Activity and Student Learning Result in the Study of Environment Alteration Subject Using Problem Based Learning Model

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Article Info	Abstract
	Basic of competence 3.11 analyzes data on environmental change, causes, and changes in environmental change for life. Basic competence 4.11. PBL model is suitable to be applied to environmental change learning material. PBL is problem-oriented. So it's good for solving lessons, challenging abilities and increasing student activity. The purpose of this study is to analyze activities, learning outcomes, attitudes, and understand the thinking of learning outcomes with student activities. This type of research is a quasi-experimental research design with non-aquivalent control groups. The population of this research is students of class X IPA 1 and 2 MA Al Asror Semarang. The independent variables contain learning material about the environment using PBL, while the variables are discussed further, learning outcomes, and student attitudes. PBL which plays a role in student activity seen in the Mann Whitney test results with Asymp. Sig. (2-tailed) 0,000 <0.05 indicates Ha received, which means all activities between the experimental class and the control class. Learning outcomes improve the medium category with an n-gain of 0.5315 and achieve classical completeness. The correlation of activities with learning outcomes shows r count 0.589> r table 0.361 including moderate category with r2 34.69%, meaning 34.69% of activities contribute to learning outcomes, 65.31% is determined by other factors. PBL samples affect students seen in the results of independent sample t test sig value of 0,000 <0.05 indicates Ha is accepted, meaning that it is related to the difference between the experimental class and the control class.

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INTRODUCTION

Senior high school education recently refers to Curriculum 2013. Curriculum 2013 focuses on the learning which is student centred learning. Student centred learning is aimed in order that student has better ability in observing, asking, reasoning, and communicating. The implementation of curriculum 2013 is expected to make student more active during the learning process so that the learning process can be meaningfully done.

The results of observations at MA Al Asror Semarang in the form of student learning outcomes data on environmental change material in the 2018/2019 school year with a total of 30 students showed only 9 students who scored above the KKM (school KKM ≥ 70). This proves that student learning result is not satisfying. Environment alteration subject is one of subjects in the even semester in senior high school grade X. Basic of competence achieved in this subject is KD 3.11 which is analysing data of environment alteration, causes, and effect of environment alteration in our life, also basic of competence 4.11 which is formulating problem solving idea of environment alteration that happened in surroundings. The characteristic of this environment alteration subject can be known through concrete object of the existence environment problem. One of the learning models that able to improve comprehension of concept and student activity through problem solving activity is problem based learning (PBL).

Problem based learning (PBL) is one of learning models that is recommended on the curriculum 2013 (Kemendikbud, 2016). PBL is a learning model which is done by presenting a problem, asking question, investigating, and discussing. The recited problem should have contextual problem that is found in daily life. PBL learning model can improve student ability in thinking critically and analytically because student will be trained to look for problem solving, searching for solution, deciding the action, and giving argument, so that it can improve student's activity and thinking ability (Kurnianingsih, 2017). According to Aminah (2018) the implementation of PBL is effective towards the learning result and student attitude in environment awareness in the environment alteration subject. Sumantri (2015) said that PBL has inadequacy such as some of lesson arrangement are very difficult for PBL to be applied, need much time, and learning only based on problem.

RESEARCH METHOD

The location of this research is in MA Al Asror Semarang and it was done on June until July 2019 in the even semester school year 2018/2019. Subject of this research is student of X science 1 as the experiment class and student of X science 2 as the control class in MA Al Asror Semarang. Cognitive assessment instrument uses multiple choice for cognitive basic competence in the amount of 40 which is arranged based on knowledge level with the detail C1 = 4,55%, C2 = 4,55%, C3 = 11,35%, C4 = 75%, C5 = 4,55%, and paper assessment for skill basic competence which is valued by using heading of assessment. While student learning activity is done by observing included oral activities, writing activities, and visual activities, in each Problem Based Learning phase. The assessment of attitude uses heading which content is criteria that should be filled by student and observer. Primer data includes data of learning result in cognitive aspect (test score), affective (attitude), and psychomotor (paper), also student activity that will be analyse on descriptive quantitative scale. Correlation between activity and learning result is analysed by using moment product correlation.

RESULTS AND DISCUSSION

Below is the result of this research that is student activity and learning result which is done related to PBL with subject of environment alteration in X science 1 and X science 2 in MA Al Asror Semarang.
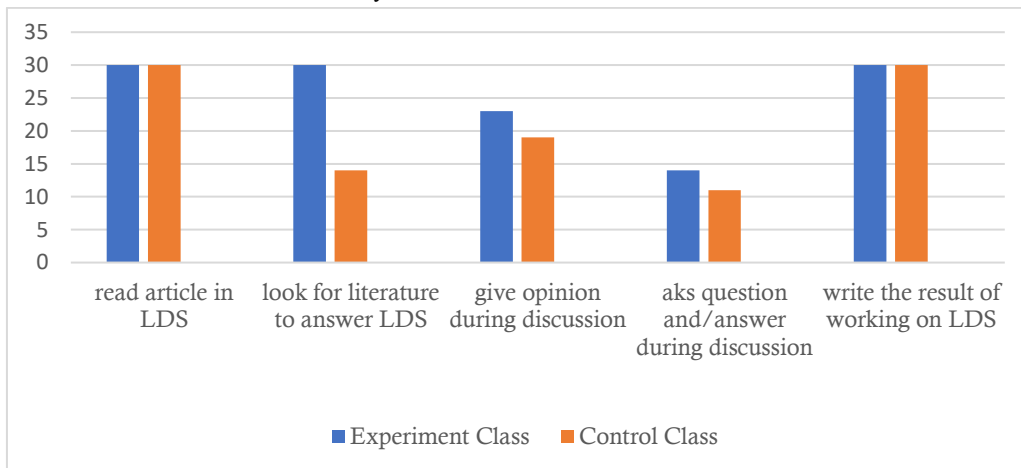**Student Activity**

Result data of student learning activity during learning process in experiment class and control class is presented in Picture 1.
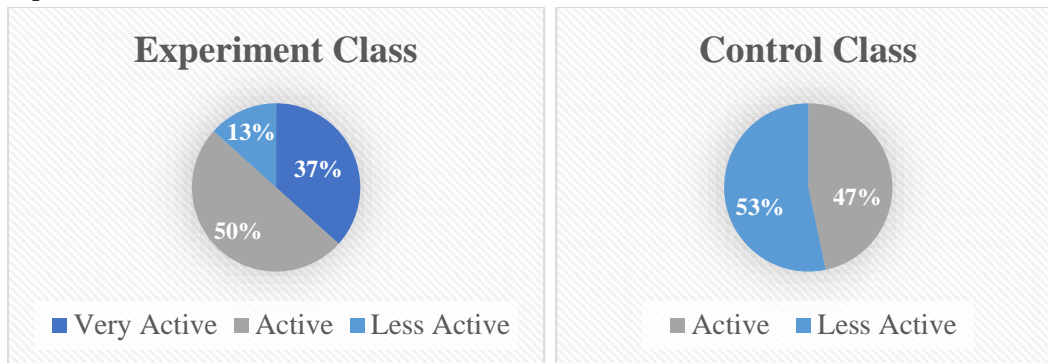
Picture 1 Data of Student Activity

Based on Picture 1, there is a difference between student activity using PBL with student activity using conventional model. The percentage of student activity in experiment class is bigger than student activity in control class. This is in mutual accord with the research result of Wulansari (2013) which mentioned that implementation of PBL in learning process can improve student involvement.

Based on Picture 1, 36,66% student in experiment class get in the criteria of very active and 50% active, while in control class only 46,66% student who get in active criteria and 53,33% student less active. The accumulation data of student activity can be seen in Picture 2.

Picture 2 Student Activity Accumulation

Experiment class which applies PBL has higher learning activity level than control class. This shows that PBL can affect student activity through various phases. Phase 1 is giving problem to student and phase 2 is organizing student to examine, both phases support student to show visual activity by reading problem in LDS and looking for literature that appropriate to answer the question in LDS. Phase 3 is helping individual and group investigation also phase 4 is developing and presenting the result, both phase support student to show oral activities and writing activities where in both phase student will discuss about the appropriate answer to answer the question in LDS then write it down in the available column.

The implementation of PBL in the environment alteration subject in MA Al Asror Semarang at experiment class has achieved the learning success criterion which applied that is 85% student achieves very active and active criteria. PBL proves that it is more capable in making student more active during learning process. 100% student shows that they read article in LDS, 100% student look for literature to answer the question in LDS, 76,66% student actively present their opinion in group discussion, , 46,66% student actively ask question to teacher or groups, and 100% student write answer on LDS.

Activity at control class shows that 53,33% student achieve less active criteria. This is caused by learning process that still dominated by teacher, although using discussion method but this activity only dominated by few students. Many students less active in searching literature to answer LDS and just rely on power point or lesson explained by teacher, so that many students just be quiet and do not actively doing the catechize. Based on the observation result, it is obtained the percentage that 100% student shows that they read LDS, 46,66% student look for literature, 63,33% student present their opinion, 36,66% student do the catechize, and 100% student write the answer on LDS.

To find out the influence of the application of the PBL model on student activities normality tests and independent sample t tests were performed. The results of the normality test of student activities can be seen in Table 1.

Table 1 Normality Test Results and Mann Whitney Test Student Activities

Class	Normality Test		Mann Whitney Test
	Sig.	df	
Experiment	0,000	30	0,000
Control	0,000	30	

The effect of applying PBL models on environmental change material can be seen from the Mann Whitney test results. The Mann Whitney test was used because the data could not meet the requirements for conducting the independent sample t test. The requirement to do independent sample t test is that the data must be normally distributed, while the results of the normality test of student activity data indicate that the data are not normally distributed with a sig value of 0,000 <0.05. Mann Whitney test results indicate the Asymp value. Sig. (2-tailed) 0,000 <0.05, it can be said that Ha is accepted and H0 is rejected, which means there are differences in activities between the experimental class and the control class.

Based on the result and discussion above, the implementation of PBL in the environment alteration subject in MA AL Asror Semarang is a good learning process because it gives chances to student to learn individually. Students are motivated to engage actively in the learning process in each meeting so that they have better activity.

Learning Result

   a. N-gain Test Result

N-gain test functions to see student learning result improvement. The result of N-gain test is presented on Table 2.

Cognitive learning result in this research is obtained from test score and LDS score, while psychomotor learning result is gained from individual assignment to make paper about idea of environment alteration. Cognitive and psychomotor value can be seen on Table 2.

Table 2 N-gain Test Result

Data	Experiment class		N-gain (criteria)	Control Class		N-gain (criteria)
	Pretest	Posttest		Pretest	Posttest	
Lowest score	45	67,5		40	50	
Highest score	82,5	95	0,5315 (moderate)	75	85	0,2525 (low)
average	59,65	80,83		53,91	65,58	

Learning process using PBL can be considered as successful. This is supported by N-gain test result in experiment class which scored 0,5315 included in moderate criteria, while in control class that scored 0,2525 included low criteria. From the data mentioned, it can be said that experiment class achieve higher learning result improvement than control class. This result is appropriate with research done by Erfa (2019) on the treatment of PBL that said the average of N-gain in experiment class is higher than control class. So, it can be said that learning using PBL improve student learning result more, so that it is appropriate to be applied in learning process at class especially for environment alteration subject. This is in mutual accord with the research done by Pujiastuti (2017) mentioned that the improvement of learning result happened to the class

which using PBL than class which using conventional learning model. Besides Pujiastuti, Erfa (2019) also explained that the implementation of PBL in the environment alteration subject affect student learning result.

b.   The Result of Classical Thoroughness Analysis Based on Final Score

Student final score is obtained from the average of psychomotor and cognitive score. Student classical thoroughness is gained from student final score which explain how many students who complete the learning with score ≥70 than the amount of all students in one class. The result of cognitive learning in this research is obtained from test score average and LDS score. Psychomotor learning result is gained from individual assignment to make paper about idea of overcoming environment alteration. Below the result of final score analysis and student classical thoroughness is presented on Table 3.

Table 3 Final Score and Student Classical Thoroughness

Data	Experiment class	Control class
Average of cognitive score	81,50	72,51
Average of psychomotor score	81,26	78,25
Average of final score	81,77	73,12
Highest score	91,66	81,99
Lowest score	73,66	65,33
Completed student	30	20
Incomplete student	0	10
Classical thoroughness (%)	100	66,66

Based on Table 3 student cognitive learning result of experiment class 81,50 bigger than control class with score 72,51. This is because experiment class has higher average posttest and LDS than control class. The high of cognitive score of experiment class is because the difference of the learning model given which is using PBL. The achievement of high cognitive learning result is because experiment class able to apply knowledge they get individually through discussion. This is gone along with the research done by Supiandi (2016) said that The high of student cognitive learning result through PBL is based on the principle that student not only get knowledge but also know how to apply them in real situation.

Psychomotor learning result is obtained from individual assignment to make paper about idea of overcoming the environment alteration. Paper assessment uses paper assessment sheet with the result that experiment class achieve the average of 81,26 and control class achieve the average of 78,25. Both classes achieve the average above the minimum criteria of mastery learning (KKM) which is 70. Even though both get the average above KKM, but experiment class achieve higher score in the aspect of paper content include cause of environment alteration factor, impact of environment alteration, and solution of environment alteration.

The high of experiment class more than control class in some aspects is because experiment class use to search for problem solving on deep scale so that they more careful in doing the assignment given. This result is appropriate with the research done by Noviar (2015) that PBL can improve the learning result in the psychomotor aspect. Moreover, the research done by Priadi (2012) explained that PBL can increase the average of student psychomotor learning result. It happened because PBL consider student as an active thinker in gaining knowledge through problem solving from their experience. Student classical thoroughness result of experiment and control class can be seen in Picture 3.
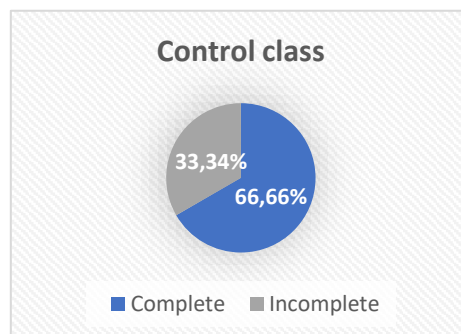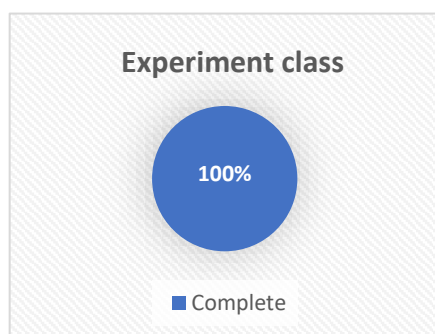
Picture 3 Final Score Thoroughness

Based on Picture 3, it shows that experiment class achieves higher thoroughness than control class. The high of final score in experiment class is because of the PBL implementation focuses on the problem solving process. Problem solving process is a good technic to facilitate student to comprehend the content of the subject and it can challenge student ability and also give satisfaction to find new knowledge. Problem solving can also improve student activity as well as developing student ability to think critically and evolving student ability in adjusting the new knowledge. According to Rahayu (2011) the involvement of student in learning causes the improvement of subject concept mastery, in addition student will more satisfy of problem solving that they find independently.

Correlation of Learning Result with The Student Activity

To find the positive correlation between student activity with student learning result, the correlation test was being done which the result can be seen on Table 4.

Table 4 Correlation of Learning Result with The Student Activity

| Class	∑ Student	r arithmetic	r table (0,05)	r²(%)	Sig. (2-tailed)
Experiment	30	0,589	0,361	34,69	0,001
Control	30	0,477	0,361	22,75	0,008

Based on the data above, experiment class achieves r arithmetic of 0,589 while control class achieves 0,477. The correlation between student learning result and student activity in experiment class is higher than control class. The correlation between student learning result and student activity in experiment and control class achieve the category of moderate. In experiment class, 34,69% of learning result is given by student activity, while 65,31% is given by other factors. In control class, 22,75% of learning result is given by student activity, while 77,25% is given by other factors.

Over all, the result of correlation test shows that there is a positive correlation between activity and learning result in experiment and control class. This result is relatable with the research done by Nuraini (2018) that there is a positive correlation between activity and student learning result.
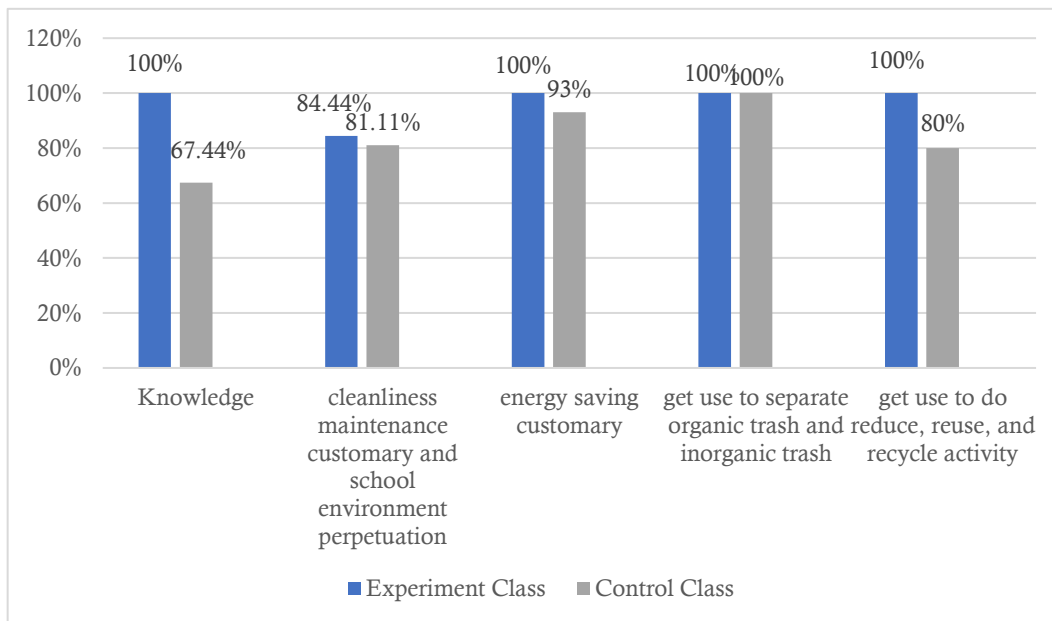
Attitude of Environment Awareness

In this research, the assessment of student awareness towards the environment was being done using questionnaire which is filled by the student based on their own experience. The environment awareness attitude is scored using five indicators that are knowledge, cleanliness maintenance customary, and school environment perpetuation, energy saving customary, get use to separate organic trash and inorganic trash, also get use to do reduce, reuse, and recycle activity.

Data of student environment awareness attitude is presented in Picture 4.
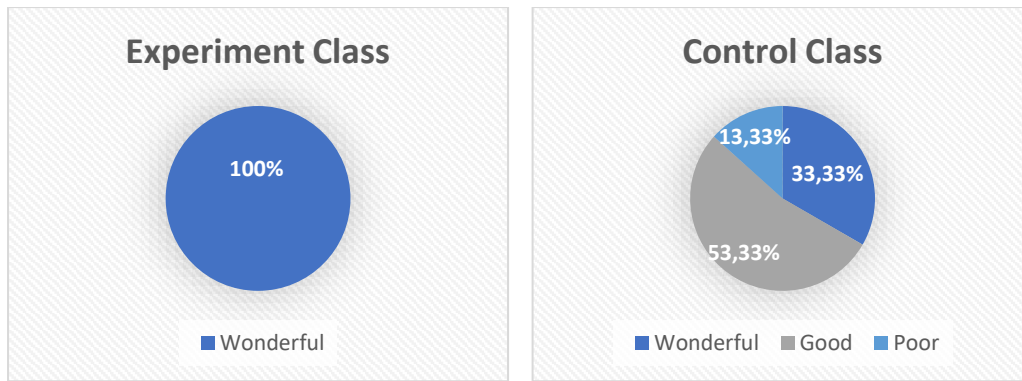
Picture 4 Percentage of Student Environment Awareness Attitude

Based on Picture 4, experiment class shows bigger percentage in wonderful criteria than control class. This result shows that level of awareness of experiment class is wonderful than the control class. 100% student in experiment class achieve wonderful attitude criteria, while student in control class achieve only 33,33% of wonderful criteria, 53,33% student achieve good criteria, and 13,33% get in poor criteria. Student who achieve poor criteria are amounted to 4. There are students categorized as poor is because lack of knowledge in the subject of environment alteration so that it gives impact on not enough customary in environment awareness. The lack of student knowledge can be seen in the average percentage of attitude assessment result which presented in Picture 5.

Picture 5 The Average Percentage of Attitude Score

The different percentage result of environment awareness attitude between experiment and control class is because of the difference of learning model applied in studying the environment alteration subject. PBL which applied in experiment class motivate student to comprehend each problem on deep scale through study of literature independently. Student search the cause, impact, and solution from the phenomenon happened towards student in learning environment alteration subject until it able to influence student perception. So that student is responsible to take care of surroundings. According to Maulidya (2014) responsibility is one of aim components to keep eye open on surroundings. This statement is appropriate with the research done by Ngabekti (2012) mentioned that to grow the attitude of environment awareness, student should be given responsibility to keep clean of the surroundings such as to keep clean in class.

To determine the effect of applying the PBL model on students' attitudes the normality test and independent sample t test were performed. The results of students' attitude normality test can be seen in Table 5.

Table 5 Normality Test Results and Independent Sample T Test Student Attitudes

Class	Normality Test		T Test		
	Sig.	df	t arithmetic	t table	Sig.
Experiment	0,069	30	5,821	2,0422	0,000
Control	0,377	30			

The effect of applying PBL models on students' attitudes can be seen from the results of the independent sample t test which shows the sig value of 0,000 <0.05 and t arithmetic 5.821 <t table 2.0422, which means that Ha is accepted and H0 is rejected, which means that there are differences in attitude between experimental class with control class. This is in line with the results of research from Badarudin (2018) that there is an influence of the PBL learning model

on student attitudes. The application of the PBL model can develop attitudes and cooperation in a variety of situations (Af'idah, 2013). In addition, according to Machin (2014) states that PBL-based learning will be oriented to the inculcation of attitudes / characters that encourage students to become active learners together with group members to identify problems that exist in the surrounding environment. The problem is used to link curiosity and analytical thinking ability and initiative on subject matter.

CONCLUSION

Based on the research result and the elaborated discussion, it can be concluded that:

1. The implementation of PBL in the environment alteration subject has an effect on student activity.
2. The student learning result in the environment alteration subject using PBL experiencing the learning result improvement which included in moderate criteria and achieve classical thoroughness.
3. There is a positive correlation between learning outcomes and student activities in learning environmental change material using the PBL model.
4. The implementation of PBL in the environment alteration subject has an effect towards the attitude of student environment awareness.

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