



Improving Learning Outcomes through Problem-Based Learning with PQ4R Method

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Abstract

The purpose of this research is to improve mathematics learning outcomes on line and angle material. This research including Quasi Experiments using True Experimental Design with Posttest-Only Control design. The subject of this research is a class VII student of MTs Swasta Tontonunu in the year 2017 which consists of the 2 classes each as class experiment and class control. The instrument used is a test instrument, sheet observation activity students, and sheets observation teacher activity in learning. Data analysis used the difference of two mean, namely the t-test of two independent samples was good assumption variance same or no, but previously tested the normal distribution using Kolmogorof Sminov. The results of the descriptive analysis showed that the mean posttest class experiment 78.76 19 higher than the mean posttest class control 73, 375. The results of the two- way difference test on mean show a significance value (2 tailed) $0.005 < (0.05)$ which means that the mean of the two posttests is significantly different. Based on the results of the study, it was concluded that the application of the learning model based on problem with PQ4R method can improve learning outcomes math on the subject discussion of lines and angles. This is possible because of learning based on problem started with introduce real everyday problems will more meaningful and moreeasy recognized by students. And through PQ4R, material on the subject discussion of lines and angles more many about fact will moreeasy understood in accordance steps preview, question, read, reflect, recite, and review.

Keywords: results learning, problem based learning, PQ4R.

A. Introduction

Lines and angles is one theory base in learning mathematics as base geometry. In life every day, lines and angles are very close relationship with determine slope and height things, as well making the roof of the house to be sturdy and beautiful. Lines and angles are also very important for determine distance and direction something position.

Even though tree discussion of lines and angles is dominant material about facts and concepts and not too involve complicated calculations , so that appear no so difficult n but based on a number of results study uncover that results learn on the material this still low on some student (Biber et al., 2013; Perawansa & Edy, 2018; Rosdianah et al., 2019). Research results (Biber et al., 2013) uncover that: (1) students notice appearance physique figure geometric just without consider nature geometric; (2) though they detect a number of nature geometric numbers, they fail link traits this with other knowledge required for settlement;(3) they generalize a property valid only for condition certain in different situations; (4) and they no fully understand draft parallelism on the subject angle.

Research results (Perawansa & Edy, 2018) find that: (1) students difficulty in understand connection between corners of interlocking lines intersect; (2) students difficulty identify the same angle on two parallel lines cut by a line; (3) students difficulty identify corner straighten so that no could count big corner with right. Temporary that study (Rosdianah et al., 2019) put forward that the difficulties experienced all student caused by low understanding concept.

Based on findings from results research, can drawn conclusion that difficulty students on the tree discussion of lines and angles students mean caused by understanding draft low student. Low understanding draft a little many could caused by the learning process. Selection of models and methods customized appropriate learning with desired goal achieved could influence understanding and power remember student to something concept.

Presentation Theory learning through something activity physique as well as mentally give something experience physically and mentally to students. Besides that meaningful learning also encourages student for have knowledge knowledge because feel need will knowledge the for help complete problem life every day. one approach learning that includes Thing the is learning based on problem.

Barrows defines learning based on problem as: resulting learning of working process going to understanding about solution something problem. The problem is first time met in the learning process (Barrett, 2017). Have a lot study about application learning based on problem as effective solution in achievement destination learning (Aripin, 2015; Ismail, 2018; Jumaisyaroh et al., 2014; Mustajab et al., 2020) good in increase results study nor ability level high.

Learning based on problem consist of 5 steps that is orientation problem, organizing student, investigation individual or group, develop and present results work, evaluate and analyze the solving process problem (Wulandari, 2016). In step 1 is the teacher introduces or serve problem to students. Selected problem is existing problem relationship with learned material. Besides that the selected problem must also be relate with problem daily students so that the material lesson the truly mean for studied for students. In orientation problem this , need existence activity directed for students so that students truly could understand problem , For that PQ4R strategy was chosen, namely: Previw , Questions, Read, Reflect, Recite, Review (Ginanjari et al., 2019; Widiyanthi et al., 2014).

Based on description the above problems, research this will apply learning based on problem with PQ4R method on class experiment for see is there difference results study student compared to with control class that uses learning conventional.

B. Literature Review

1. Learning based on Problem

Learning based on problem is learning begins with problem contextual and open , with characteristics as the following : (1) view constructivism , with formation understanding through assimilation and accommodation from problem presented, discussion in solve problems, and experiences think experienced mathematics; (2) learning student centered, with teacher as facilitator, motivator, and manager study. Interaction between students and teachers are prioritized; (3) focuses on linkage between discipline (Wulandari, 2016).

Problem contextual is existing problem relationship with problem life daily students. With lift problem like this student will more easy recognize and understand problem. Besides that could cultivate a sense of need will Theory the because it is very useful for could solve the problems encountered in daily students. Whereas problem open is possible problem solution or the answer more from one.

2. PQ4R

This PQ4R method started with (Preview) students read glance, step next (Question) students make question for herself alone, (Read) read by carefully for find answer from questions that have been formulated, which then (Reflect) students no enough remember or memorize, but most importantly is they try understand what have read it and connect with knowledge that has been is known previous next next (Recite) students requested for contemplating return information that has been studied , the last is (Review) student requested for make conclusion or essence from text reading. PQ4R fits perfectly used for understand problem for students and applied to step first learning based on problem.

C. Methodology

1. Research Design

This research is a quasi experimental research using True Experimental Design with Posttest-Only Control design. The subject of this research is a class VII student of VII MTs Swasta Tontonunu in 20-17 which consisted of 2 classes, namely VIIA and VIIB. Implementation study this will follow classes and schedules already. Through random class, obtained class VIIA as class experiment and class VIIB as class control. Research begins with preparation that is preparation of RPP and LKPD. Next implementation learning in the classroom, where class experiment get learning based on problem and PQ4R while control class got learning conventional. Each meeting observed its implementation. Each class, learning held as many as 4 meetings, 3 meetings implementation learning and 1 meeting implementation posttest. The design of this research can be seen in Table 1.

Table 1. One Group, Pre-test Post-test Designs

| Class Experiment | X | Post- test |
|------------------|---|------------|
| Class Control | - | Post- test |

Based on Table 1, class the experiment was given treatment that is get learning based on problem and PQ4R, whereas class control given given learning conventional, then second class given a posttest. The posttest results were analyzed and compared.

2. Instruments

The instrument used in this study was a test instrument, sheet observation activity students, and sheets teacher activity about implementation of the learning process. Instrument test totaling 5 items essay questions on line and angle material. Before used, instrument test this checked its validity and reliability.

3. Technique of Data Analysis

The posttest data in this study were analyzed descriptively to determine the mean value, maximum value, minimum value, and standard deviation. To find out whether the mean values are significantly different, a two-mean difference test is used, namely the t-test of two independent samples. Before the difference test is carried out, first the normality test is carried out using the Kolmogorof Smirnov test. If the data is normally distributed then the two independent sample t test is used. However, if the data are not normally distributed, then the difference test is performed using the Mann-Whitney U test. Prerequisite testing and hypothesis testing of this study were carried out with the help of SPSS26. While the result data observation activity students and teachers count with formula:

$$P = \frac{\text{skor perolehan}}{\text{skor ideal maksimum}} \times 100\%$$

Percentage implementation teacher and student activities both in the control class and class experiment categorized as according to Riduan (Kurniasari & Kusnan, 2018) in accordance Table 2.

Table 2 . Category Execution Learning

| Percentage | Category |
|------------|-----------|
| 81% - 100% | Very Good |
| 61% - 80% | Well |
| 41% - 60% | Enough |
| 21% - 40% | Bad |
| 0% - 20% | Very Bad |

D. Findings and Discussion

1. Findings

Posttest data analyzed by descriptive produce values as in Table 3.

Table 3 . Description Mean, Maximum Value, Minimum Value, and Standard Deviation

| Statistics | Control Class Posttest | Experiment Class Posttest |
|----------------|------------------------|---------------------------|
| n | 24 | 21 |
| mean | 73,3750 | 78.76 19 |
| Maximum | 87 | 90 |
| Minimum | 65 | 71 |
| Std. Deviation | 6,295 | 5,682 |

Based on Table 3, the mean posttest class experiment more tall than mean, but what is the mean significant, then carried out a different test two sample mean in pairs. However Previously, each pretest and posttest data was tested for normality of the data first. Kolmogorof Smirnov's test results can be seen in Table 4.

Table 4 . Posttest Data Normality

| | Kolmogorof Smirnov Sig |
|------------------|------------------------|
| Control Class | 0,200 |
| Experiment Class | 0,200 |

Based on Table 4, the results of the normal distribution test using Kolmogorof Smirnov, obtained that Sig value of both data > 0.05 indicates that class experiment and class control was normally distributed, so for different test two mean use t test two sample independent. T test results two sample in pairs shown in Table 5.

Table 5 . Independent Samples Test

| | Levene's Test for Equality of Variances | | t-Test for Equality of Means | | | |
|-----------------------------|---|-------|------------------------------|--------|-----------------|------------------|
| | F | Sig. | T | df | Sig. (2-tailed) | Mean Differences |
| Posttest | | | | | | |
| Equal variances assumed | 2,080 | 0.779 | 2,996 | 43 | 0.005 | -5.3869 |
| Equal Variances not assumed | | | 2.016 | 42,950 | 0.004 | -5.3869 |

Based on Table 5, obtained score sig. Levene's Test for Equality of Variances (0.77) > (0.05) means that the posttest data for the control class and the class experiment homogeneous. because of that taken t value is assumed value of t have the same variance, ie t=2,996. Seen value of sig. (2-tailed) ie (0.005) < (0.05) indicates that there is significant difference between posttest control class and class experiment. It can be seen that the Mean Differences are negative which indicates that there is a difference between the mean learning outcomes of the control class and the experimental class (73,3750- 78,7619) = -5,3869

Observation results implementation learning class control and class experiment shown in Table 6.

Table 6. Category Execution Learning

| Observation Results | Percentage | Category |
|---------------------|------------|-----------|
| Control Class | | |
| Student activities | 82.12% | Very Good |
| Teacher Activities | 92.87% | Very Good |
| Experiment | | |
| Activity student | 85.49% | Very Good |
| Teacher Activities | 94.12% | Very Good |

2. Discussion

Based on results analysis descriptive, obtained posttest mean score class experiment more tall than the control class. These two means are also different by significant. This thing show that results study student being taught with learning based on problem with PQ4R method, while class control given learning conventional. This thing possible because in learning based on problem, student introduced with a problem, then based on problem the they build the concept alone with teacher assistance as facilitator. In study this student build the concept alone. For example connection position angle formed of 2 intersecting lines, each given a name by student in accordance relationship with teacher's help, then the teacher offers proper name, and then agreed together in accordance true meaning. Become a student recognize term no with memorize it but term the appear from understanding students. Likewise about amount corner straighten up, students invited measure corner alone, then conclude hunungan straight angle. The teacher 's job as facilitator is prepare problems that can manipulated as object build draft math. Through PQ4R students required recognize the problem that is poured in sheet work. With teacher monitoring, students guided for to do read glance, make question for herself alone, reading by carefully for find answer from questions that have been formulated, connect with knowledge that has been is known before, pondering return information that has been studied, the last is student requested for make conclusion or essence from text reading.

Temporary it's on learning conventional teacher conveys material that has been so for understood by students. Delivery like this will push student for memorize material, so that if served different problem, students always wrong answer. In terms of the learning process, the mean implementation good control class and class experiments, teacher activities and students above 80 % so classified as very good.

E. Conclusion

Based on results research and discussion could concluded that the application of the learning model based on problem with PQ4R method can improve learning outcomes math on the subject discussion of lines and angles. This is possible because of learning based on problem started with introduce real everyday problems will more meaningful and more easy recognized by students so that step next easy followed by students. And through PQ4R, material on the subject discussion of lines and angles more many about fact will more easy understood in accordance steps preview, question, read, reflect, recite, and review.

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