The Effect of The Problem Based Learning Model Using Quizizz Evaluation on Student's Cognitive Science Learning Outcomes in Elementary School

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Article Info	Abstract
	Cognitive learning outcomes of elementary school students are still less than optimal. The learning process still used conventional models with lectures, questions and answers, taking notes, listening, and giving assignments. The teacher still uses the lecture method by cramming various concepts of science into a system of listening, note taking, and memorizing. The purpose of this study was to analyze the effect of the Problem Based Learning's model using Quizizz evaluation on student cognitive learning outcomes and to determine the difference in the effect of the Problem Based Learning's model using Quizizz evaluation with conventional learning on student cognitive learning outcomes. The approach used a a quantitative research, namely a quasi-experimental method. The research design used a pretest-posttest control group design. This design involved two groups of subjects, one was given experimental treatment (experimental group) and the other was not given treatment (control class). The results was the Problem Based Learning's model using Quizizz evaluation affects students' cognitive learning outcomes and there are differences in student cognitive learning outcomes between the experimental class and the control class. In conclusion, the Problem Based Learning's model using Quizizz evaluation has a positive impact on cognitive learning outcomes of fifth grade students of SDIT Al-Madina

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INTRODUCTION

Science learning is knowledge obtained and developed based on experiment (inductive) and based on theory (deductive). There are two things that are inseparable from science, namely science as a product and science as a process. Science as a product is factual, conceptual, procedural, and meta cognitive knowledge, and Science as a process, namely scientific work. According to Juhji (2016), science is a rational and objective knowledge of the universe and everything in it.

Science learning is related to how to systematically find out about nature so that it is not only the mastery of a collection of knowledge but also a process of discovery (Andrian, 2017). So, Natural Science Learning in elementary school is learning about knowledge related to nature and daily activities around students that involve scientific activities, namely observing, exploring, asking, associating, and concluding. The opinion expressed by Hacieminoglu (2016) reveals that science learning in elementary schools is not only about knowledge but also needs to be applied skills because elementary school students need learning in the form of activities in the scientific process. In line with the opinion expressed by Asrial (2018) that science in elementary schools is the beginning of students getting knowledge and scientific process skills that are formed through the practice of science competencies.

Based on the results of interviews with class teachers, the results of interviews with students, and the results of observations on the science learning process in fifth grade SDIT Al Madina in August 2019, several problems can be identified, namely when carrying out practicum activities there are 15 out of 28 students who are still confused, they are not know what to do. Students are not able to make hypotheses, identify and conclude what is learned.

Based on the results of interviews with several students, 12 students found it difficult to take part in science learning, because the learning resources used during learning did not use media, the teacher only used books as a learning resource. Some students also stated that science learning is one of the subjects that is difficult to understand. Scientific names also make science very complicated and confusing.

When children are asked to provide examples of cases in everyday life related to learning topics, students find it difficult to answer them and it is seen that students first open their notebooks or science textbooks to look for answers. The learning methods applied are less varied because the teacher always uses lectures in learning. This can be seen when discussing the subject matter, students tend to be passive in following the lesson, only 3 students asked questions and none of them expressed their opinion regarding the subject matter. In line with the research facts found by Widiawati (2015) that the average science score of students is low because students acquire the concept of science without going through a meaningful process.

The data obtained about student learning outcomes in the cognitive domain in fifth grade SDIT AL-Madina, from 27 students fifth grade A for science content, there were 7 students or 26% who achieved minimum criteria while the remaining 20 students or 74% had not yet reached the minimum criteria. Furthermore, students in fifth grade B totaled 28 students, there were 10 students or 36% who reached the minimum criteria, the remaining 64% or 18 students had not reached the minimum criteria. There were 27 students in fifth grade C, there were 7 students or 26% who reached the minimum criteria, while the remaining 20 students or 74% had not reached the minimum criteria. Finally, namely fifth grade D, which amounts to 29 students, there are 12 students or 41% who have reached the minimum criteria while the remaining 17 students or 69% have not reached the minimum criteria.

Based on the findings of problems in the field, learning is needed that makes students actively involved in learning. In order to encourage the thinking potential of students in the implementation of learning and evaluation,

teachers must manage their activities in a planned manner to empower students' cognitive learning outcomes. Yuliana (2016) suggests that learning outcomes are abilities obtained by individuals after the learning process takes place, which can provide behavioral changes.

The solution offered in this research is using the Problem Based Learning's model. Problem Based Learning presents authentic problems to be formulated and solved together in groups. Agraw (2017: 858) suggests that Problem Based Learning is an instructional method where relevant problems are introduced at the beginning of the instruction cycle and are used to provide context and motivation in learning. Meanwhile, Apriyani (2017) suggests that the Problem Based Learning's model is a learning model based on existing problems, which places students as learning subjects, so that learning is more student-centered.

Nugraha (2017) states that the Problem Based Learning's model is a learning model that applies cognitive and constructivist theories because it constructs existing knowledge and skills in students. Fitriono (2015) also revealed that Problem Based Learning has the principle of real learning in everyday life.

Etiuobon & Anthonia (2016) states that the steps of the Problem Based Learning's method are 1) orienting students, 2) organizing students to learn, 3) guiding individual / group investigations, 4) developing and presenting work, 5) analyzing and evaluating the process solution to problem.

The use of the Problem Based Learning's model is in line with research conducted by Nafiah (2014) which shows that student learning outcomes after the application of problem based learning increased by 24.2%. The use of the Problem Based Learning's model facilitates student learning by emphasizing problems and problem solving so that students are able to improve more meaningful learning skills, think at higher levels and be able to solve problems correctly (Astuti, 2016).

In addition to using the Problem Based Learning's model, researchers also want to apply an attractive evaluation tool for students

which is expected to increase students' enthusiasm in participating in learning, namely by applying the Quizizz evaluation.

Quizizz is a game-based educational application, which brings multiplayer activities to the classroom and makes classroom practice interactive and fun. By using Quizizz, students can do classroom exercises on their electronic devices. Unlike other educational applications, Quizizz has game characteristics such as avatars, themes, memes, and entertaining music in the learning process (Purba, 2019). Amornchewin (2018) explained that Quizizz is a learning tool or media that is believed to motivate students in learning with interesting features. Quizizz can help teachers in conducting evaluations without being limited by places, attractive displays and set time settings will guide student concentration in learning.

The purpose of this study was to analyze the effect of the Problem Based Learning's model using Quizizz evaluation on student cognitive learning outcomes and to determine the difference in the effect of the Problem Based Learning's model using Quizizz evaluation with conventional learning on student cognitive learning outcomes. The benefit obtained from this research is to add to the existing knowledge treasury, especially regarding the implementation of the Problem Based Learning's model using Quizizz evaluation in improving critical thinking skills and cognitive learning outcomes of elementary school students.

METHOD

This study used a quantitative research approach, namely a quasi-experimental method. The research design used a pretest-posttest control group design.

The population in this study were all fifth grade students at SDIT Al-Madina Semarang City. Fifth grade has 4 parallel classes, namely classes A, B, C, and D. Fifth grade A totals 27 students, Fifth grade B consists of 28 students, Fifth grade C has 27 students, and Fifth grade D has 29 students. So that the total population in

this study were 110 grade V students at SDIT Al Madina Semarang City.

The sample chosen in this study was determined using purposive sampling technique. The purposive sampling technique was used in this study due to several considerations, namely the control and experimental groups came from one school, the number of students was balanced or the same, the student learning outcomes showed relatively the same results. Based on these considerations, 27 students in Fifth grade A and 27 children in fifth grade C were selected as research samples.

Data collection techniques in this study used test. The instrument used was a multiple choice test item to measure cognitie learning outcomes. Indicators used in cognitive learning outcomes are remember (C1), understand (C2), apply (C3), analyze (C4), evaluate (C5), and create (C6).

The data analysis technique used in this study was the normality test, homogeneity test, mastery test, improvement test, and influence test, as well as the ANOVA test with Post Hoc.

RESULTS AND DISCUSSION

The results of the research that will be described in this chapter are oriented towards research objectives that have been described in the background of the problem, namely to determine the effect of the Problem Based Learning (PBL) model using Quizizz evaluation on student cognitive learning outcomes in science learning class V SD on learning theme 8 "Environment Our Friends", sub-theme 1" Humans and the Environment "(lessons 1, 2 and 5). Learning activities in research in the experimental group used Problem Based Learning's model using Quizizz evaluation, while in the control group using conventional learning.

1. Prerequisite Test
A) Normality Test

The first stage after the pretest data on the cognitive learning outcomes of the experimental class and control class were collected, then the data normality test was carried out using the normality test formula through the Liliefors test (Kolmogorov-Smirnov) using SPSS version 21. The form of the hypothesis for the normality test are as follows. H0: data comes from samples that are normally distributed.

H1: The data do not come from normally distributed samples.

The criteria used to reject or not reject H0 based on the P-value are as follows. If the P-value $< \alpha$, then H0 is rejected. If the P-value $\geq \alpha$, then H0 is accepted. The results of the normality test for the control class and experimental class can be seen in Table 1.

Table 1. Pretest Normality Test for Cognitive Learning Outcomes

Normality Test	Experiment Class	Control Class
Sig. Kolmogorov-Smirnov	0.200	0.200
α	0.05	0.05
	Normally distributed	Normally distributed

Based on Table 1, it can be seen that the pretest results of the cognitive learning outcomes of the experimental class students have a normality test Sig value of 0.200 which is greater than the value of $\alpha = 0.05$. This shows that the experimental group pretest data comes from data that is normally distributed or H0 is accepted. In the control class, after the normality test was carried out, the Sig value was 0.200, which was greater than the value of $\alpha =$ 0.05, this indicates that the pretest data for the control group was normally distributed or H0 was accepted. Therefore, it can be said that the experimental class and control class data are normally distributed.

B) Homogeinity Test

The homogeneity test is carried out to investigate whether or not the homogeneity of

the variance or groups is fulfilled or not. The hypothesis for the homogeneity test are:

        H0: The two variances are the same.
        H1: The two variances are different.

The criteria used to determine pretest homogeneity are as follows. H0 is accepted if the significance is ≥ 0.05. H1 is rejected if the significance is <0.05. The following shows the results of the homogeneity test in Table 2.

Table 2. Pretest Homogeneity Test for Cognitive Learning Outcomes

		Levene's Test for equality of Variances	
		F	Sig.
Pretest	Equal variances assumed	0.345	0.922
	Equal variances not assumed		

Based on Table 2 the homogeneity test of the experimental group and the control group has a Sig value of 0.922, this shows that H0 is accepted because Sig > 0.05, meaning that the experimental group and the control group come from the same variance.

2. Hypothesis Test

A. Completeness Test of Experimental Class

Completeness test in science learning in elementary school fifth grade A (experimental class) SDIT Al-Madina was carried out to determine student cognitive learning outcomes, both individual and classical completeness. Individual completeness cognitive learning outcomes are presented in Figure 1.
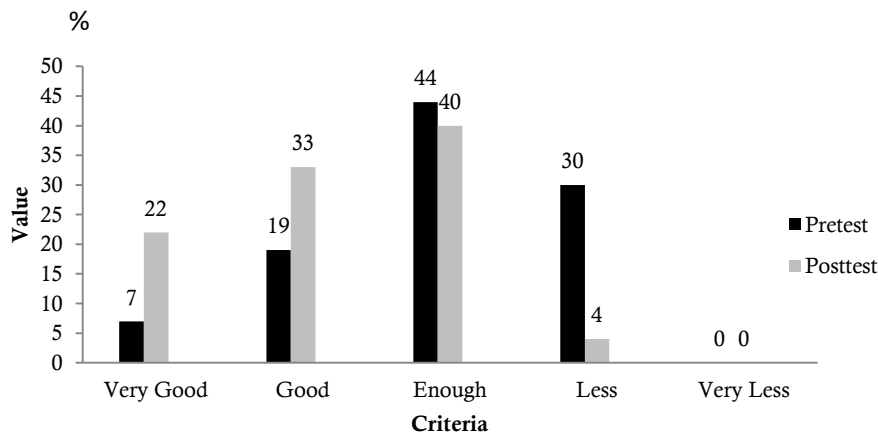
Figure 1. Individual completeness cognitive learning outcomes

Figure 1 shows the implementation of the pretest in cognitive learning outcomes, there are 1 student or 4% who get very good category results, there are 6 students or 22% who are in the good result category, there are 12% students who are in the moderate result category, there are 8% students who are in the poor result category, and there are no students with very poor result categories. After the implementation of learning with the PBL model using the Quizizz evaluation of the posttest results, there

were 10 students or 37% who obtained very good category results, there were 11 students or 41% who were in the good result category, there were 5 students or 18% who were in the moderate result category, there are 1 or 4% of students who are in the less result category, and there are no students with very less result categories

Furthermore, the results of classical completeness can be seen in Figure 2 below.
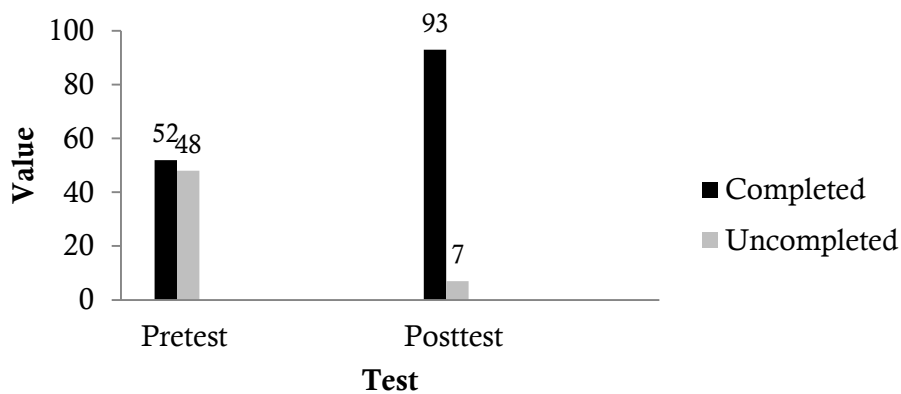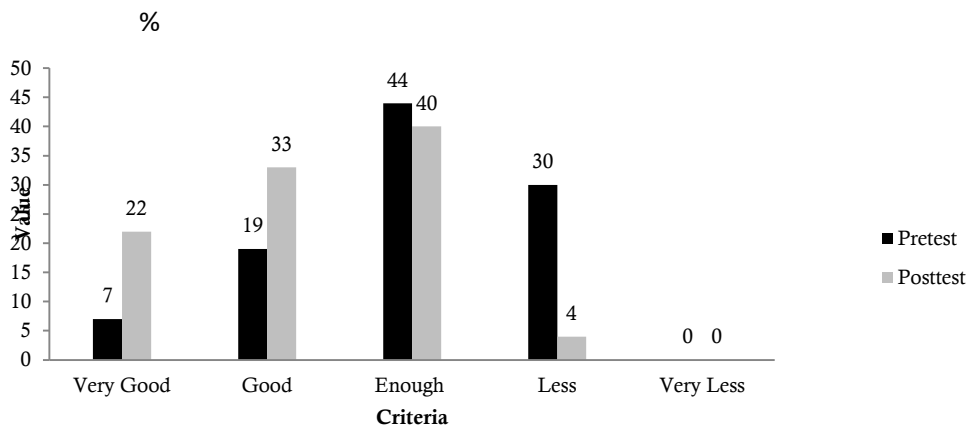
Figure 2. Completion of the Pretest-Posttest%

Based on Figure 2, it can be seen that the average score of the results of the critical thinking ability of the pretest is 66.25 and classical completeness has only reached 52%, while the students who have not completed reach 48%.

The mean value of post-test cognitive learning outcomes is 81.70 and classical completeness has reached 93% while students who have not completed reach 7%.

B) Completeness Test for Control Class

Completeness test in science learning in fifth grade C (control class) SDIT Al-Madina was conducted to determine student cognitive learning outcomes, both individual and classical completeness. Individual completeness cognitive learning outcomes are presented in Figure 3.

Figure 3. Individual Completeness of Cognitive Learning Outcomes

Based on Figure 3 it can be seen that after the implementation of the pretest in cognitive learning outcomes there were 2 students or 7% who obtained very good category results, there were 5 students or 19% who were in the good outcome category, there were 12 students or 44% who were in the result category Enough, there are 8 or 30% of students who are in the poor result category, and there are no students with very less result categories. Whereas after the implementation of the posttest in cognitive learning outcomes, there were 6 students or 23% who obtained very good category results, there were 9 students or 33% who were in the good result category, there were 11 students or 40% who were in the moderate result category, there were 1 or 4% of students who are in the less result category, and there are no students with very less result categories.

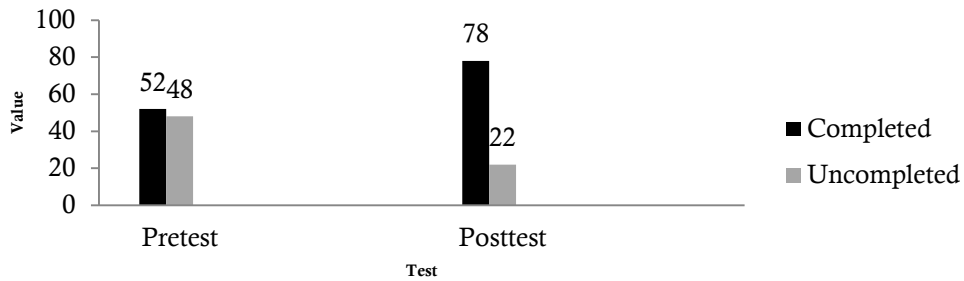Furthermore, the classical completeness results of the control class can be seen in Figure 4.

Figure 4. Completeness of the Pretest-Posttest

Based on Figure 4, it can be seen that the average value of pretest cognitive learning outcomes is 66.40 and classical completeness has only reached 52% while students who have not completed reach 48%. The average value of posttest cognitive learning outcomes 75.96 and classical completeness reached 78% while students who had not completed reached 22%.

C) Enhancement Test

The enhancement test using the Gain Score Test was conducted to determine the difference between the pretest and posttest scores in the control class and the experimental class.

The following are the results of the N-Gain cognitive learning outcomes of the experimental class and control class students presented in Figure 5.
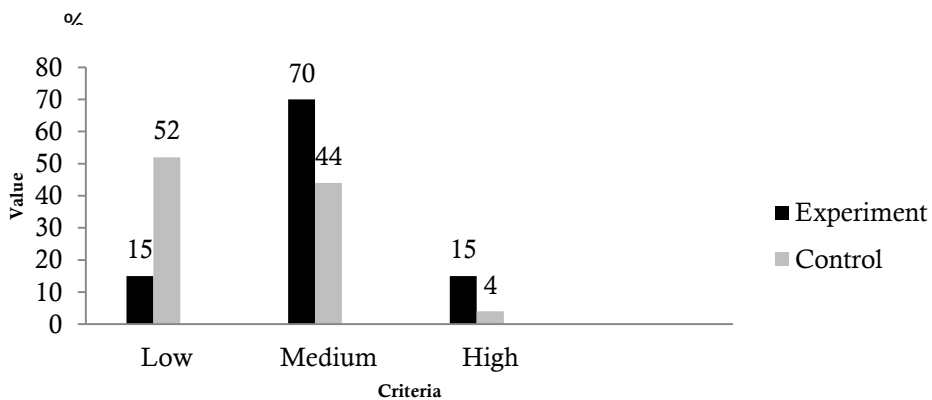
Figure 5. N-Gain Cognitive Learning Outcomes

Based on Figure 5, it can be seen that the cognitive learning outcomes of students in the control class in the high category are 4%, while those in the experimental class are 15%. Student cognitive learning outcomes in the moderate category in the control class were 44%, while those in the experimental class were 70%. Students' cognitive learning outcomes in the low category in the control class were 52%, while those in the experimental class were 15%.

Furthermore, in the control class the average N-Gain is 0.28 and is in the low category, while in the experimental class the average N-Gain is 0.46 and is in the medium category. This shows that the acquisition of cognitive learning outcomes of students in the

experimental class is better than the control class.

3) Effect Test
A. Paired Sample t-Test

Paired Sample t-Test is used to determine whether there is an effect of the Problem Based Learning's model using Quizizz evaluation on students 'cognitive learning outcomes in elementary school science learning in grade V on theme 8 "Our Friends' Environment", sub-theme 1 "Humans and the Environment".

The results of the paired smaple t-test, the Sig value obtained is 0.00 <0.05, meaning that

H0 is rejected, so it can be said that there is an influence on student cognitive learning outcomes with the PBL model using Quizizz-based evaluation.

B. Independent Sample t-Test

Independent sample t-test was used to determine the difference in the effect of the Problem Based Learning's model using Quizizz evaluation with conventional learning on student cognitive learning outcomes in elementary school science learning.

Following are the results of the independent sample t-test presented in Table 3.

Table 3. Independent Sample t-Test

| Sig. 2 tailed | α | Mean | |
		Experiment	Control
0.00	0.05	81.51	75.96
		There is a difference in the average cognitive learning outcomes of students	

Based on the test table above, it can be seen that the significance value shows the number 0.00 <0.05. This proves that there is a difference in the average value of students' cognitive learning outcomes in the experimental class and the control class after learning. In the mean box it can be seen that the mean of the experimental class shows a result of 81.51, while the control class shows a result of 75.96. This shows that the average cognitive learning outcomes of students in the experimental class are higher than the average cognitive learning outcomes of students in the control class.

C. ANOVA test with Post Hoc

This test was conducted to determine the difference in the effect of the Problem Based Learning's model using Quizizz evaluation and conventional learning on groups of low, medium and high level students on cognitive learning outcomes. If the calculation results prove that there is a difference in the effect of each lesson, then continue with the Post hoc test to see in more detail which group the effect is significant.

Table 4. ANOVA Test

Group	Sig.
Very High	0.00
High	
Medium	

Based on the results in Table 4, it can be seen that there are differences in the influence of the very high, high, and medium groups. Obtained a Sig value of 0.00 <0.05, then there is

a significant effect on the very high, high, and medium groups in the experimental class.

Furthermore, it is known that a significant influence is in the experimental class, then it is followed by the Post Hoc test to

determine the magnitude of this influence is presented in Table 5.

Table 5. Post Hoc

Group		Sig.	Mean
Very High	High	0.00	14.015
	Medium	0.00	30.472
High	Very High	0.00	-14.015
	Medium		
	Very High	0.00	16.458
Medium	High	0.00	30.472
		0.00	-16.458

Based on the data in Table 5, it can be seen that the group of students with very high cognitive learning outcomes has a Sig value of 0.00 for the high group, and the very high group has a Sig of 0.00 for the moderate group, meaning that the very high group has a significant difference with the high group and the medium group. . The group of students with high learning achievement had a Sig value of 0.00 against the very high group, meaning that the high group had a significant difference with the very high group, while the high group had a Sig value of 0.00 against the moderate group, meaning that the high group had a significant

difference with the moderate group. Meanwhile, the medium group had a Sig value of 0.00 against the very high group and the high group, meaning that the medium group had a significant difference from the very high group to the high group.

Next, look at the mean box to see which group has the most significant difference. It can be seen that the very high group has a very significant difference compared to the medium group with the mean acquisition of 30,472.

Figure 6 and Figure 7 shows the quizizz and the results of the quizizz presentation done by students.

Figure 6. Quizizz Performance from Experiment Class

Based on Figure 6, it can be explained in Figure 7 below.
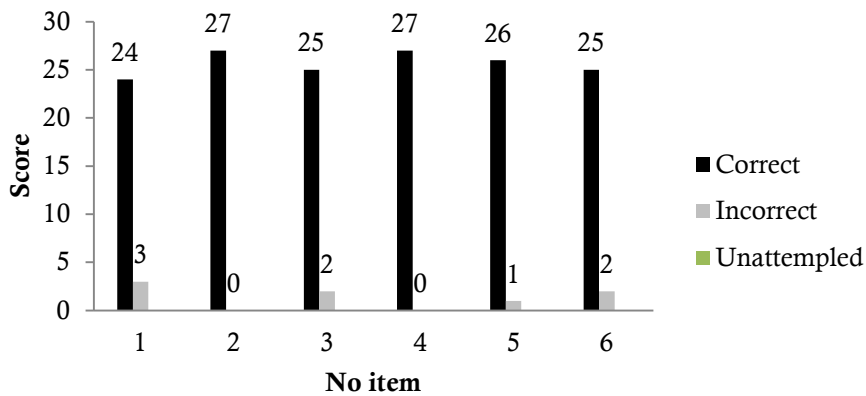
Figure 7. Answers of experimental students

In question number 1, which is "erosion that occurs by sea water is called ..." the correct answer is abrasion. There were 24 students who answered correctly because they already understood the concept of the question, while the other 3 students answered incorrectly, namely erosion. This is because they pay less attention to the learning that is being followed. Furthermore, in question number 2, namely "in everyday life, the use of water for washing, bathing, cooking, etc. must be ..." the correct answer is economical, there were 27 students who answered correctly while no student answered wrong. This is because students already understand the concept of how to save water in everyday life. Problem number 3, namely "water sources are divided into 2,

namely natural water sources and artificial water sources. which is a natural source of water is… ”The correct answer was springs, there were 25 students who answered correctly while the rest, namely 2 students, answered incorrectly. This happens because students who answer wrong are not accurate enough. Problem number 4, namely "closing roads with asphalt or blocks can cause various problems, except ...." the correct answer is that rain water soaks in well. There were 27 students who answered correctly while there were no students who answered incorrectly. This is because students have understood the concept of water infiltration.

Furthermore, here are the answers from the control class students in Figure 8.

Figure 8. Quizizz Performance from Control Clas

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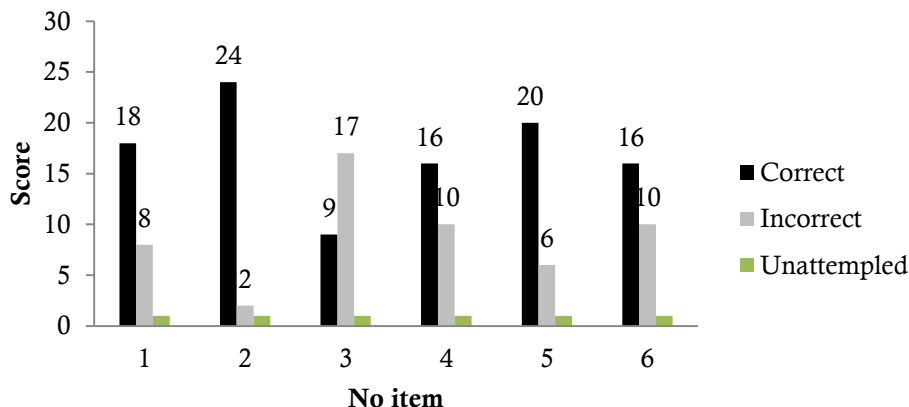Based on Figure 8, it can be explained in   Figure 9 below.

Figure 9. Answer of Control Students

In question number 1, which is "erosion that occurs by sea water is called ..." the correct answer is abrasion. There were 18 students who answered correctly because they already understood the concept of the question, while 8 other students answered incorrectly, namely erosion, and 1 student did not give an answer. This is because they pay less attention to the learning that is being followed. Furthermore, in question number 2, namely "in everyday life, the use of water for washing, bathing, cooking, etc. must be ..." the correct answer is economical, there are 24 students who answered correctly while 2 students answered incorrectly and 1 student did not give answer. This is because students already understand the concept of how to save water in everyday life. Problem number 3, namely "water sources are divided into 2, namely natural water sources and artificial water sources. which is a natural source of water is… ”the correct answer was springs, there were 9 students who answered correctly while 17 students answered incorrectly and 1 student did not give the answer. This happens because students who answer wrong are not accurate enough. Problem number 4, namely "closing roads with asphalt or blocks can cause various problems, except ...." the correct answer is that rain water soaks in well. There were 16 students who answered correctly while 10 students answered incorrectly and 1 student did not give

an answer. This is because students have understood the concept of water infiltration. This shows that the experimental class performs better than the control class.

Based on the data obtained, the quizizzes that were done by the experimental class students got better scores than the questions in the quizizzes that were done by the control class students. This is because through the problem-based learning model, students are required to try and experiment so that material they get is more durable than the lecture model.

During the Problem Based Learning's model with Quizizz-based evaluation, students seemed enthusiastic and happy. The Problem Based Learning's model with Quizizz-based evaluation seems to provide direct experience to students through a practice, so that the experience will be imprinted for a long time in students' memories. This is in accordance with Paloloang (2014) who states that in the Problem Based Learning's model, the teacher does not only stand in front of the class and acts as a student guide in solving problems by providing ready-made solution steps, but the teacher goes around the class to facilitate discussions, ask questions, and helping students to become more aware of the importance of learning.

CONCLUSION

Based on the research results that have been described, it can be concluded there are differences in the effect of the problem based learning (PBL) model using quiziz evaluation and conventional learning and the effect of the problem based learning (PBL) model using quiziz evaluation is greater than conventional learning on cognitive learning outcomes.

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