Comparative Study of Critical Thinking Skills on PBL Model Learning with Animated Videos between the Students Using Moodle and Google Classroom

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Abstract

This study aims to compare the students' critical thinking skills who use moodle and google classroom on learning PBL models with animated videos. This is comparative research with a nonequivalent pretest-posttest group design and sampling technique cluster random sampling. Based on the results of the study, it shows that the first experimental class that used moodle is better than the second experimental class that used google classroom. This is obtained from the test results N-gain where the first experimental class obtained a gain score of 0.51 in the fair category, and the second experimental class obtained a gain score of 0.43 in the fair category. The result of t test is t count = 2,8038 > t table = 1,9917 shows that Ha is accepted so that the critical thinking skills of students who use moodle are better than google classroom.

INTRODUCTION

Learning using the 2013 curriculum encourages students to carry out scientific approach activities includes observing, asking, reasoning, trying or collecting data, and communicating in the learning process. According to Suendarti (2017) stated that Science learning is learning that fosters students' thinking skills obtained by observation and experiment that is assisted by rules, laws, theories and hypotheses. Based on this statement, learning science with a scientific approach can build student activity on the learning process to understand the concepts given and develop critical thinking skills.

Critical thinking is an ability that students need to have in the 21st century, and some developed countries have included it in the curriculum as a learning goal (Prayogi et al., 2019). Putra (2015) in Ramdani et al. (2020) states that critical thinking ability is a person's thinking process ability to evaluate or investigate evidence, assumptions and logic that underlie other people's ideas.

Critical thinking skills in science learning must often be trained to students in order to be able to solve problems in science conceptsthat happened in everyday life, so that, it can build students' critical thinking skills to analyze, collect information and evaluate. One of the learning models that can be used to improve students' critical thinking skills is the PBL model (Kemendikbud, 2017). According to the research results of Nasrullah et al. (2018), it is proven that the PBL model can improve students' critical thinking skills in excretory system materials. With the existence of that real problems, the PBL model can help students improve their critical thinking skills.

Besides, from the 5 indicators of critical thinking skills, there are 4 indicators that have not been seen in the learning process as; (1) the ability to conclude, students still provide long or short but not comprehensive explanations; (2) the ability to build basic skills, the students explore information about the material using only the module as a source of information; (3) the ability to explain, in science learning that has many discussions, but the students only use a module. This problem makes the students unable to explain the concept of science fully; (4) ability to provide further explanation, the students do not respond to explain a term and give assumptions; (5) the ability to set strategy and tactics, most students are able to analyze the problems that are around even though they are not contained in the module.

That statement is supported by the interview results with the students who often think that science is a difficult subject. Thus, causing the lack of interest and affect the understanding of the material being taught. So, need the awareness of students to learn independently. It can be concluded that students' critical thinking skills are still lacking. This statement is in line with the statement of Tiruneh & Cock (2017) stated that critical thinking skills could be seen when students are able to understand concepts and solve problems.

Moodle is an application program that can convert learning media into a web form (Herayanti et al. 2018). Moodle features that support the learning process are administrative features, teaching material delivery features, testing features, assessment features, and communication features. Based on Putra (2015), features of the forum, assignment, chat, and quiz help the students to think critically because they can respond to the problems developed. Giving these responses fulfils of critical thinking ability indicators because the students will analyze problems, look for accurate sources, find solutions, and conclude.

Google classroom is an internet-based service provided by Google with an e-learning system to be used as an efficient learning media, practical and interactive service to support technology-based learning (Nurfalah, 2019). Some features that support learning in google classroom include reuse posts, create a question, create an assignment, and create announcement features. These features make it easy to access study materials, submit assignments, fill out attendance lists, and access exam assessments (Nurhusna, 2020). On the other hand, the other google application that supports the learning process is google meet for virtual meetings as a substitute for face-to-face meetings so that students and teachers can still interact directly.

The use of moodle and google classroom as tools for the learning process helps the teachers make the learning process more flexible and introduce students to technological developments in education to support learning. Moodle and google classroom have features that help to present teaching materials to the students. Teaching materials in the form of learning media, such as animated videos can be used to complete the learning process using moodle. The animated video contains an explanation of the problems that occur in the learning material. Animated video as a learning media is very good because it increases students' knowledge and enthusiasm when learning (Ponza et al. 2018). This animated video provides positive contributions to students in improving students' critical thinking skills using the PBL model.

Based on the description, it is necessary to change the learning process to improve students' critical thinking skills. So it is necessary to apply moodle and google classroom to the PBL learning model with animated videos. Moodle and google classroom can be used as learning aids with features that support online learning. This study aims to compare the improvement of students' critical thinking skills using moodle and google classroom. Based on that explanation, a study was conducted with the title: "Comparative Study of Critical Thinking Skills on PBL model learning with Animated Videos between the Students Using Moodle and Google Classroom"..

METHOD

The subjects of this research were the students of MTs Mathalibul Huda Mlonggo with two experimental classes, VIII F class as the first experimental class and VIII G the second experimental class. The sampling technique used was the cluster random sampling technique in which the sample was taken with the same strata.

This type of research is comparative research. The research design used a nonequivalent pretest-posttest group design. The design of this study can be seen in the Table 1.

Table 1. Nonequivalent Pretest Posttest Group Design

Group	Pretest	Treatment	Posttest
1st Experiment	O_1	X	O_2
2nd Experiment	O_3	Y	O_4

Explanations:
O_1 = pretest of the 1st experimental class
O_2 = posttest of the 1st experimental class
X = PBL model with animated video using *moodle*
Y = PBL model with animated video using *google classroom*
O_3 = pretest of the 2nd experimental class
O_2 = posttest of the 2nd experimental class

RESULT AND DISCUSSION

The instruments used to measure students' critical thinking skills are 22 reasoned multiple choice questions and 2 essays. The data from the *pretest* and *posttest* results with a KKM of 75 were analyzed, and the average score from the 1st experimental class was 60 at the *pre-test* changed to 81 at the *post-test*. Meanwhile, the average score from the 2nd experimental class was 56 at the *pretest* changed into 75 at the *posttest*. The average graph from both experimental classes can be seen in Figure 1.
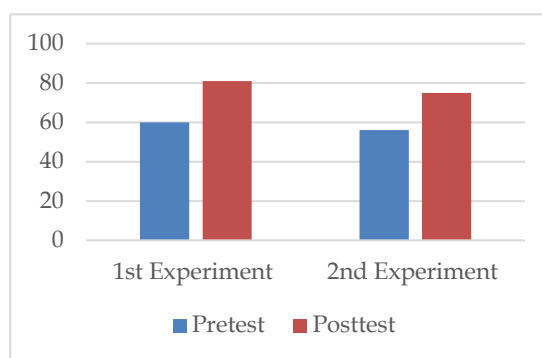

Figure 1. The graphic of average from both experimental classes

Test the normality of the data to find out whether the data is normally distributed or not and determine the type of further analysis.

Table 2. The normality test results of the pretest-posttest data

Data	Class	X^2count	X^2table	Description
Pre-test	1st Exp	8,22	11,07	Normal
	2nd Exp	6,95	11,07	Normal
Post-test	1st Exp	10	11,07	Normal
	2nd Exp	8,83	11,07	Normal

Based on Table 2, it is known that the data is normally distributed because $x^2 count \leq x^2 table$. The normality test data obtained were further tested with the N-gain test and the T-test. The N-gain test aims to determine the improvement of students' critical thinking skills.

Table 3. N-gain test data for both experimental classes

Class	$\sum_{pretest}$	$\sum_{posttest}$	*Gain*	Desc
1st Exp	60	81	0,51	Fair
2nd Exp	56	75	0,43	Fair

The N-gain test is also carried out on each indicator in the question.

Table 4. N-gain test data for each indicator

Indicator	Number of Question	N-gain	
		1st Exp	2nd Exp
1	6	0,40	0,45
	20	0,30	0,26
	1 (essay)	0,60	0,45
2	2	0,65	0,41
	4	0,60	0,47
	3	0,60	0,27
3	19	0,31	0,49
4	18	0,50	0,50
	2 (essay)	0,60	0,60
5	11	0,60	0,59
6	5	0,60	0,52
	9	0,65	0,38
7	8	0,30	0,21
	12	0,48	0,42
	14	0,60	0,22
8	13	0,14	0,36
	15	0,74	0,47
9	1	0,60	0,45
	16	0,67	0,46
	17	0,47	0,60
10	7	0,30	0,18
	10	0,30	0,21
Average		0,50	0,41

Indicator Description:

1 = Focusing the questions
2 = Analyzing the questions
3 = Asking and answering about a challenge or an explanation
4 = Considering source accuracy
5 = Observing and considering the report of observation
6 = Inducing and considering the results of induction
7 = Deducing and considering the results of deduction
8 = Defining the terms
9 = Indentificating the assumption
10= Deciding on an action

The comparison between the two experimental classes determines which one is better between *moodle* and *google classroom* in PBL model learning with animated videos using a t-test.

Table 5. *Pretest* and *posttest* t-test data

Class	Variants	T_{count}	T_{table}	Desc
1st Exp	66,785			
2nd Exp	98,233	2,803	1,991	Ha is accepted

The research carried out is to apply the PBL model in learning combined with animated videos to support the understanding of students' material using *moodle* and *google classroom*. In the learning process, students conduct investigations to solve the problems. Giving this problem aims to motivate students to conduct investigations to understand how to solve problems and obtain solutions (Phungsuk et al., 2017). The use of animated videos as a learning media benefits for the teachers to provide material easier, and the students can understand the difficult material assisted by audiovisuals and animations in the animated video (Sari, 2019).

Learning that uses PBL with animated videos improves students' critical thinking skills in both experimental classes. This is because PBL learning encourages the students to solve the problems presented, then confirmed together and strengthened understanding of the concept with animated videos. The problem of the Covid-19 pandemic has changed face-to-face learning to online, while learning must continue as usual. These problems become obstacles in the educational process. The application of the learning model during the pandemic should still be applied so that it can be continued according to the scientific approach. PBL models with animated videos can be a solution to be applied in learning so that the teaching and learning process continues properly.

E-learning as learning support, and in this study, the PBL model was applied with animated videos using 2 e-learning to be compared; *moodle* and *google classroom*. *Moodle* is used by the 1st experimental class, while *google classroom* is used for the 2nd experimental class. Based on the results of the study, the students' critical thinking skills were obtained on the t test and *N-gain* test in Table 4.7 and table 4.5. T test

results obtained $t_{count} = 2,8038 > t_{table} = 1,9917$ then the hypothesis test Ha is accepted. These results indicate that the 1st experimental class in the PBL model learning with animated videos using *moodle* was better than the 2nd experimental class in the PBL model learning with animated videos using *google classroom*. The results of the t-test are also supported by the results of the *N-gain* test which shows that there is an increase in the students' critical thinking skills in the 1st experimental class of 0.51 with a fair category, while the 2nd experimental class is 0.43 with a fair category. Based on these results, it can be seen that the 1st experimental class obtained a greater increase than the 2nd experimental class. The difference in improvement scores in the two classes is not much different because of the same treatment by the PBL model with animated video, *N-gain* test result can be seen in the Table.3. The result of this study is also supported by a result study conducted by Yuliati dan Saputra (2020) that *moodle*-based STEM learning improves students' scientific literacy skills because it adds meaningfulness in learning and makes it easier to learn the material. In addition, the application of the PBL model with animated video also has an effect on increasing critical thinking skills in the two experimental classes. This is in line with research conducted by Melianasari et al. (2018) that using the PBL model assisted by video media improves students' critical thinking skills.

The results obtained in the 1st experimental class are better than the 2nd experimental class. This is because learning using *moodle* is more integrated and has more complete features compared to *google classroom*. The display feature in *moodle* can be modified so that it can display e-*learning* that attracts the students' attention, while the *google classroom* feature can only be changed in the theme section and the appearance in it is the same, and cannot be modified in order to attract the students' attention. In *moodle,* there is a feature to change the language, while in *google classroom* this feature is not available. The communication feature, *moodle* can create groups according to members so that discussions can still be carried out in one application, but on *google classroom,* communication can only be done on the uploading post feature, so it is necessary to create another group on *WhatsApp* to create a discussion group. In addition, the assessment features on *moodle* are integrated with one application, such as *quizzes* or assignments to be

carried out *pretest* or *posttest,* and have many choices for the form of questions, and can be set for processing allocations so that students work according to the specified time. On the other hand, while in *google classroom,* it is separated from other applications, named *google forms* and cannot be given time allocation, even though both applications belong to *google*, but it will be very easy if integrated with one *google classroom* application. This statement is in line with a research by Copriady et al. (2020), it stated that *moodle* has advantages. It has full features, simple display, available 120 languages, levels of users, and can be operated on the computers or smartphones.

The application of the PBL model with animated videos greatly affects the improvement of students' critical thinking skills during the pandemic. In the learning process, the students are given assignments by the researchers. Then, they work on it and submit it to the researchers. Students' answers are verified and discussed together through *google meeting* so that there is an interaction between students and researchers, such as face-to-face learning, and then the students are strengthened in understanding the material with animated videos. Learning activities using the application of the PBL model with animated videos attract the students' attention because the learning process is fun and new. This thing is in line with Maulina et al. (2017) that animated videos combined with PBL learning models make the students more interested and active during the learning process.

Learning using media will attract the students' attention to improve their critical thinking skills. *Moodle* has more prominent advantages over *google classroom*, which can build the skills in mastering the material, so that the students can set learning strategies to improve critical thinking skills in accordance with the stages of cognitive development of junior high school students. According to Fitrianingsih et al. (2019) that the students in junior high school are in the *formal operation* stage of cognitive development, which means they are able to think abstractly and logically, and scientific thinking models have begun to emerge such as the ability to draw conclusions, interpret, and develop hypotheses. This thing is in line with a study by Gunawan et al. (2021), stated that the application of *moodle* affects higher order of thinking skills because *moodle* provides chat and discussion forums that can be

used to interact. Besides that, the teacher can also supervise the discussion activities of students in *moodle*. This discussion facility is very helpful for students and researchers to continue to discuss and assist the learning process according to the stages of the PBL model.

The improvement of students' critical thinking skills is influenced by the PBL model with animated videos and *e-learning* used, this is evidenced by the different results of the *pretest* and *posttest* in the two experimental classes. In the 1st experimental class, the average *pretest* result was 60, and the average *posttest* result increased to 81. In the 2nd experimental class, the average *pretest* result was 56, and the average *posttest* result increased to 75. These results are in line with Septiyani et al. (2020) that learning using e-learning helps the students improve their critical thinking skills because they can actively participate in learning.

The difference in the average improvement score is due to the difference in the use of *e-learning* between *moodle* and *google classroom,* and the students are not familiar with the application of the PBL model with animated videos in learning during the pandemic. The habit of learning using PBL will make the students to be independent because they can find concepts from real problems they solved (Afni et al. 2018). The obstacles in the research because it is carried out online are; (1) the lack of student participation in discussions and presentations; (2) the difficulty of observing the overall activity of students; (3) technical problems such as signals, so it takes a longer time.

The results of the questionnaire analysis of student responses at MTs Mathalibul Huda Mlonggo conducted a study on PBL model learning with animated videos using *moodle* and *google classroom*. There were 38 students in the 1st experimental class who used *moodle*, and 40 students in the 2nd experimental class who used *google classroom*. The analysis results showed that the 1st experimental class obtained an average result of 88.28% in the very high category, while the average result of the 2nd experimental class was 84.31% in the good category. Based on the analysis results, it can be concluded that the 2nd experimental class learning the PBL model with animated videos using *google classroom* is good in improving students' critical thinking skills on vibration, waves, and sound materials. Moreover, based on the students' responses, it can be seen that the 1st experimental class got more positive responses than the 2nd experimental class due to the use of *moodle,* which has more complete features and attracts the students' attention. These results are also in accordance with research conducted by Muslimah & Fauziah (2021) that the application of *moodle* can improve the students' learning results with the percentage of 89% in the very good category. *Moodle* is also easy, equipped with complete facilities and features, and can be used as an alternative in distance learning.

CONCLUSION

Based on the research of "Comparative Study of Critical Thinking Skills on PBL Model Learning with Animated Videos between the Students Using Moodle and Google Classroom" that has been done, the results of the N-gain test on PBL model learning with animation video for the 1st experimental class using moodle were 0.51 with a fair category, and for the 2nd experimental class using google classroom were 0.43 in a fair category. Comparison of the two experimental classes using the t-test, and the results obtained are t_count = 2,8038 > t_table = 1,9917, so, it can be concluded that learning the PBL model with animated videos using moodle is better than learning the PBL model with animated videos using google classroom.

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