

## Effectiveness of PBL Models Assisted by Interactive Video on Problem-Solving Abilities of Elementary School Students

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### Abstract

The purpose of this study was to analyze the effectiveness of PBL models assisted by interactive videos on students' problem-solving abilities. The type of research used was quantitative research with the design of the control group pre-test post-test. The study population consisted of all fourth-grade students in the Kartini Group of Kudus City. The sample was selected through a purposive sampling technique so that the fourth grade of Elementary School Glantengan was selected which amounted to 27 students as the experimental group and fourth-grade Elementary School 4 Panjungan which amounted to 29 students as the control group. Data collection techniques use test techniques. The results of this study indicate that the classical completeness of the problem-solving ability of the experimental class reaches 92.5% with an average value of 83.52. The results of the analysis of problem-solving abilities in the experimental class showed that the indicator of understanding the problem had increased from 54% to 83%. The indicator for planning has increased from 56% to 82%. The indicator of solving problems has increased from 59% to 80%. The checking indicator has increased from 58% to 81%. The experimental class N-gain score scores reached 0.62 with a moderate category.

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## INTRODUCTION

The era of globalization is growing rapidly in various fields, and humans are required to be able to compete with other nations, especially in terms of science and problem-solving abilities. Therefore we need an effort to train and develop problem-solving skills in students from an early age. The inability to solve the problems it faces will have an impact on students' lives because the problems they face are increasingly complex. Students find it difficult to find solutions to the problems they face. This makes students must have sufficient ability to deal with it. That ability is one of the competencies that must be mastered by students in social studies. Problem-solving ability becomes very important when looking at the current conditions where conditions are very rapidly changing, and technological developments are increasingly rapid and very competitive. The ability that students must have is problem-solving ability. The social studies learning process in the classroom is expected to be able to prepare students to have these competencies so that students can obtain, manage, and utilize information to solve problems faced.

Dzulfikar, Asikin, and Hendikawati (2014) states that teaching students to solve problems allows students to be more analytical in making decisions in their lives. Given the importance of problem-solving skills in life today, educators in schools should facilitate students to develop these abilities. To be a good problem solver, students need many opportunities to solve problems in real-life contexts.

Given the importance of training problem-solving skills in students, teachers should pay attention to the ability to solve these problems during the learning process. Students who have good problem-solving skills, also good skills and abilities in developing strategies and tactics to achieve success in a global competition in the future. Problem-solving skills cannot be taught through the lecture method because problem-solving is an active process. One learning model that is relevant to the development of students'

problem-solving abilities is problem-based learning.

Problem-based learning is a learning model that uses real-world problems as a context for students to learn about critical thinking and problem-solving skills, and to acquire essential knowledge and concepts from subjects (Hairi, 2017). Supriadi (2013) states that the Problem Based Learning (PBL) Learning model is an innovative learning model that strives students to be able to solve problems. According to Arends, a problem-based learning method is a learning approach where students are guided to solve authentic problems to develop knowledge, inquiry and high-level thinking skills, independence and self-confidence of students (Taryadi, and Rusdarti, 2018). Based on this opinion, it can be concluded that the PBL model is a learning model that uses real-life problems in learning activities as a stimulus to develop students' problem-solving abilities. Problems can be obtained from the teacher or students. In their learning activities, students are trained to be critical and creative in solving problems and focused on building students' cognitive structures.

Hmelo-Silver, and Barrows (2006) states that problem-based learning is an active learning model based on the use of unstructured problems as a stimulus for learning. Structured problems are very complex problems that cannot be solved by simple algorithms. Such problems do not necessarily have one correct answer but require students to consider alternatives and provide reasoned arguments to support the solutions they produce. In PBL, students have the opportunity to develop skills in reasoning and independent learning. Empirical studies of PBL have shown that students who have learned from PBL curricula are better able to apply their knowledge to new problems as well as utilize more effective self-directive learning strategies than students who have learned from traditional curricula (Hmelo-Silver, and Barrows, 2006).

Problem-based learning model in addition to helping students understand difficult concepts, it is also useful to help students grow cooperative skills in their groups and train students in critical thinking so that students' ability to understand the

subject matter delivered can increase (Dewi, Darsana, and Suniasih, 2014). Problem Based Learning (PBL) is a learning model that involves students to solve problems through the stages of the scientific method so that students can learn knowledge related to the problem and at the same time have the skills to solve problems that are meaningful, relevant and contextual (Rusman, 2013).

PBL learning model is a learning model that utilizes the ability to think in a cognitive process that involves mental processes that are faced with the complexity of a problem that exists in the real world. Students are expected to have a complete understanding of a material formulated in the problem, mastery of a positive attitude, and skills gradually and continuously. PBL requires students' mental activity in understanding a concept, principle, and skill through a situation or problem presented at the beginning of learning. Students understand the concepts and principles of material starting from working and learning to situations or problems given through investigation, inquiry, and problem-solving. Students develop concepts or principles with their abilities that integrate the skills and knowledge that have been previously understood.

Application of Problem Based Learning (PBL) learning models besides being able to improve problem-solving skills. This is reinforced by research conducted by Hidayah, Sri, and Sunarto (2018) stating that the effectiveness of the Problem Based Learning (PBL) model on problem-solving skills in fifth-grade elementary school students. The research conducted by Karina, Sadia, and Suastra (2014) states that the effectiveness of the Problem Based Learning (PBL) model on students' problem-solving abilities and emotional intelligence. Astuti, Suara, and Abadi (2016) conducted a study of the PBL model, which showed that the application of the Problem Based Learning model could improve Social Sciences Knowledge Competence Mastery and critical thinking skills.

Mubuuqe, Louw, and Schalkwyk (2017) researched cognitive and social factors that influenced student responses in PBL models. Simamora, S. J., Simamora, R. E., and Sinaga

(2017) conducted a study on the application of PBL models to students' mathematical problem-solving abilities. Nurjanah (2014) conducted a study on the effectiveness of the PBL method in social studies learning on student learning outcomes. Based on this opinion, it can be concluded that cognitive and social factors were found to influence the use of student feedback in the tutorial, and have reciprocal relationships, mutually reinforcing to influence student learning. Key cognitive influencing factors include overload of feedback, non-specific and unfocused feedback, limited teacher knowledge, different feedback throughout the tutorial group, and by linking feedback from learning outcomes. The main social influence factors include the language of feedback and communication, facilitator interpersonal skills, level of facilitator participation, gender stereotyping, and individualization of feedback.

In addition to the application of the PBL learning model, the thing to consider is the use of IT-based learning media. Some types of media in supporting learning are visual media, audio media, and audio-visual media. Learning media is a tool for learning and everything that can be used to stimulate thoughts, feelings, attention, and abilities or learning skills so that it can encourage the learning process. Leshin (Arsyad, 2010) states that learning media various principles of its use, including human-based media, print-based media, visual-based media, audio-visual based media, and computer-based media.

Learning with PBL models is assisted by the use of interactive video media. Through interactive video learning media, students displayed concrete shows in the form of short videos about the material being taught so that students became more interested in learning. Thus the enthusiasm for learning social studies will emerge from within the students and then supported by the enthusiasm and efforts of the teacher so that it is expected that social studies teaching which has not received optimal attention from students will motivate students to learn so that social studies learning objectives will be optimally achieved.

Dwi, Arif, and Sentot (2014) conducted a study on the effect of ICT-based PBL models on conceptual understanding and problem-solving abilities. Supriadi (2013) conducted a study on the application of PBL models assisted by audiovisual media to students' social studies learning outcomes.

Badra, Tastra, and Mahadewi (2013) researched video technology in production, communication, and transportation for social studies subjects. Sarnoko, Ruminiati, and Setyosari (2016) conducted a study on the application of the SAVI approach assisted by learning videos to improve social studies learning activities and outcomes students. Social studies learning using videos learning media is more effective in improving learning outcomes than learning using conventional media. Therefore, researchers used to apply PBL models assisted by interactive videos to improve students' problem-solving skills in social studies subjects.

## METHODS

This study uses quantitative research methods in the form of quasi-experiment design. The design used in this study used a control group pre-test post-test design. The population in this study were all students of class IV of the City of Kartini in Kudus who was enrolled in the even semester of the 2018/2019 academic year. This sample was taken by a purposive sampling technique that is sampling technique with consideration. Class IV Elementary School Glantengan Kudus as an experimental class and grade IV Elementary School 4 Panjunan Kudus as a control class based on considering the same average social studies learning outcomes.

The data collection technique of students' problem-solving abilities is done through test techniques in the form of description questions, non-test techniques reinforced by interviews and documentation. Data were analyzed using simple statistical formulas for prerequisite tests consisting of data normality tests and data homogeneity tests. Besides that, it also uses the classical completeness test, the average sample t-test, and the N-Gain test.

## RESULTS AND DISCUSSION

The strength of this study lies in learning activities because during the learning activities take place, and students actively discuss with group friends to solve the problems presented by the teacher. This is because the characteristics of the PBL model can provide a fun and meaningful learning environment for students. Because in the implementation of PBL model learning, students are first put forward problems related to the real world and then find solutions to the various information obtained through interactive videos prepared by the teacher.

In the first activity, students are faced with problems presented with interactive videos as capital in PBL learning with interactive video. Problems can be visualized through videos related to the real world. In this activity, students carry out the process of observing the problems presented by the teacher. Observing activities will lead to the curiosity of students who will stimulate students to do questioning both with friends and teachers. Students begin to get organized to solve the problems presented through discussion. Following the stages of student activities in learning activities using the Problem Based Learning (PBL) learning model assisted by interactive video in figure 1.

Interactive video-assisted Problem Based Learning (PBL) learning models effectively improve students' problem-solving. This increase can be seen from the results of the study as follows.



**Figure 1.** Student Orientation Towards the Problems Contained in the Student Worksheet



**Figure 2.** Organizing Students to Solve Problems on Student Worksheets



**Figure 3.** Group Investigation Activities



**Figure 4.** The Activity Presents the Results of Group Discussion



**Figure 5.** Analyzing and Evaluating the Results of the Discussion

## Test of Prerequisites for Students' Problem-Solving Abilities

### Normality test

The normality test is intended to measure whether the data obtained has a normal distribution. The hypothesis proposed is  $H_0$  = sample data come from populations that are normally distributed; and  $H_a$  = sample data does not come from a population that is normally distributed, with the testing criteria  $H_0$  accepted if  $Sig > 0.05$ . The results of the normality test of the control class and experimental class can be seen in table 1.

**Table 1.** Data Normality Test Results

	Kolmogorov-Smirnov		
	Statistics	F	Sig.
Experiment class	0.138	27	0.200*
Control class	0.171	29	0.131*

The normality test in this study used the Kolmogorov-Smirnov test because the study sample was  $> 50$ , based on the results in table 1 sig value from the experimental class post-test was 0.200. While the post-test results in the control class show a Sig value of 0.131, data is said to be normally distributed if  $Sig > 0.05$  significance level. Therefore, it can be said that the control class and experimental class data are normally distributed.

### Homogeneity test

Homogeneity tests are carried out to investigate whether or not it is homogeneous in the variance or group. The following homogeneity test results show the Levene statistics value = 0.760 with sig. = 0.387. Decision making and concluding hypothesis testing is carried out at a significance level of 5%. If the significance is more than 0.05, it can be concluded that the variance is the same (homogeneous), but if the significance is less than 0.05, then the variance is different. Based on the results of the homogeneity test, the sig value obtained is  $0.387 > 0.05$ , it can be said that the two sample classes are homogeneous.



**Test the Hypothesis**

Problem-solving ability analysis

Problem-solving ability indicators used:  
 (1) understanding the problem, (2) planning a

settlement, (3) solving problems, and (4) checking again. The results of the pre-test and post-test in the experimental class and control class can be seen in table 2.

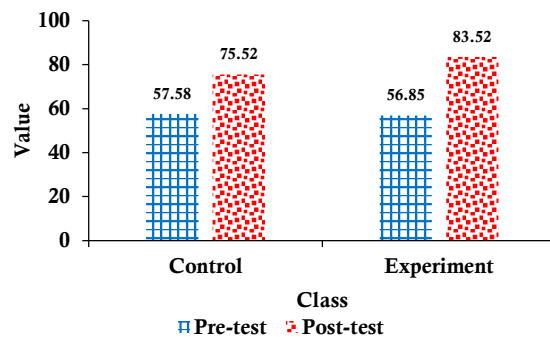
**Table 2.** Results of Analysis of Students' Problem-solving Capabilities

		Indicator of problem-solving capability (%)			
		1	2	3	4
Experiment class	Pre-test	54	56	59	58
	Post-test	83	82	80	81
Control class	Pre-test	54	59	63	56
	Post-test	76	74	75	76

Based on the results of the analysis of problem-solving abilities in the experimental class experienced a significant increase. Indicators understand the problem has increased from 54% to 83%. The indicator for planning a settlement has increased from 56% to 82%. The indicator of solving problems has increased from 59% to 80%. The checking indicator has increased from 58% to 81%. The results of the analysis of problem-solving abilities in the control class experienced an increase, although not as significant as in the experimental class. Indicators understand the problem has increased from 54% to 76%. The indicator for planning a settlement has increased from 59% to 74%. The indicator of solving problems has increased from 63% to 75%. The checking indicator has increased from 56% to 76%. Conclusion of the results of problem-solving ability that in the experimental class is better than the results of problem-solving skills in the control class.

**Average difference test**

The average difference test was used to test the differences in students' problem-solving abilities between the control group and the experimental group. This test uses an independent sample t-test. The following is Figure 6, which presents the average results of the problem-solving abilities of the experimental class students and the control class.



**Figure 7.** Results of Students' Problem-solving Abilities

Based on figure 7 it can be seen that before learning the material of economic activities in the control class, the results of the test of students' problem-solving abilities obtained an average of 57.58 that were in the sufficient category, then after learning the material of economic activities on students' problem-solving abilities increased the result is 75.52 in the good category. Whereas before learning using the Problem Based Learning (PBL) learning model assisted by interactive videos in the experimental class, the results of the problem-solving ability test of students obtained results of 56.85 which were in the sufficient category, then after learning to use the Problem Based Learning (PBL) learning model) assisted by interactive video test results of students' problem-solving abilities increased to 83.52 which is in the very good category.

The SPSS calculation results related to the test of the average difference in the problem-solving skills of the control class and experimental class show that sig. 2-tailed at 0.01 with a significance level of 0.05. The average value in the control class is 75.52, while the average value in the experimental class is 83.52.

Based on the average difference test results obtained Sig of  $0.01 < 0.05$ , then according to the decision-making basis of the independent sample t-test it can be concluded that  $H_0$  is rejected and  $H_a$  is accepted, meaning that there is a difference between the average problem-solving abilities of the experimental class students and control class. In the mean box, it can be seen that the average problem-solving ability of students in the experimental class is 83.52, while the mean problem-solving ability of students in the control class is 75.52. This shows that the average problem-solving ability of students in the experimental class is higher than the average problem-solving ability of students in the control class.

#### **Hypothesis Test N-gain Score Problem Solving Capability**

The results of N-gain in the experimental class showed 0.62 and N-gain in the control class showed 0.39. N-gain in the experimental class is in the medium category. N-gain in the control class is in the medium category. The conclusion from the results of N-gain in the experimental class and the control class that the N-gain Test results are higher than the results of the N-gain control class.

Based on the data obtained, the application of interactive video-assisted Problem Based Learning (PBL) learning models for the experimental class is more effectively applied in learning activities. This is reinforced by the research conducted by Dzulfikar, Asikin, and Hendikawati (2014) researching the effectiveness of the PBL model for problem-solving abilities. The results of this study indicate that the PBL learning model is effective in the problem-solving ability of students of class VIII of Public Junior High School 11 Semarang. The statement was also reinforced by research conducted by Arismawati, and Bondan (2017) conducted a study on the effectiveness of PBL in terms of ability to solve problems and self-confidence. Widyaningrum, Wasitohadi, and Rahayu (2018) The application of the Problem Based Learning (PBL) model assisted by video media can improve the learning outcomes of science

content. Santoso (2014) conducted a study on the effectiveness of learning using learning cd media in social studies subjects in Grade V of Elementary School.

Ineffective learning Problem Based Learning (PBL) in the control class is caused because in learning activities using media that do not support discussion activities (information acquisition). Following what was stated by Hia, Maulina, and Pohan (2018), the learning model Problem Based Learning (PBL) using media handouts (pictures) student learning outcomes did not increase.

#### **CONCLUSION**

Based on the results of the research that has been described can be stated that there are differences in the results of students' problem-solving abilities using the Problem Based Learning (PBL) learning model assisted by interactive video in learning activities. Based on the results of research, learning using the Problem Based Learning (PBL) learning model assisted by interactive video is more effectively applied in learning activities. The average difference test results show that the average problem-solving ability of students in the experimental class is higher than in the control class. Furthermore, the results of the N-Gain test on problem-solving skills in the experimental class are included in the moderate category.

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