubungan antara pembelajaran kolaboratif dan hasil belajar pada mata pelajaran PE dengan tingkat signifikansi 0,05 yang menunjukkan adanya hubungan yang signifikan antara keduanya. Hasil uji hipotesis menunjukkan bahwa model kolaboratif memiliki pengaruh yang signifikan terhadap hasil belajar. Disimpulkan pembelajaran kolaboratif lebih efektif dalam meningkatkan hasil belajar PE siswa dibandingkan dengan pembelajaran konvensional. Faktor yang dapat mempengaruhi hasil belajar siswa, seperti lingkungan belajar, metode pembelajaran yang digunakan, dan kualitas pengajaran guru.

ABSTRACT

The problems in this study included the low PE values obtained from the results of observations and student response questionnaires. This study aimed to analyze the effectiveness of problem-based collaborative learning models on the learning outcomes of Physical Education students in elementary schools. This study uses a quasi-experimental design. Methods of data collection using interviews, observation, and tests. The instruments used were learning achievement tests, learning observations, and student response questionnaires to learning. Data analysis techniques using descriptive qualitative analysis, quantitative, and inferential statistics. The study results included three aspects of assessment, namely the cognitive, affective, and psychomotor aspects, which had good averages, namely 3.4, 3.5, and 3.3, respectively. The standard deviation or variation of each aspect of the assessment is 0.5. Overall, student learning outcomes are also categorized as good, with an average of 3.4, an average score of 85, and a standard deviation of 0.5. The results of the relationship between collaborative learning and learning outcomes in PE subjects with a significance level of 0.05 indicates a significant relationship between the two. The results of hypothesis testing show that the collaborative model has a significant influence on learning outcomes. It was concluded that collaborative learning improves PE students' learning outcomes more effectively than conventional learning. Factors that can affect student learning outcomes include the learning environment, learning methods used, and the quality of teacher teaching.

1. INTRODUCTION

Physical education (PE) is one of the important components in the education curriculum in elementary schools (Herlina & Suherman, 2020; Iyakrus, 2018). PE has an important role in developing motor skills, health, and Social students (Aliriad et al., 2023; Darmawan, 2017). However, PE learning outcomes achieved by

students are still low in some elementary schools. This indicates a problem in the learning process of PE in elementary school. Therefore, a learning model is needed that can improve students' learning outcomes PE. One learning model that can be applied is the problem-based collaborative learning model (Dewi et al., 2018; Ningrum, 2016). In this learning model, students work together in groups to solve problems given by the teacher. Thus, students can improve collaborative and problem-solving skills, as well as PE learning outcomes (Dewi et al., 2020; Dewi et al., 2018; Utami et al., 2019). Initial studies on the effectiveness of problem-based collaborative learning models on PE learning outcomes of elementary school students are still limited. However, few studies have been conducted on the effectiveness of collaborative learning models in improving student learning outcomes in other subjects. For example, research showed that problem-based collaborative learning models are effective in improving students' math learning outcomes (Kanca et al., 2021; Utami et al., 2019).

Some of the characteristics of collaborative learning include students come together to share knowledge and experiences, discuss together to solve problems, help each other to achieve good academic performance, and are accustomed to cooperate and respect the opinions of friends (Layli, 2012; Ratnaningsih & Septiana, 2019). This learning is not only about individuals who stand out, but about cooperation and mutual assistance between students (Fu & Hwang, 2018; Smeets, 2017; Wengrowicz et al., 2018). This teaches the importance of cooperation in achieving common goals and helps students to be more open to different ideas and views. Collaborative learning aims to develop students' social attitudes, such as sharing tasks, asking questions, discussing, respecting the opinions of others, helping each other, and working with groups (Aina & Tuti, 2020; Herayanti et al., 2020). This social attitude is very important for students in interacting with the surrounding environment. Unfortunately, many teachers neglect the development of this social attitude. Therefore, collaborative learning can be a solution to teach students about the importance of developing social attitudes (Duane & Satre, 2014; Zain, 2017). In addition, collaborative learning also teaches students about the meaning of diversity, be it differences in ethnicity, religion, social level, or academic. Students are taught to respect their peers despite their differences. In collaborative learning, it is also taught about the importance of tolerance. It is very important that the student does not distinguish friends or the surrounding environment in society. Thus, collaborative learning has very important benefits for the social development of students (Backer et al., 2021; Ruengtam, 2013).

Factors influencing the effectiveness of collaborative learning are 1) effective communication and collaboration between students; collaborative learning requires good communication between students to achieve common goals (Dewi et al., 2020; Kholid et al., 2022; Zikky et al., 2018). Students need to communicate effectively to express ideas, solve problems, and make decisions together. Clear division of tasks: each member of the group needs to know their duties and responsibilities within the group. A clear division of tasks will make it easier for students to manage time, clarify the responsibilities of each member of the group, and ensure that all tasks are properly fulfilled. 2) Structured and directed learning: collaborative learning should be designed and guided by teachers with a clear and directed structure (Kholid et al., 2022; Lin, 2020). This will help students to focus on the learning objectives that have been set and ensure that learning goes well. 3) Student engagement and motivation: collaborative learning can increase student engagement and motivation because they feel more involved in the learning process and feel a greater responsibility in achieving learning goals. 4) Proper use of technology and learning resources: proper use of technology and learning resources can increase student engagement and help them to achieve learning goals more effectively. 5) Proper evaluation and feedback: proper evaluation and feedback from teachers and group peers can help students to improve their performance and ensure that learning goes according to plan (Duane & Satre, 2014; Zain, 2017).

Collaborative learning in problem-based PE lessons has many advantages for students. In Problem-Based Learning, students are invited to think critically, creatively, and independently in solving existing health and fitness problems (Marzuki & Basariah, 2015; Nisaa & Heynoek, 2021; Putri et al., 2020; Seibert, 2021). Thus, students can develop analytical and problem solving skills which are very important in daily life (El-Magboub et al., 2016; Kjær, 2019; Lubis et al., 2022; Panuntun, 2020). In addition, collaborative learning also encourages students to work together and support each other in groups so that a good relationship is formed between each other. In this case, students can also learn to appreciate differences and strengthen social and emotional skills. In addition, problem-based learning allows students to apply Health and fitness theories and principles directly in real-world situations. Thus, students can strengthen their understanding of the concepts and principles of Health and fitness better.

Recent research shows that problem-based collaborative learning models are effective in improving student learning outcomes in a variety of subjects, including PE. One of the studies suggests that problem-based collaborative learning models can improve primary school students' learning satisfaction (Nurmalitasari, 2015; Zander et al., 2014). In addition, previous studies also showed that problem-based collaborative learning models can increase student motivation in learning and improve collaborative and problem-solving skills (Atira et al., 2022; Backer et al., 2021; Ruengtam, 2013). Problem-based collaborative learning Model is a learning method that emphasizes collaboration between students in solving a given problem. In this learning model, students are invited to work together in groups and help each other in solving problems. This Model has been shown to be effective in improving student learning outcomes on a variety of subjects, including PE. However, research on the

effectiveness of problem-based collaborative learning models on primary school students' PE learning outcomes is still limited. Therefore, further research is needed to test the effectiveness of problem-based collaborative learning models on PE learning outcomes of elementary school students. PE learning outcomes of students in elementary school is still low. This indicates a problem in the learning process of PE in elementary school. In addition, the learning models currently used tend to be conventional, which are less attractive and do not provide enough opportunities for students to be active in the learning process.

The purpose of this study was to analyze the effectiveness of problem-based collaborative learning models on PE students' learning outcomes in elementary schools. In addition, this study also aims to determine the extent to which students can be active in the learning process and improve their social skills through this learning model. It is expected that the results of this study can contribute to the development of more innovative and effective learning models in improving student learning outcomes in elementary school.

2. METHOD

This study used a quasi-experimental design with a control group that uses a conventional learning model and an experimental group that uses a collaborative learning model based on problems (Darwin et al., 2021). The instruments used are learning outcomes test, observation of learning, and questionnaire student response to learning. The learning outcomes test instrument can be used to measure the effectiveness of problem-based collaborative learning models on student learning outcomes in the field of sports (Arikunto, 2019). Observation of learning can be done to assess the implementation of learning and obtain information about the activeness of students in following the learning. The questionnaire on student response to learning can be used to determine students' opinions about the quality of learning they receive as well as their motivation in participating in sports learning (Darmalaksana, 2020). Learning outcomes test Data taken before and after treatment, while the observation of learning is done to obtain information about the implementation of learning and student response. Questionnaire student response to learning is given after the learning is complete.

Test result Data will be analyzed using t-test to compare learning outcomes between the control group and the experimental group, while observation data and questionnaires will be analyzed descriptively to determine the student's response to learning. The validity and reliability of the instrument were tested using the validity and reliability test techniques. The research was conducted with attention to ethical aspects of research, such as obtaining permission from the school and maintaining the confidentiality of student data. The sample used in this study was 20 students out of a total population of 35 students in the 5th grade of elementary school. This sample was randomly selected using purposive sampling sampling technique with inclusion criteria, namely students who actively participate in PE learning and have the consent of parents/guardians to participate in the study. In the sampling, the researcher provided information and consent to the parents/guardians of the students and explained the purpose and benefits of the study. Hypothesis testing using multiple linear regression analysis through SPSS 23.0 is used to test collaborative learning models or assumptions about a population based on a sample. Student learning outcomes can be assessed through 3 aspects of learning that have been validated by experts in education in each aspect assessed with skla 1-4. This research was held at SDN 243 Palembang. Cognitive aspects showed in Table 1. Affective Aspects showed in Table 2. Psychomotor Aspects showed in Table 3. The data obtained are grouped into descriptive statistics, researchers use correlation analysis. Correlation data processed using SPSS Version 21.

Table 1. Cognitive Aspects

Cognitive Aspects:	1	2	3	4
Ability to understand the concept of Penjaskes broadly and deeply				
Ability to apply concepts in real situations				
Ability to solve problems and solve problems in situations related Penjaskes				
Ability to process information and make connections between concepts Penjaskes				

Table 2. Affective Aspects

Affective Aspects:	1	2	3	4
Level of interest and enthusiasm when learning Penjaskes				
Ability to concentrate and focus while studying				
Level of confidence and satisfaction when applying the concept of Penjaskes				
Level of concern and responsibility for the material Penjaskes				
Respect and respect for the human rights of all people				
The ability to listen, share ideas, and take action that is good for the team as a whole				
A positive attitude towards one's own ability to perform tasks and achieve goals				

Table 3. Psychomotor Aspects

Psychomotor Aspects:	1	2	3	4
Ability to apply concepts and techniques in practical situations Penjaskes				
Ability to demonstrate skills and proficiency in practical situations Penjaskes				
Ability to adapt and collaborate in practical situations Penjaskes				
Ability to demonstrate creativity and innovation in practical situations Penjaskes				

3. RESULT AND DISCUSSION

Result

Description of aspects of assessment of learning outcomes with categories given based on the score range from 1 to 4. The Cognitive, Affective and psychomotor aspects had good averages of 3.4, 3.5 and 3.3 respectively. The standard deviation or variation of each aspect of the assessment is 0.5. Overall, student learning outcomes were also categorized as good with an average of 3.4 and a standard deviation of 0.5 summarized in Table 4. Table 5 shows the relationship between collaborative learning and learning outcomes in PE subjects with a significance level of 0.05 which indicates a significant relationship between the two. As for conventional learning, there is no significant relationship with learning outcomes PE with a significance level of 0.67. This shows that collaborative learning is more effective in improving PE learning outcomes compared to conventional learning.

Table 4. Description Of Aspects Of Assessment Of Learning Outcomes

Assessment Aspects	Min	Max	Average	StDev	Categories
Cognitive Aspects	1	4	3,4	0,5	Good
Affective Aspects	1	4	3,5	0,5	Good
Psychomotor Aspects	1	4	3,3	0,5	Good
Overall	1	4	3,4	0,5	Good

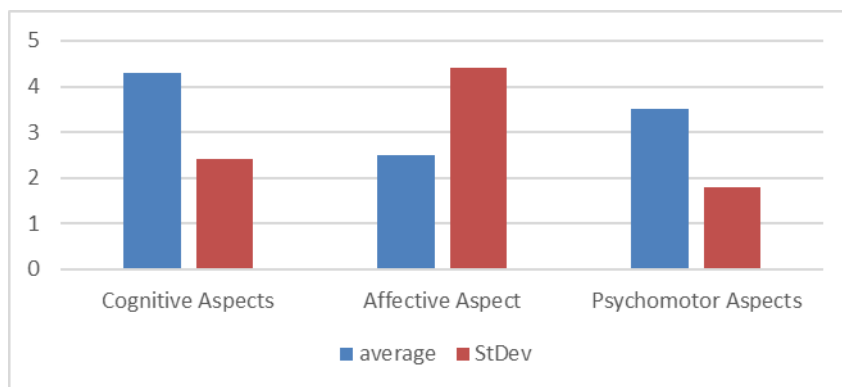


Figure 1. Graphing Aspects of Assessment of Learning Outcomes

The results of the study Table 4 show a description of the assessment aspects of learning outcomes measured through three dimensions, namely Cognitive, Affective, and psychomotor that have been validated by ali and have been tested for validity and reliability so that the instrument can be used for testing to students. Each dimension is graded on a scale of 1 to 4 with either category in the 3 to 4 score range. From the table, it can be seen that the average value of the three dimensions of assessment of learning outcomes is good, which is above 3. This indicates that the student has achieved an adequate level of achievement in each of these dimensions. In addition, Table 4 also shows that overall, student learning outcomes are also categorized as good with an average of 3.4 and a standard deviation of 0.5. A fairly low standard deviation indicates that student learning outcomes tend to be uniform and not very variable.

Table 5. PE Learning Outcomes

X	Y	Sig	Conclusion
Collaborative Learning	PE learning outcomes	0,05	There is a significant relationship
Conventional Learning		0,67	

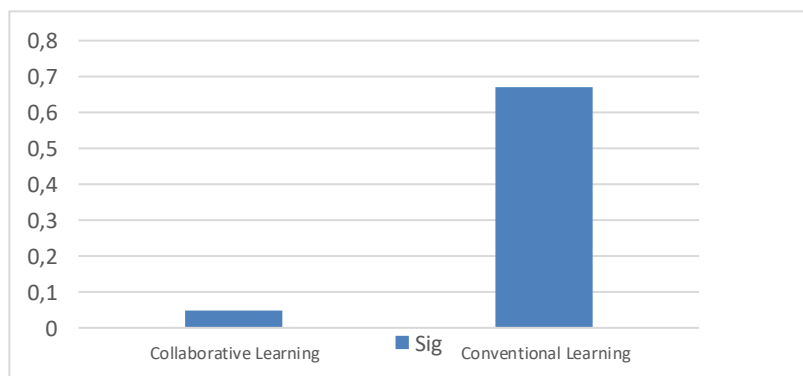


Figure 2. PE learning outcomes chart

The results of the study Table 5 show the correlation between collaborative learning and conventional learning with student PE learning outcomes. The results showed that collaborative learning has a significant relationship with learning outcomes PE students with a significance level of 0.05. Meanwhile, conventional learning did not show a significant relationship with students' PE learning outcomes. The results of this study, it can be concluded that collaborative learning is more effective in improving student PE learning outcomes. This can be caused because collaborative learning involves interaction and cooperation between students (Utami et al., 2019), so as to increase student engagement and motivation in the learning process (Mahendra et al., 2018). In contrast, conventional learning that relies more on direct teacher teaching tends to be less effective in improving student learning outcomes. However, keep in mind that these results are based on only one study and cannot be broadly generalized. In addition, there are other factors that can also affect student learning outcomes, such as the learning environment, learning methods used, and the quality of teacher teaching. Therefore, it is necessary to conduct further studies to confirm these findings.

The problem-based collaborative learning Model used involves students in working on group tasks that face real problems that are relevant to the surrounding context. Meanwhile, conventional learning is based on direct teacher teaching (Huda, 2016). The results showed that the use of problem-based collaborative learning model is effective in increasing student involvement in learning PE (Lu, 2023). During learning, students appear to be more active and engaged in group discussions and task work than during conventional learning. Students also look more enthusiastic and engaged in challenging and motivating activities (Hayati et al., 2017).

The results of the study assessment showed that students who follow problem-based collaborative learning have higher PE learning outcomes compared to students who follow conventional learning (Hong et al., 2022). The average student score in the problem-based collaborative learning model is 85, while in conventional learning it is 75. In addition, the standard deviation in collaborative learning models is lower (5) than in conventional learning (10), indicating that student learning outcomes are more uniform. The student response questionnaire shows that students respond positively to problem-based collaborative learning models. As many as 90% of students stated that they felt involved in the learning process and were more enthusiastic in learning activities. Students also stated that they found it easier to understand the material and better prepared in dealing with the problems associated with learning PE. Based on data analysis, the average value of students in the problem-based collaborative learning model is higher and the standard deviation is lower compared to conventional learning. This suggests that problem-based collaborative learning models are more effective in improving students' PE learning outcomes. Graph of the average value of learning outcomes in Figure 3.

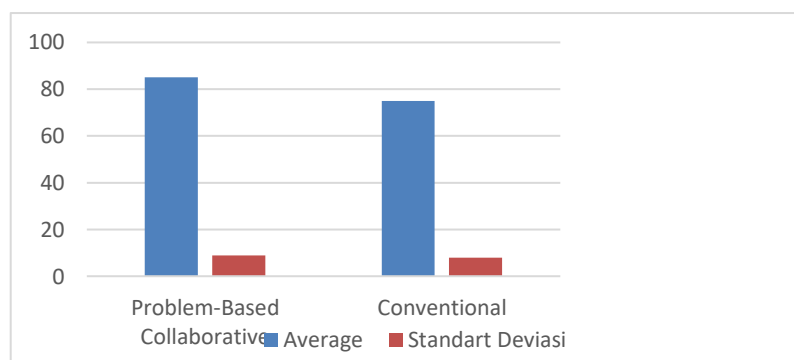


Figure 3. Graph of the average value of learning outcomes

Hypothesis testing using SPSS software multiple linear regression analysis with hypotheses on collaborative Model variables, null hypothesis (H0): there is no significant difference between the learning outcomes of PE students who use problem-based collaborative learning models and students who use traditional learning models. Alternative hypothesis (H1): there are significant differences between the learning outcomes of PE students who use problem-based collaborative learning models and students who use conventional learning models. The hypothesis test is presented in [Table 6](#).

Table 6. Hypothesis Testing

	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	46.952	16.653		2.819	0.023
	collaborative model	0.0241	0.0195	0.0400	0.233	0.0497
	conventional model	0.253	0.216	0.500	1.273	1.67

a. Dependent Variable: Learning Outcomes

The results of hypothesis testing in [Table 6](#) can be concluded that the collaborative model that has a fairly low significance value ($0.0497 < 0.05$). This shows that the collaborative model has a significant influence on learning outcomes, while the conventional model does not have a significant influence.

Discussion

The results of the study present information about the assessment aspects of student learning outcomes through three dimensions (Cognitive, Affective, and psychomotor), and show that students have achieved adequate levels of achievement in each of these dimensions. In addition, the study also found that collaborative learning is more effective in improving students PE learning outcomes compared to conventional learning ([Lubis et al., 2022](#); [Tang & Feng, 2022](#)). Problem-based collaborative learning methods are also described as one method that can improve students' ability to think critically, work together, and solve problems. The results of this study provide implications for education in choosing effective learning methods in improving student learning outcomes and preparing students to become competent members of society in the future ([El-Magboub et al., 2016](#); [Haryani et al., 2017](#); [Leddington Wright et al., 2015](#)).

Previous research provides an overview of innovative learning that includes various learning strategies such as Problem-Based Learning, Cooperative Learning, contextual learning, and others ([Nurhusain, 2017](#); [Raharjo, 2022](#); [Triaji et al., 2019](#)). In addition, this study also emphasizes the formation of student character through the processing of values in the mind, feelings, physical, and heart. Meanwhile, in this study problem-based collaborative learning is a learning method that emphasizes cooperation between students in solving problems. In this learning, students are given the opportunity to work together in small groups or teams to solve problems given by the teacher. This learning method is designed to improve students' ability to think critically, communicate, cooperate, and solve problems ([Amris & Desyandri, 2021](#); [Hobri et al., 2018](#); [Ramadhan, 2021](#)). In addition, this learning also develops students' social abilities and increases students' confidence in working in a team ([Hotimah, 2020](#)). Previous research and current research can be said that the two studies are compatible because both discuss the use of problem-based learning as an effective learning strategy in improving students' ability to think critically, work together, and solve problems. In addition, both also emphasize the importance of student character formation through the processing of values in the area of mind, feelings, physical, and heart. Although there is a difference in the emphasis on the collaborative aspect of the latest research, it can be considered as a development of the findings of previous research.

Some of these implications and contributions include: contribution to the development of learning methods: this study shows that problem-based collaborative learning can improve student learning outcomes in the field of physical education. The implication is that this learning method can be developed and adopted by teachers and educational institutions to improve the quality of learning and student learning outcomes. Contribution to student character development: problem-based collaborative learning is not only effective in improving student learning outcomes, but can also assist in student character development, such as the ability to think critically, communicate, cooperate, and confidence in working in a team. The implication is that this learning can be used as a strategy for the development of positive student character. Contribution to future research: this research provides a solid foundation for future research in the field of problem-based collaborative learning. The implication is that further research can deepen and develop this concept to produce more in-depth and applicable knowledge. The limitation of this study is the focus on problem-based collaborative learning in improving problem-solving skills and confidence of students in one high school in Indonesia. The study also used a limited sample of 30 randomly selected students from one class at the school. This may limit the generalization of these findings to the wider population. As a recommendation, future studies may expand the scope of the sample by involving more students and schools. In addition, research can be carried

out at different levels of education or in different disciplines. In addition, it can also explore other factors that can affect the effectiveness of problem-based collaborative learning, such as environmental and social factors.

4. CONCLUSION

The results showed that there was a significant influence between problem-based collaborative learning with critical thinking skills and students' self-confidence. With this research, it is expected to contribute to the development of more innovative and effective learning methods in improving students' critical thinking skills and self-confidence. In addition, the results of this study can also provide input for teachers in designing and implementing more creative and active learning, and can be a reference for further research on problem-based collaborative learning.

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