The role of problem solving model integrated with collaborative to increase student’s learning outcomes on buffer solution

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Abstract: This research aims to determine whether there are differences in student learning outcomes learned using the problem Solving integrated with collaborative learning model compared to students who are taught by the conventional learning model on the subject of buffer solution. The sample was determined by the random sampling which took 2 classes which were used as the experimental class. This study used the quasi-experimental method. Test that use valid instruments and reliable (0.814). Based on test data requirement, showed that pretest and posttest value of control class and experiment class has been normal distributed and homogeneous. Hypothesis test with significant level 0.05 to increased student’s learning outcomes has been got tcount > ttable , its meant Hₐ accepted that student’s learning outcomes that has been learned by problem solving integrated with collaborative model higher than student’s learning outcomes that has been taught with conventional model. The result of observation sheet show that the learning process based on Lesson Study in this research is obtained that the student are less in saying the opinion just 75% of the student that stay saying the opinion in the class. While there are 83% of students that working together in “U” form seat .

1. Introduction
According to (Janah et all, 2018) that "2013 curriculum is a curriculum that emphasizes understanding, skill, and character education. Students are required to understand the material, be active in discussions and presentations and have good manners and discipline. Curriculum 2013 applying the scientific approach which refers to the discovery of basic concept underlying the application of learning models to inculcate scientific attitude on students which touches three domains, namely the attitudes, knowledge, and skills in accordance with the curriculum assessment in 2013."

To achieve these educational goals, the necessary role a professional teacher. This is in accordance with the statement (Lestari and Afifah, 2018) that professional teachers are the main factor in determining the success of education and the achievement of learning objectives. To become a professional teacher, prospective teachers must master basic teaching skills. According to Wijayanti (2015) chemistry is one of the subjects given in high school. Chemistry studies about matter and the changes that occur in it. This science is very important because it is closely related to everyday life. Learning chemistry in high school learns some subjects, one of which is buffer solution.. Based on the background above is if a student
learning outcomes with Problem Solving model based on lesson study using PowerPoint media higher than conventional model. Based on the formulation of the problem, the purpose of this study is to know if student learning outcomes on the topic of buffer solutions through Problem Solving model based on collaborative using PowerPoint media higher than conventional models.

2. Method

2.1. Location and Time Research
This research will be conducted at SMA N 1 Perbaungan. While for the time of research will be held in March - April 2019 in the even semester of the 2018/2019 academic year.

2.2. Research Population and Sample
In this study 2 classes will be used as samples, namely the experimental class and the control class. The sampling technique used is Random Sampling. The first class is the class given teaching with Problem Solving model based on lesson study using PowerPoint media (experimental class) and the second class is the class given teaching with conventional learning models (control class).

2.3. Research Instruments
Instruments used in this study were test instruments. Increased learning outcomes of students in both classes namely the experimental class and the control class on buffer solution material were measured by tests in the form of pre-test and post-test in the form of multiple choice questions. The pre-test was given to the sample before being given treatment (treatment) with the aim to find out homogeneity and normality or similarity of characteristics of the students' initial abilities. Post-test was given after completion of the treatment process (treatment) in order to determine student learning outcomes. The final grade of students can be calculated by:

\[ Value = \frac{\text{Number of correct answers}}{\text{Number of questions}} \times 100 \]

2.4. The Research Design and Research procedure
Design of this study used a real experimental design with Pretest-Postest Control Group Design. In conducting this research, it involved two different treatments between the experimental class and the control class. Class experiments with Problem Solving models based on lesson study with PowerPoint media while the control class is taught with conventional learning models.
Figure 1: the scheme of Lesson Study Cycle on The Implementation Of Problem Solving Model Based on Lesson Study to Increase Student’s Achievement in Buffer Solution Topic.

2.5. Data Analysis Techniques

2.5.1. Normality Test Normality
Test aims to see whether the sample comes from a population that is normally distributed or not. Data normality testing is done by Chi Square Test ($x^2$)

2.5.2. Homogeneity Test
If the normality test shows that the data are normally distributed, then the homogeneity test is then carried out. The homogeneity test in principle wants to test whether a data has the same variance between members of the group.

2.5.3. Hypothesis
This test was conducted to see an increase in student learning outcomes with Problem Solving models based on lesson study with media power points higher than conventional learning models.
Statistical Hypothesis:

a. $H_a : \mu_1 > \mu_2$
b. $H_0 : \mu_1 \leq \mu_2$

Hypothesis testing is used to test whether the truth can be accepted or rejected by using a t-one party test or right-party t-test. The formula used is:
$t_{\text{count}} = \frac{(X_1 - X_2) - do}{\sqrt{\left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}\right)}}$

3. Results And Discussion

3.1. Research Result

3.1.1. Validity Tests
Validity test of instrument is used to determine if the item can be used to measure the students learning outcomes. The analysis is used to examine the validity of the content of the test instrument in terms of technical, content and editorial. The study of the technical terms are intended as an evaluation instrument based on the principles of measurement and format of writing. Reviewing the terms of the content is intended as a review of the feasibility of knowledge stated.

3.1.2. Reliability Tests
Test reliability tests in this study using the Kuder-Richardson 20 (KR-20). Reliability test results of 20 items that are valid against 36 respondents indicated that the price rhitung = $r_{11}^{Kr-20} = 0.873$.

3.1.3. Normality And Homogenity Test
The data obtained pretest control class $\chi^2_{\text{count}} = 8.75$, and the experimental class $\chi^2_{\text{count}} = 9.23$, on a real level $\alpha = 0.05 \chi^2_{\text{table}} = 11.07$, then the data pretest control group (8.75 <11.07) and the experimental group (9.23 <11.07) normally distributed.

Based on the value of the F distribution table with a significance level $\alpha = 0.05$ and dk numerator 36 (n-1 = 36-1) and denominator dk 35 F (35.35) know the $F_{\text{table}} = 1.75$. Thus it can be stated that there is no difference variants pretest two sample groups of data, or the data is expressed homogen. Based on the result, the sample is used as a subject worthy of study.

3.1.4. Hypothesis Test
This test aims to determine the research hypothesis is accepted or rejected. Test the hypothesis is right the two groups of test samples. Testing criteria if $t_{\text{count}} > t_{\text{table}}$, then $H_0$ is rejected on the real level $\alpha = 0.05$, Data hypothesis test calculation results can be seen in Table 1 below.

| Class     | S2   | Average | $t_{\text{table}}$ | $t_{\text{count}}$ | Information |
|-----------|------|---------|---------------------|---------------------|-------------|
| Control   | 0.005| 0.418   | 1.67                | 3.11                | $H_a$ accepted |
| Experiment| 0.008| 0.764   |                     |                     |             |

* Data can be seen in appendix 24

Based on Table 1, the $t_{\text{count}} > t_{\text{table}}$ (3.11 > 1.67). Thus $H_0$ is rejected and $H_a$ accepted, it could be conclude that the student achievement that be taught by Problem Solving model using Power Point media based on lesson study is significant higher than student achievement that be taught by conventional model. There are eight indicators that observed by observer when learning process of Lesson Study in experiment class. The result of increase lesson study shown in graphic.
The result of observation sheet show that the learning process based on Lesson Study in this research is obtained that the student are less in saying the opinion just 75% of the student that stay saying the opinion in the class. While there are 83% of students that working together in “U” form seat.

3.2. Discussion

The average increase in learning outcomes or gain in the experimental class is 76% while in the control class is 41%. Based on the analysis of the data, it was concluded that the learning outcomes in the experimental class were higher than the control class. Based on the results of the data gain analysis, the two parties hypothesis used the Independent Sample T-test with a significant level of $\alpha = 0.05$, the link table ($3.11 > 1.67$).

Thus $H_0$ was rejected and $H_a$ accepted, it could be conclude that the achievement was taught by Problem Solving model using Power Point media based on a significant higher study than student achievement that was taught by conventional models may be taught by conventional model. Although this study succeeded in increasing student learning outcomes and fulfilling the classical completeness level that was 76.88, individual completeness could not be said to be 100% complete because there were some students whose postures had not yet reached the KKM score (minimum completeness criteria) which was 75 for chemistry subjects in the school. This can be attributed to the factors that cause students to be unable to fulfill the KKM according to Anyo (2013), namely, aspects of complexity that relate to mater's difficulty level: lessons learned, aspects of supporting resources related with facilities and infrastructure available at school and intake aspects that are related to the intellectual level of students. But aside from posttest scores according to Herlhan (2009) student completeness can also be compared from the daily activities in learning activities and changes in behavior after learning.

4. Conclusion And Suggestion

4.1. Conclusion

After do the experiment, the data analysis and hyphotesis testing, researcher get the conclusion, as follow:
Students learning outcomes in learning Buffer Solution taught by Problem solving model based on lesson study using power point media is higher than student learning outcomes taught by conventional model based. The hypothesis test is \( t_{\text{count}} > t_{\text{table}} \) is 3.11 > 1.66

4.2. Suggestion
Based on the esult and discussion, It is suggested for chemistry teacher to use the fit model and media in purpose to increase students’ learning outcome.

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