ISSN:3026-0442

Proceedings of the 1st International Conference on Education, Science Technology And Health (ICONESTH 2023 Universitas Bina Bangsa Getsempena, Des 12-14, 2023, Banda Aceh, Indonesia)

THE APPLICATION OF PROBLEM-BASED LEARNING MODEL TO THE LEARNING OUTCOMES ON EXPONENT FUNCTION OF FIRST GRADE STUDENTS IN KRUENG BARONA JAYASENIOR HIGH SCHOOL

Rahmat Fitra[*1], Nurul Arieschа[2] Yuli Amalia[3]
[1,2,3] Getsempena Bina Bangsa University, Banda Aceh, Indonesia

** Corresponding email: rahmatfitrah@gmail.com*

ABSTRACT

The lack of teacher creativity in implementing learning results in low student learning outcomes. One way to improve student learning outcomes is to use a learning model that focuses on student activeness. This study aims to determine the effect of applying the Problem Based Learning learning model on student learning outcomes in exponent functions in first grade students at Krueng barona Jaya senior high school. The type of research used is quasi-experimental with Pretest Posttest Control Group Design. Sampling based on purposive sampling technique, obtained X1 class students (N = 24) as an experimental class that applies learning with Problem Based Learning model and X2 class students (N = 28) as a control class that applies conventional learning. Data collection techniques using observation, tests and documentation. Based on the results of the t-test analysis of two independent samples through the average value of the posttest of student learning outcomes, obtained t-count > t-table (4.49> 2.00). So it can be concluded that there is an effect of learning using the Problem Based Learning model on student learning outcomes on exponent function.

Keyword: Problem Based Learning, Learning Outcomes, Eksponent Function

INTRODUCTION

Schools are formal institutions that provide education in a systematic, organized, directed and planned manner. Teachers are one of the components of education. During the learning process, teachers help students develop their knowledge according to the subject they are studying. Mathematics is a very important science to master. Learning math is essential for building structural and logical thinking skills. Both the basic capital to improve human thinking and the basic things used to educate citizens.

Math learning outcomes are very important in a learning and teaching process because they can measure changes in the ability of cognitive, affective and psychomotor aspects achieved or mastered by students after participating in the learning process. Learning outcomes are often used to determine how far a person has mastered the material that has been taught in accordance with educational objectives. Likewise, math learning outcomes, this is because mathematics has many benefits in humans, because the way mathematical thinking is systematic, through regular and certain sequences. Low student learning outcomes are influenced by several factors, one of which is the level of understanding of student learning in the lesson. Teachers in learning activities can choose the model they want to use and involve students to play a more active role, so that in learning.

Low student math learning outcomes can be caused by various things, one of which is the lack of ability to think about the problems that exist in the learning process. In this regard, after the researchers observations at Krueng Barona Jaya senior high school, the situation that occurred during the learning process included: 1) the teacher is still dominant in learning, 2) students' desire and awareness to learn is still low, 3) students' concentration in participating in learning is low, 4) students' participation in participating in learning is still not visible, especially in doing exercise questions, students rarely ask questions even though the teacher often asks students to ask if there are things they don't understand, and students lack the courage to do problems in front of the class.

Then the results of discussions and sharing with mathematics teachers at Krueng Barona Jaya senior high school found that mathematics is considered a difficult subject to understand at the school. This can be seen from the 24 students of first grade at Krueng Barona Jaya senior high school, only 3 students scored above the minimum completion criteria, while the other scores were below the minimum completion criteria, the value set by the Mathematics teacher, which is 70. Some of the problems above will result in low student learning outcomes in the learning process, especially in mathematics.

One way to increase students' interest in learning and learning outcomes in mathematics is to apply a learning model that focuses on student activeness in learning. Among them, teachers can apply the Problem Based Learning (PBL) model or problem-based learning. This model puts students more self-learning, developing students in problem solving. Students are placed as learning subjects in the problem-based learning model, which aims to improve their ability, explain phenomena, and solve problems. In this model, the teacher functions as a guide and learning facilitator. This model teaches students to analyze and try to solve problems independently with the help of teachers or worksheets. In addition, the process of discovering ideas will give a deep impression to students, so that the ideas they learn will be embedded longer in their memories.

According to Siswono (2015), a problem-based learning model is a model that starts by posing a problem and then solving it. The problem-based learning model allows students to develop their thinking, not feel bored, and become more interested in learning. This model also allows students to discuss with each other and think critically about how to solve each problem they encounter. This allows students to show the critical side of their thinking and makes them more confident in their ideas. Students will learn to analyze and try to solve problems with this model.

Based on the description above, the researcher wants to examine the use of the Problem Based Learning model on mathematics learning outcomes on Exponent Function of first grade student at Krueng Barona Jaya senior high school in the 2023/2024 academic year.

METHOD

This research is a quasi-experimental study. The research design employed in this study is the pretest-posttest control group design. This research is a type of quasi-experiment research. The research design used in this study was pretest posttest control group design.

Table 1. ***Control Group Pretest-Postest Design***

Group	Pretest	Treatment	Posttest
Eksperiment	O_1	X	O_2
Control	O_1	-	O_2

The research population used in this study were first grade students of SMA Negeri 1 Krueng Barona Jaya. Sampling was done by purposive sampling technique. Purposive sampling is a sampling technique with certain considerations and obtained samples in this study class X_1 as an experimental

class that followed learning using the Problem Based Learning model and class X_1 as a class with a conventional model.

Data collection techniques used in this study include observation sheets which are used to observe the research object being observed. Then the test instrument by giving a pretest and posttest, which is a series of questions or exercises used to measure skills, knowledge, intelligence, abilities, or talents possessed by individuals or groups under study. Documentation is also needed to record the activities of students and teachers in the learning process in the form of written test results for each cycle conducted and photographs.

After the data is collected, then the data is analyzed. Data analysis techniques in this study were carried out with statistical calculations. The data obtained will be tested with t-test statistics at a significant level of 5% (α = 0.05). The normality test uses the chi-squared test, the normality test in this study was carried out for each group data from the experimental class and control class both pre-test and post-test by comparing x^2_{count} with x^2_{table} with a significant level $\alpha = 0{,}05$ and degree of freedom (dk) = k-1, with the test criteria rejecting H_0 if $x^2 \geq x^2_{(1-\alpha)(k-1)}$ and in other cases H_0 is accepted.

The homogeneity test used statistics as proposed by Sudjana by comparing the largest and smallest variance values. By using the homogeneity test criteria is if : : $F_{count} \leq F_{tabll}$ then H_o is accepted. To test the hypothesis using the equality test of the two averages of student learning outcomes using t-test statistics. The statistical formula for the t-test with the specified testing criteria is to accept H_0 if $t_{hitung} < t_{tabel}$ and reject H_1 in other cases.

H_0: $\mu_1 = \mu_2$: There is no effect of the Problem-Based Learning model on the learning outcomes of 10th-grade students at SMA Negeri 1 Krueng Barona Jaya.
H_1: $\mu_1 > \mu_2$: There is an effect of the Problem-Based Learning model on the learning outcomes of 10th-grade students at SMA Negeri 1 Krueng Barona Jaya.

The significance level for the independent sample test is set at 5% (α=0.05). The decision-making criteria are as follows:

1. If the significance value is < 0.05, then H_0 is rejected, and H_1 is accepted.
2. If the significance value is > 0.05, then H_0 is accepted, and H_1 is rejected.

The hypotheses to be tested in this study are as follows:

$H_0: \mu_1 = \mu_2$: There is no effect of the Problem Based Learning model on the learning outcomes of first grade students of Krueng Barona Jaya senior high school.

$H_1: \mu_1 > \mu_2$: There is an effect of the Problem Based Learning model on the learning outcomes of first grade students of Krueng Barona Jaya senior high school

The significance value of the independent sample test using the 5% level ($\alpha = 0{,}05$), then the decision-making criteria are as follows:

1) Significance value $< 0{,}05$ then H_o is rejected, H_1 is accepted

2) Significance value $> 0{,}05$ then H_o is accepted, H_1 is rejected.

RESULTS AND DISCUSSION

This research was conducted at Krueng Barona Jaya senior high school from August 15 to 18, 2023. Both classes were given an initial ability test before being given treatment (pretest). This is intended so that there is no difference in the two classes so that the two classes can be used, then given the final ability test after being given treatment (postest).

The experimental class was given learning treatment using the Problem Based Learning model. The syntax of the Problem Based Learning learning model used is with five learning steps, namely: (1) Orient students to the problem, (2) Organize students to learn, (3) Guide individual and group investigations, (4) Develop and present work and, (5) Analyze and evaluate the problem solving process. Meanwhile, the control class was given learning treatment using conventional learning where the learning stages, namely: 1) Preparation, 2) Presentation, 3) Correlation, 4) Concluding, 5) Applying. While the control class uses conventional learning where the control class is used as a comparison for the learning outcomes of the experimental class.

After learning by using the Problem Based Learning model in the experimental class and conventional learning in the control class, student learning outcomes were obtained which can be seen in Table 2.

Tabel 2. Rangkuman Skor Hasil Belajar

Result	Class	N	Avarage
Pre Test	Eksperiment	24	44,5
	Control	28	44,3
Post Test	**Eksperiment**	**24**	**84,3**
	Control	**28**	**70,8**

Table 2 shows the average test results of learning outcomes with experimental and control classes from pretest results are not significantly different and posttest results are significantly different.

After the normality test was carried out on the postest data, it was found that all postest data for both classes were normally distributed, namely 1.05 < 1.94, which means that the posttest data of the experimental and control class groups had homogeneous or equal data variants. Based on these results, the posttest data is normally distributed and homogeneous, so a two-sample t test is used to see the difference in learning outcomes after being given treatment in both classes.

Based on the average data of student learning outcomes in the control and experimental classes, it can be seen that there is a significant difference between the learning outcomes in the experimental class and the average in the control class. So that after calculating the hypothesis test for the difference between the two averages of student learning outcomes on the exponent function t_{count} = 4,49 dan t_{table} = 2,00, it was obtained t_{count} = 4.49 and t_{table} = 2.00, then $t_{count} > t_{table}$, namely 4.49 > 2.00, thus H_1 is accepted and H_0 is rejected. This means that the average learning outcomes on exponent function material in control classes that learn using conventional models and experimental classes that learn using Problem Based Learning models have significant differences. Based on the results of the hypothesis test, the difference between the two averages of learning outcomes in the control class and in the experimental class proves that the provision of different treatments in the control and experimental classes has an effect on the difference in student learning outcomes in the two classes.

CONCLUSIONS AND SUGGESTIONS

The research results indicate that students' learning outcomes in the topic of Exponential Functions using the Problem-Based Learning (PBL) instructional model are higher compared to those using conventional methods. The difference in outcomes between the experimental and control groups is attributed to the implementation of the Problem-Based Learning model in the experimental group. Therefore, it can be inferred that the Problem-Based Learning instructional model has a more positive impact on improving students' learning outcomes compared to the conventional model, particularly in the subject of exponential functions in the 10th grade at SMAN 1 Krueng Barona Jaya.

The results showed that student learning outcomes on Exponent Function material using the Problem Based Learning model were higher than learning outcomes using conventional methods. The difference in the results

obtained between the experimental class and the control class occurred because the Problem Based Learning learning model had been developed in the experimental class. Thus, it can be seen that the Problem Based Learning learning model provides a better influence in improving student learning outcomes compared to conventional models, especially in exponent function in first grade Krueng Barona Jaya senior high school.

ACKNOWLEDGEMENT

A heartfelt thank you goes to Nurul Ariescha for her invaluable assistance in the research and writing of this article. Additionally, I would like to express gratitude to SMA Negeri 1 Krueng Barona Jaya for granting permission for the research. Special thanks are also extended to the support system that contributed to the completion of this article, enabling it to be finished successfully.

A big thank you to Yuli Amalia and Nurul Ariescha who helped in the research of writing the article and also to Krueng Barona Jaya Senior High School for research permission. Thanks also to the support system that helped complete this article so that it could be completed properly.

REFERENCES

Agusmin, R., Nirwana, dan Rohadi, N., 2018, Peningkatan motivasi dan hasil belajar siswa dengan model problem based learning berbantuan simulasi phet di kelas XI IPA-C SMAN 6 Kota Bengkulu, *Jurnal Kumparan Fisika*, No. 2, Vol. 1, hal. 53-59.

Dakhi, A. S. (2020). Peningkatan hasil belajar siswa. *Jurnal Education and Development*, 8(2), 468–468. https://journal.ipts.ac.id/index.php/ED/article/view/1758

Djoko Santoso, dkk. Penerapan Model Pembelajaran Problem Based Learning Dengan Mengimplementasi Program Microsoft Excel Untuk Meningkatkan Keaktifan dan Hasil Belajar Mata Pelajaran Administrasi Kepegawaian di SMK Negeri 1 Surakarta. *Jurnal Informasi dan Komunikasi Administrasi Perkantoran.* Vol. 1. No. 1.November. 2016

Hastuti, A., Sahida, H., dan Gunawan, 2016, Pengaruh model PBL berbanrtuan media virtual terhadap kemampuan pemecahan masalah fisika, *Jurnal Pendidikan Fisika dan Teknologi*, No. 3, Vol. 2, hal.129-135

Mariati. (2021). *Penerapan model problem based learning (PBL) untuk meningkatkan hasil belajar siswa di SMA. Prosiding Seminar Nasional Universitas Jabal Ghafur*, 1(1), 170– 175. https://journal.unigha.ac.id/index.php/SemNas/article/view/353/370

Paradina, D., Connie., Medriati, R. (2019*) Pengaruh Model pembelajaran Problem Based Learning Terhadap Hasil Belajar Siswa Kelas X*. Jurnal Kumparan Fisika, Vol.2No.3,Desember2019,Hal.169-176

Saputro, O. A., & Rahayu, T. S. (2020). Perbedaan Pengaruh Penerapan Model Pembelajaran Project Based Learning (PJBL) dan Problem Based Learning (PBL) Berbantuan Media Monopoli terhadap Kemampuan Berpikir Kritis Siswa. *Jurnal Imiah Pendidikan dan Pembelajaran*, 4(1), 185-193.

Warimun, S. E., Arifah, A., dan Hamdani, D., 2016, Penerapan model problem based learning untuk meningkatkan kemampuan berfikir kritis siswa kelas X pada pokok bahasan suhu dan kalor di SMA Negeri 7 Kota Bengkulu, *Jurnal Pendidikan Eksata*, No. 1, Vol. 1, hal. 14-19

Yulianti, E., & Gunawan, I. (2019). Model pembelajaran problem based learning (PBL): Efeknya terhadap pemahaman konsep dan berpikir kritis. *Indonesian Journal of Science and Mathematics Education,* 2(3), 399–40