

Video Online Learning: An Alternative for Students' Mathematics Problem Solving

Fitria Lestari*, Deni Efendi, Triyana Dara

Universitas Muhammadiyah Lampung, Indonesia

 fitria.lestariavicena@gmail.com*

Abstract

The research design used quantitative in control group design (pretest-posttest control group design). The population in this study were all students of class VIII at SMP Muhamamdiyah 3 Bandar Lampung, totaling 147 students. The sampling technique used purposive sampling technique with the consideration that the selected sample was taught by the same teacher. For this reason, there were 2 sample classes, namely the experimental class, which consisted of 29 students and the control class, which consisted of 29 students. Data collection techniques were obtained through problem solving ability tests, observation. Based on the results of the analysis, it was obtained that there is a significant influence between classes using problem solving assisted learning online learning videos and classes using conventional learning models testing criteria with a significance level of 0.05. It was found that the results of the Sig t-test, (2 tailed) in both sample classes is $0.000 < 0.05$, then H_0 is accepted meaning: there is a significant difference in effect between classes using problem solving learning assisted by online learning videos and classes using conventional learning models.

Keywords: Problem Solving, Online Learning Videos, Mathematical Problem Solving Skills.

ARTICLE INFO

Article history:

Received

May 24, 2023

Revised

September 01,
2023

Accepted

September 04,
2023

Published by

ISSN

Website

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2774-4299

<https://attractivejournal.com/index.php/bse/>

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INTRODUCTION

The ability to solve problems is one of the most important goals in mathematics (Gagatsis, 2004; Warli, n.d.) This ability is one of the five basic abilities that must be mastered by students according to the National Council of Teachers of Mathematics (NCTM, 2000) including the ability of (1) Mathematical Reasoning, (2) Mathematical Communication, (3) Mathematical Problem Solving, (4) Mathematical Connection, and (5) Mathematical Representation. Each of these abilities can be developed and become an integral part of a mathematics learning objective. The opinion of (Hidayat & Sariningsih, n.d.) says that the main foundation in learning mathematics is the ability of students to solve problems. However, the facts in the field in the previous research conducted at Muhammadiyah Middle Schools found that: 1) It is difficult to teach mathematics during online learning, apart from the limited time students also do not understand the material presented because all learning activities only follow orders so that students only act as recipient of the material delivered by the subject teacher. 2) Students are less enthusiastic about participating in online learning activities so that not a few students are late in

submitting the daily assignments given by the teacher. 3) the test questions used are multiple choice questions which aim to make it easier for students to answer questions 4) Student learning outcomes in online learning are still below the Minimum Completeness Criteria (KKM). This can be seen in the student learning KKM table during online learning as follows:

Table 1 Data on grade VIII B students at SMP Muhammadiyah 3 B. Lampung

No.	KKM score	Criteria	Amount	Persentase
1.	≥ 75	complete	9	28%
2.	≤ 75	Not finished	23	72%
Amount			32	100%

Based on the data, it was found that only 28% of students achieved a KKM score of 75, while as many as 72% of students had not achieved the KKM. Some students even left blank questions unanswered. Students only calculate questions without knowing the correct concept. In addition, students who have not finished yet must follow the next material, so students are increasingly confused to solve the questions presented. 5) During face-to-face learning the teacher uses ordinary learning media and is not interactive with the lecture method so that students tend to be passive in learning mathematics. 6) Students are not fully active in learning activities in class, some students only act as recipients of the material delivered by the subject teacher. 7) For knowledge of number patterns students still have difficulty distinguishing odd and even numbers, which is evident when the teacher conducts trials of calculating even and odd multiples, subtracting and adding numbers using positive and negative numbers during the lesson so that the teacher has to repeat it again for material passed in the previous week to deepen and clarify students' knowledge of number patterns 8) Most students are not used to being given essay questions so, not a few students have difficulty understanding questions, writing down what is known and asked about questions so, not a few students who can solve the problem correctly. If these problems are left unchecked, it will have a negative impact, especially on problem-solving abilities in solving the math problems presented. (Wahyudi et al., 2019) said students who cannot solve problems or questions will be a problem for him when he has no way to solve them.

The existence of a problem that arises requires a person to immediately find a way to solve it (Nissa, n.d.) One alternative solution that is used to help students is by utilizing learning media using online learning videos. In the opinion of (Wibawanto, n.d.) the selection of online learning videos is considered the best for visualizing more clearly to students. Learning videos are one of the products resulting from technological developments that can be used in learning activities (Gunawan et al., n.d.; Saharsa et al., n.d.) Several studies by (Delen, 2014; dkk, n.d.; Purwanto, 2020; Wieling, 2010) and mentions that there is a significant difference in problem-solving skills between the experimental and control groups and has a positive effect on learning making students more interested in participating in class learning because students are directly involved in the learning process. The use of learning media is of course aimed at making learning activities run effectively, creating active and interactive learning conditions.

METHOD

Experimental research method with a quantitative approach to the type of Quasi Experiment research. The research design used (pretest-posttest control group design)

(Sugiyono, n.d.). Pretest and posttest were given to the experimental class and the control class which received different treatment. The stages in this research can be seen in Figure 1:

Figure 1: Steps Research



- Understanding the Problem : Giving a pretest to see the conditions that students' problem solving abilities
- Devising a Plan : With the help of online learning videos, students begin to think about what steps are taken to solve the problem by paying attention to what is known and asked about the problem.
- Carrying out the Plan : Students form systematics in solving problems into mathematical models
- Looking Back : Students will provide conclusions from the steps for solving questions assisted by online learning videos
- Evaluation : Conduct a Post Test after the application of the treatment is complete and analyze the Pre test-Post Test data to see students' problem solving abilities

The population in this study were all students of class VIII SMP Muhammadiyah 3 Bandar Lampung. The research sample was 29 students from class VIII B as the experimental class and 29 students from class VIII A as the control class using a purposive sampling technique with the consideration that the selected sample was taught by the same teacher before being given treatment. The test questions consist of 5 questions. The previous questions were given through the expert validation stage, namely to two UM Lampung Mathematics Education Lecturers and the teacher who taught at the school. The results of validation calculations by experts show that the test items show a score of 0.71 with a percentage of 71% which states that the results of the instrument validity test are valid. Meanwhile, the reliability test results were 0.884 with a very high interpretation. For discriminating power, the interpretation of the questions in the categories is very good and good, while for the level of difficulty of interpretation of easy, medium and difficult questions. The conclusion from the calculation results of the Validity, Reliability, Differentiation, and Difficulty Level Tests of the test class's problem-solving abilities is declared feasible to be used as a pretest and posttest in the experimental class and control class. Researchers also tested the truth by using the data normality test, homogeneity test, and hypothesis testing when analyzing the data. The conclusion of the results of the calculation of the Validity, Reliability, Differential Power, and Difficulty Level tests of the test class's problem-solving abilities was declared feasible to be used as pretest and posttest questions in the experimental class and control class

RESULT AND DISCUSSION

Results The average pretest score in the experimental class was 40.04 while in the conventional class it was 40.0. After the treatment was carried out with the help of online learning videos, the average result of the students' posttest scores was 80.60 while the posttest results of students who did conventional learning were 72.50. Testing the scores of the pretest and posttest results of the two sample classes was tested by the Shapiro Wilk Normality Test at a significance level of $\alpha = 0.05$. It was found that the sig. the

mathematical problem solving ability of students in both sample classes is greater than $\alpha = 0.05$ thus H_0 is accepted, so that the distribution of test score data of students' problem solving abilities in both classes before and after being treated is normally distributed.

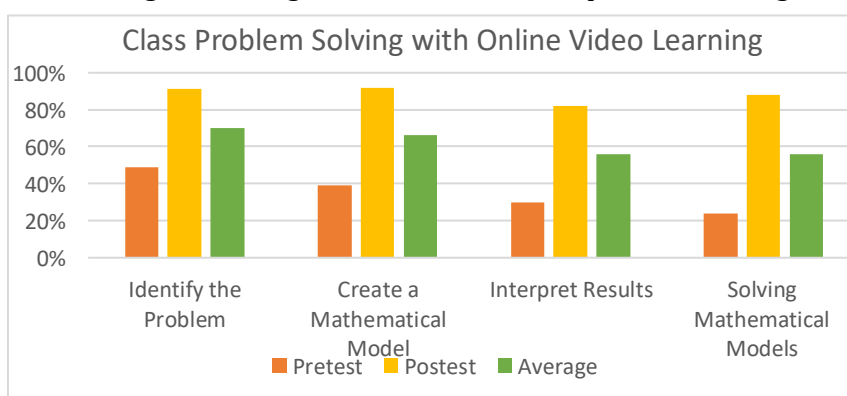
Testing the homogeneity test using SPSS 26 with the Levene Statistics homogeneity test at a significance level of $\alpha = 0.05$. The results of the homogeneity test on the posttest score data of students' mathematical problem solving abilities obtained the value of Sig. 0.243 $> \alpha = 0.05$, so that H_0 is accepted, with the conclusion that the variance of the post-test data for the two sample classes is homogeneous or the same

Testing the hypothesis test using the Paired-Sample t-Test aims to find differences in the effect between the two sample classes using the results of the pretest and posttest. This test is to answer the research hypothesis "There is a significant influence between classes that use problem solving learning assisted by online learning videos and classes that use conventional learning models" testing criteria with a significance level of 0.05. It was found that the results of the Sig t test. (2tailed) in the two sample classes is 0.000 < 0.05 then H_0 is accepted meaning "There is a significant difference in effect between classes using problem solving learning assisted by online learning videos and classes using conventional learning models". The results of observations on students' mathematical problem-solving ability tests using indicators of problem-solving ability obtained the percentage of pre-test, post-test, and average problem-solving ability indicators shown in table 2:

Table 2 Indicators of problem solving ability of the experimental class

Class of <i>Problem Solving Learning with online videos</i>				
Indikator	Identify problem	Create Mathematical Model	Interpret Results	Solving Mathematical Models
Pretest	49%	39%	30%	24%
Posttest	91%	92%	82%	88%
Average	70%	66%	56%	56%
Criteria	Good	Good	Enough	Enough

Figure 2 : Diagram of In Indicators of problem solving ability

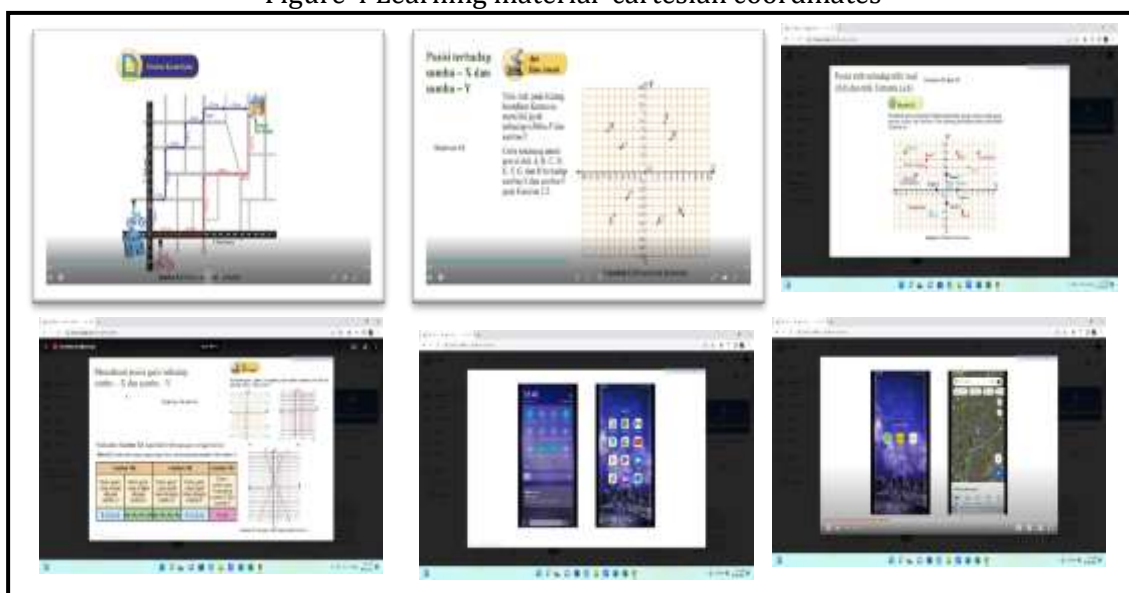


Based on the percentage of observations above, it is known that the percentage of pre-test, post-test, and average each step indicators on students' mathematical problem-solving abilities has changed. To identify problems in the pretest results obtained by 49% and experienced a change in the posttest by 91% with an average of 70% included in the Good criteria category. It can be seen that students are able to understand the problem by writing down what is known and what is asked in a problem. Students' ability to make

mathematical models obtained pretest results of 39% and posttest of 92% with an average classification of good criteria of 66%. The ability of students is still a lot to write a solution plan that is not quite right. Even if the written solution is correct. The ability to interpret the results so that the pretest percentage is 30% and the posttest is 82% with an average of 56% included in the sufficient criteria. Furthermore, the last one is the completeness of the mathematical model obtained by pretest of 24% and posttest of 88% with an average of 56% and is included in the sufficient criteria. Among the causes of the low achievement of problem solving indicators is time allocation. Students feel that the time given is not enough to work on problem solving questions with answers based on problem solving steps. So that many students only identify the problem then immediately perform calculations by ignoring the second and fourth steps.

Based on research, online learning videos can be an alternative in improving problem solving abilities. When learning, students in class with their group mates view video footage of online learning designed with problem solving learning steps. Then students are given a problem so that students can see and think to solve problems from each material provided. Research(Borko, 2008; Partayasa et al., n.d.)The use of online videos can be accessed from home and can be played repeatedly where the playback time can be adjusted to suit needs. Here's an example of the material in the video:

Figure 4 Learning material cartesian coordinates



Based on research, online learning videos can be an alternative in improving problem solving abilities. This can be seen based on the results that the average posttest score of students who received the problem solving learning model assisted by online learning videos was 80.60, while the posttest result of students who received the conventional learning model was 72.50. In the learning experiment class designed using online learning video media with problem solving learning steps. The use of online learning videos makes it easier for students to master concepts in solving a form of problem. This finding is strengthened by the results of previous research which states that the use of videos can improve mathematical problem solving skills (Harefa & laia, n.d.; Karimah, n.d.; Sholihah et al., 2020)

Through online learning video media, students are able to develop thinking skills and interpretation of the questions given. These two things play a role in problem solving (Hensberry & Jacobbe, n.d.; Lubienski, 2000; Polya, n.d.; Zawojewski et al., n.d.). Research conducted by (Batubara & Batubara, n.d.; Susiyanti & Nugraheni, n.d.) states that

providing learning videos in learning will help students understand the material so that when faced with problems, they can use that understanding. Learning videos also have an impact on students becoming more interested in learning (Arsyad, n.d.; Nurrohma & Purnomo, 2020) Because one of the functions of learning media is to attract students' attention by showing something interesting (Harefa & laia, n.d.) Interesting learning can increase students' learning motivation. and effective so that it is easy to accept the learning provided (Huda et al., 2019; Lestari et al., 2019). The implications of this research are expected to improve students' mathematical problem solving abilities.

CONCLUSION

Based on the results of the data analysis carried out and discussion of the results of the research it can be concluded that: "There is a significant difference in influence on students' mathematical problem solving abilities between classes that use problem solving learning models assisted by online learning videos than classes that use conventional learning models." Recommendations in this study: 1) teachers can use online learning video media as an alternative to facilitate students' problem solving abilities. 2) Readers and other researchers who wish to develop further research on online learning video media as an alternative for measuring students' mathematical problem solving abilities should: a) Compile Learning Videos that are adapted to the time allocation, b) Sharpen problem solving steps on application questions, c) Re-testing online Learning Video Media for a longer period of time and carried out more than one trial.

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