

The Effect of Review Video Making on Problem Based Learning to Spatial Ability

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Abstract

The aims of thi study is to know the effect of review video making on problem based learning to spatial ability. This research is a quasy experimental research using posttest only control design. The experimental class applied video review on problem-based learning model and the control class did not do video review but only applied problem-based learning model. The population in this study amounted to 49 people and the research sample was 40 people. The sampling technique used in determining the research sample was purposive sampling technique. The research instrument used an essay test which was prepared based on indicators of spatial ability consisting of spatial perception, mental rotation, and spatial visualization. Data analysis techniques include descriptive analysis and inferential analysis. Descriptive data analysis describes the comparison of spatial ability scores of experimental and control classes while inferential analysis is used to test the hypothesis. Descriptive analysis of spatial abilities obtained the average value of the experimental class and control class is 90.50 and 59.50, The results of the spatial ability analysis test using the Mann-Whitney test showed a significance value <0.05, indicating that there is an effect of reviewing student-made videos in the Problem Based Learning Integrated Project assignment learning model on spatial abilities.

Keywords: problem based learning; animation review; spatial ability.

1. Introduction

The Problem Based Learning is one of the learning models that is currently a global concern to applied in learning (Hussin et al., 2018). Problem based learning is one learning that is student centered which bring students solve everyday problems ini collaborative environment. The chracterisics of PBL is learning guidance mostly by students, the problem related to subjects, collaborative, teacher instruction, and using the authentic of open inquiry. The first step in this learning is bring the students to identify the problem, and then make an exploration. Based on the possible solution which generated from synthesizing information, the student have to make collaborative discussion to get the best answer and present it to another. After it, the student will get the feedback. Based on the feedback, solution will be identified with newly acquired knowledge (Liu & Pásztor, 2022). Problem based learning was the effective models to training the students understanding, and linking their education to identify what they need to solve the problems. It also helps the student to develop the skills and dispositions needed for lifelong learning (Taradi et al., 2005); (Mulyono, 2018). However the traditional Problem based learning has lack of support and lack of interest from theteacher and students. They think that problem based learning have waste their time and energy. To solve this lack, the support from technology are needed (Hussin et al., 2018).

The 21st century is the era where the information can be accessed quickly by everyone on the world. Therefore, every individual must have adequate soft skills in order to be able to enter and compete in the world of work. Education is one of the alternatives that can prepare students to compete in this century (Ritonga et al., 2020). Integrating of technology in syllabus is one of the most efficient methods (Karami et al., n.d.). As many technology are interactive and it can make the teacher creat an environments in which students can learn by doing, receive the feedback, and continually refine their understanding and build new knowledge (Donnelly, n.d.). Using technology in learning making students become more active to construct their own knowledge, and reduce boredom in learning (Hussin et

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al., 2018; Azzajjad et al., 2020; Azzajjad et al., 2021). The use of technology in learning can be done by making e-book, flipchart, games, multimedia interaction (MMI), electronic modul (e-modules), power point (ppt), video, and web based learning or WBL (Seruni et al., 2020) also by using online learning (Ahmar et al., 2020a) . So, we can concluded that for solving the lack of traditional problem based learning, we can combine it with making e-book, flipchart, games, multimedia interaction (MMI), electronic modul (e-modules), power point (ppt), video, and web based learning or WBL and using video conference. The application of the problem-based learning model using applications as a form of technology integration not only brings students to gain knowledge, but also equips students with spatial thinking skills and abilities. (Muntarwikhi et al., 2022).

Chemistry is the study of matter and substances that contain various terms and concepts that are interconnected between one field of study and another, and are related to phenomena in everyday life (Ahmar et al., 2020b). Chemical materials tend to be abstract, especially in matters relating to the depiction of chemical bonds. Therefore, in learning chemistry, high spatial ability is required (Asri & Dwiningsih, 2022). Spatial ability is the ability of learners to transform their knowledge through images and colors in space and place (Hodiyanto, 2018). Further (Lowrie et al., 2019) defines spatial ability as a person's ability to visualize and manipulate an object by rotating or reflecting by using the mind while imagining things that might be formed. Spatial ability is one of the strategic abilities in the 21st century (Muntarwikhi et al., 2022). Spatial abilities are important to have in studying chemistry because with spatial abilities the ability to analyze shape and space, especially in studying the molecular shape of a compound becomes easier (Hurrahman et al., 2022).

This research focuses on the application of problem-based learning model to students' spatial ability. The problem-based learning model in this study was integrated with video review in chemistry learning. The learning steps in this study follow the syntax of the problem-based learning model which consists of problem identification, explore information, and solve problems. At the solve problems stage, a learning review is used where the results of solving problems that have been carried out by students and presented in the form of learning videos. Furthermore, students together with lecturers review and discuss learning videos that have been made and presented. Video is a form of technology integration in the problem-based learning model in this study. The presence of animated videos in learning will attract the attention and enthusiasm of students (Zahroh, 2017) It can also facilitate the presentation and visualization of learning materials through images, space, and color so that it can develop students' spatial abilities to make it easier to understand concepts that tend to be abstract in chemistry learning.

2. Methods

This research is a quasy experimental research using posttest only control design. The experimental class applied video review on problem-based learning model and the control class did not do video review but only applied problem-based learning model. The population in this study amounted to 49 people and the research sample was 40 people. The sampling technique used in determining the research sample was purposive sampling technique. The research instrument used an essay test which was prepared based on indicators of spatial ability consisting of spatial perception, mental rotation, and spatial visualization. Data analysis techniques include descriptive analysis and inferential analysis. Descriptive data analysis describes the comparison of spatial ability scores of experimental and control classes while inferential analysis is used to test the hypothesis.

3. Result and Discussion

3.1. Descriptive Statistical Analysis Result

Descriptive analysis table data can be seen in Table 1. Based on the table, the information obtained that the spatial abilities of the experimental and control classes show a minimum score of 65 and 35, a maximum score of 100 and 95, an average score of 90.50 and 59.50, and a standard deviation of 9.854 and 19.050. The data shows that the spatial of the experimental class is better than the control class. The comparison graph of the spatial ability of the experimental class and the control class can be seen in Figure 1.

Spatial ability indicators consist of spatial perception, mental rotation, and spatial visualization. Comparison of the value of each spatial ability indicator can be seen in table 2. Based on the data, it can be seen that for spatial ability indicators the minimum value, maximum value, average value, and standard deviation in the experimental class are 15, 40, 32, and 7.33 respectively and the control class is 10, 30, 20.53, and 5.75 respectively. Indicators for mental rotation ability in the experimental group were 25, 30, 29.5 and 1.54 and for the control class were 10, 30, 18.25 and 7.12 respectively. Furthermore, for media visualization ability, the experimental class was 25, 30, 29, and 2.05 and

for the control class were 10, 35, 20.75, and 8.93 respectively. Comparison graph of the average value for each indicator of spatial ability can be seen in Figure 2.

Table 1. Comparison Data of Spatial Ability of Experimental and Control Classes

Class	N	Minimum	Maximum	Mean	Std. Deviation
Experimental	20	65	100	90.50	9.854
Control	20	35	95	59.50	19.050

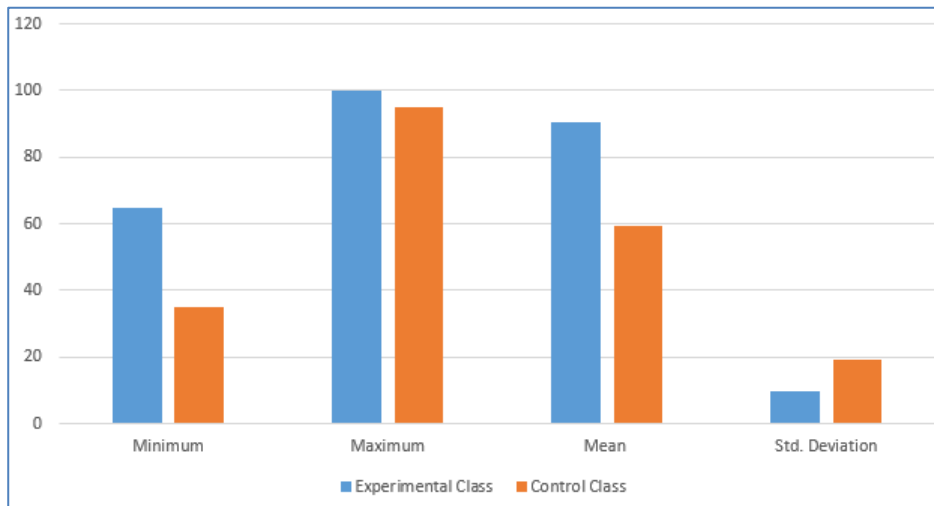


Figure 1. Comparison Chart of Spatial Ability of Experimental Class and Control Class

Table 2. Comparison Data of Each Spatial Ability Indicator

Spatial Ability Indicator	Experimental Class				Control Class			
	Minimum	Maximum	Mean	Std. Deviation	Minimum	Maximum	Mean	Std. Deviation
Spatial Perception	15	40	32	7,33	10	30	20,53	5,75
Mental Rotation	25	30	29,5	1,54	10	30	18,25	7,12
Media Visualization	25	30	29	2,05	10	35	20,75	8,93

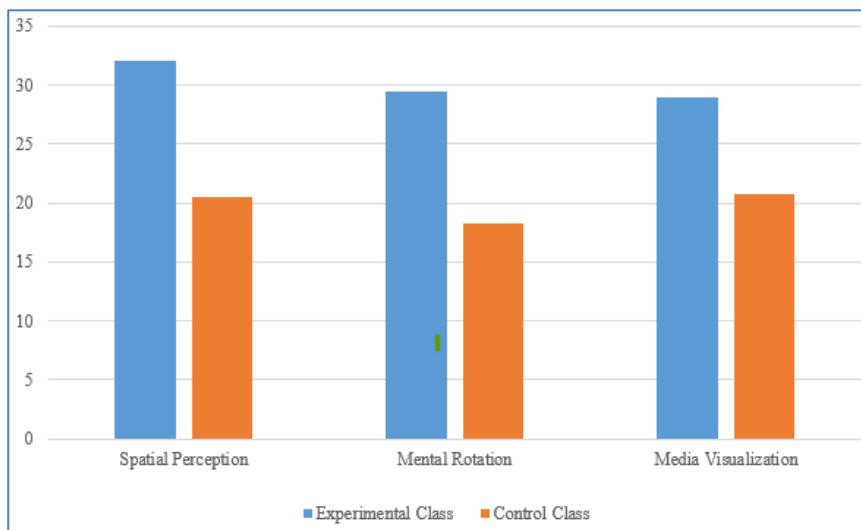


Figure 2. Comparison Graph of the Average Value for Each Indicator of Spatial Ability

3.2. Result of Inferential Statistical Analysis

Inferential statistical analysis in this study was used to test the research hypothesis. Before hypothesis testing, the prerequisite assumption test consisting of normality test and homogeneity test was conducted. The results of the prerequisite assumption test showed that the data were not homogeneous and normal. Therefore, the hypothesis test in this study used the Mann-Whitney test. The results of hypothesis testing using the Mann-Whitney test can be seen in table 3. The data shows that the significance value for hypothesis testing in this study is 0.000. Thus it can be said that the video review on the problem-based learning model affects the spatial ability of students.

Table 3. Spatial Ability Hypothesis Testing Results

Test Statistics ^a	Spatial Ability
Mann-Whitney U	33.500
Wilcoxon W	243.500
Z	-4.528
Asymp. Sig. (2-tailed)	.000
Exact Sig. [2*(1-tailed Sig.)]	.000 ^b

Based on the data in table 1 and table 2, it can be seen that the average value of spatial ability both in terms of all indicators of spatial ability and from each indicator of spatial ability of the experimental class is better than the control class. Judging from the atmosphere in learning, the experimental class that did a video review on the problem-based learning model gave a good response. The response can be seen from their activities in conveying their ideas and opinions about the video reviewed. They conveyed the maximum knowledge they had during the video review. In addition, the assignment to students to make learning videos makes them more active in searching and finding information and trains students' creativity in creating and managing animation, space, color, and sound effects from the videos they make so that it affects the spatial abilities of students. This situation is different from what happened in the control class that applied the problem-based learning model without video review. Only a few students were active in conveying their ideas. Students' responses and activities in conveying ideas and responding to questions during discussions and presentations were still lacking.

4. Conclusions

The results showed that video review on problem-based learning model affects spatial ability. Video review on the problem-based learning model conducted in the experimental class shows the value of spatial ability both overall and from each indicator of spatial ability is higher than the class that applies the problem-based learning model without doing video review.

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