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The Effect Of Problem Based Learning Model Assisted By Animated Videos On Student Learning Outcomes In The Subject Matter Of Work And Energy for Class X SMA Negeri 11 Medan T.P. 2022/2023

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Abstract

This study aims to determine the effect of problem-based learning model assisted by animated videos on student learning outcomes in the subject matter of work and energy. This type of research is quasi-experimental with a two-group pretest-posttest design. The research population was all students of class X MIPA SMA Negeri 11 Medan T.P. 2022/2023 which consists of 7 classes. The sampling were taken by purposive sampling, the classes taken were class X MIPA 4 as the experimental class and class X MIPA 1 as the control class. The instrument used was a multiple-choice test of learning outcomes in the form of 20 questions and student activity observation sheets. The results showed that the average pretest scores for the experimental class and the control class were 36.83 and 33.83, respectively. The results of testing the hypothesis obtained $t_{count} < t_{table}$, namely 1.4191 <2.002 at the significance level $\alpha = 0.05$ and dk = 58, otherwise h0 is accepted or both classes have the same initial abilities. After implementation, the average post-test score obtained for the experimental class with problem-based learning was 76.8 and the control class with conventional learning was 56. The results of testing the hypothesis obtained t_{count} (6.35) > t_{table} (1.671) at the significance level $\alpha = 0.05$, it was stated that ha was accepted meaning there was a difference in student learning outcomes after being given the implementation of problem-based learning model assisted by animated videos on the subject matter of work and energy in class X SMA Negeri 11 Medan.

Keywords: Problem Based Learning, Learning Outcomes.

INTRODUCTION

The development of information and communication technology, or commonly known as science and technology, is currently growing rapidly, resulting in many changes to the education system in schools. Education in Indonesia at this time still applies a lot of conventional learning which is known to be out of date.According to Rohmani, Conventional learning is no longer interesting and relevant to students because it still places the teacher as the center of learning (Teachers Centered Learning), so that students do not play an active role in building knowledge, attitudes and behavior. Learning interactions between teachers and students are very important in the learning process.

Physics is considered difficult by most students. This cannot be separated from the many formulas that must be memorized for each material. Actually, the understanding of students who think physics requires memorization is wrong because, in fact, physics is a science that requires more understanding of concepts. The key to success in learning physics cannot be separated from our ability to master the concepts, laws and theories in physics that we can basically find in everyday life. Teachers should use learning methods and models that make students more active in learning.

However, the reality is that currently teachers tend to use conventional, monotonous learning models, namely the lecture method, and rarely do practicums because of the lack of learning support facilities and learning that is too teacher-centered. The use of a monotonous learning model and the lack of practicum activities have an impact on the low interest and motivation in learning of students, so that student learning outcomes experience a decrease.

One learning model that stimulates student activity is a problem-based learning model where this learning model will stimulate the enthusiasm of each student to be actively involved in the learning experience, and is an alternative learning model that allows the development of students' thinking skills (reasoning, communication and connection) in solving problems.

METHOD

The research population was students of SMA Negeri 11 Medan in class X for the 2022/2023 academic year, which consisted of 10 classes. Sampling of this study was carried out by purposive sampling. The experimental class is the class that is taught by applying the problem-based learning model assisted by video animation, namely class X MIPA 4, and the control class, which is taught by applying conventional learning, namely class X MIPA 1.

The instrument used is a test of student learning outcomes. The student learning outcomes test totaled twenty (20) questions in the form of multiple choice with five (5) options which had previously been validated by the results of the experts. This study involved two classes that were given different treatments. To find out the results of student physics learning is done by giving tests to both classes before and after being given treatment. The design of this study can be seen in table 1.

From the pre-test results obtained, a prerequisite test is carried out, namely the normality test to find out whether the data is normally distributed or not. After the data is normally distributed or not, then a homogeneous test is carried out to find out whether the data is homogeneous or not. After the data is normally distributed and also homogeneous, a two-party test (initial ability

test/pretest) will be used to determine the similarity of students' initial abilities in the two sample groups. Furthermore, if the two sample classes are known to have the same initial abilities, the two samples are given different treatments. The experimental class was given treatment with a problem-based learning model with the help of animated videos and the control class was given treatment using conventional learning. After being given the treatment, the next step is that the two classes are given a post-test.

Table 1. Two group research design (pretest and posttest)

Class	Pretest	Implementation	Postest
Eksperimental	T_1	X	T_2
Control	T_1	Y	T_2

To process the data in the post-test the same as in the pre-test, prerequisite tests were carried out, namely the normality test and the homogeneous test. After the data is normally distributed and homogeneous, a one-party test (final posttest ability test) will be used to find out whether student learning outcomes apply problem-based learning models to work and energy .

RESULTS AND DISCUSSION

Result

The research was conducted for three meetings. The data from this research are in the form of results student learning (pretest and posttest). Pretest is done before learning begins. Meanwhile, the post-test is carried out after the learning has been completed. The results of this study are that the average pretest value of the experimental class is and the average pretest value of the control class is . To see in detail the results of the pretest of the two classes are depicted in Figure 1.

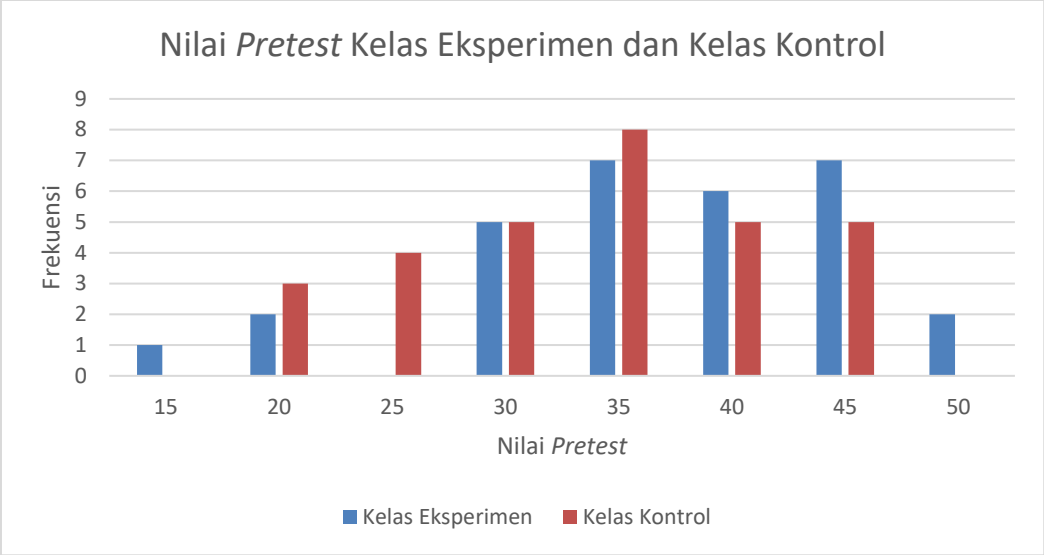

Figure 1. Comparison of class pretest data experiment and control

After being given different treatment, in the experimental class with problem-based learning models and the control class with conventional learning, it was found that the average post-test score for the experimental class was 77.8 and the average post-test score for the experimental class was 56. To see in detail the results of the post-test for both classes can be seen in Figure 2.

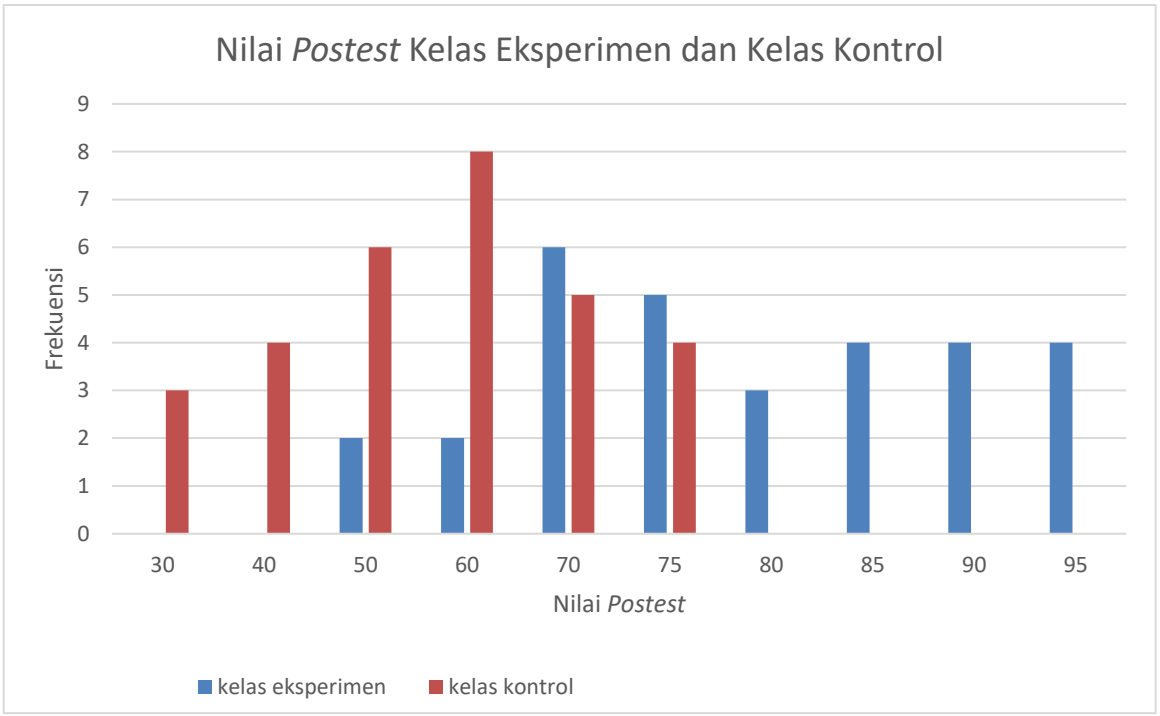

Figure 2. Comparison of class postest data experiment and control.

Hypothesis test calculations for post-test data were carried out with a one-party t-test. In summary, these calculations are presented in Table 2. It was found that there were differences in the effect of learning outcomes in the experimental class and the control class.

Table 2. Summary of post-test ability hypothesis calculations

Posttest Data	Average	t_{count}	t_{table}	Kesimpulan
Eksperimental Class	77,8	6,35	1,671	There is an effect on student learning outcomes
Control Class	56			

Discussion

This research was started by giving a pretest to both sample classes with a total of 20 questions in the form of multiple choice with five options. The results of the average pretest score of the experimental class students were 36.83 with a standard deviation of 8.65 and the average value of the control class was 33.8 with a standard deviation of 7.84. By doing the prerequisite test it is known that the pretest data is normally distributed and also homogeneous, then a two-party t test is then used and the results show that the students' initial abilities in both classes are the same.

Furthermore, after being treated in the experimental class with a problem-based learning model, while in the control class with conventional learning, the post-test was carried out and the learning outcomes increased with the average value of the experimental class being 77.8 and that of the control class being 56. By testing the hypothesis it was found that tcount = 6.35 and ttable = 1.671, it can be concluded that there is a significant difference between the scores of students in the experimental class and the control class.

The results showed that there were differences due to the effect of problem-based learning on student learning outcomes in the subject matter of Business and Energy in class X SMA Negeri 11 Medan in the 2022/2023 academic year.

CONCLUSION

Based on the results of data analysis carried out in this study, the following conclusions were obtained:

1. Student learning outcomes taught using a problem-based learning model assisted by video animation on business and energy materials in class X semester II SMA Negeri 11 Medan T.P. 2022/2023 has an average of 77.8.
2. Student learning outcomes taught using conventional learning on business and energy materials in class X semester II SMA Negeri 11 Medan T.P. 2022/2023 has an average of 56.
3. Based on the effect size results, it is included in the high category and the results of hypothesis testing show t_count ((6.35)> t_(table)(1.671), then H_o is rejected and H_a is accepted, which means that there is a significant difference in the problem-based learning model assisted by video animation on learning outcomes on work and energy material in class X semester II SMA Negeri 11 Medan T.P. 2022/2023.

ACKNOWLEDGMENTS

Researchers have several obstacles in conducting research as follows: 1) Researchers have not maximized time management so that all syntax is less effective when implementing the learning process. 2) Some students in the group are less active in helping in problem solving. 3) Some students do not prepare themselves before carrying out the learning process. Therefore, the researcher has several suggestions, namely:

1. For prospective teacher students or teachers who want to apply a problem-based learning model, it is better to pay attention to time efficiency for each phase in the problem-based learning model, especially the division of groups to carry out investigations.

2. For prospective teacher students or teachers who want to implement a problem-based learning model, it is best to ask for help and involve physics teachers at the school to guide and observe students during practical activities in group discussions.

3. Researchers have problems in providing practicum tools and materials, so prospective teacher students or teachers who want to do further research with the same learning model should prepare tools and materials as well as needs that support research so that research can run effectively.

BIBLIOGRAPHY

Anderson, L. W., & Krathwohl, D. R. (2015). Kerangka Landasan Untuk Pembelajaran, Pengajaran dan Asesmen. Yogyakarta: Pustaka Belajar.

Arends. (2008). Learning To Teach. Yogyakarta: Pustaka Belajar.

Arends, R. I. (2012). Learning To Teach. Yogyakarta: Pustaka Pelajar.

Arikunto, S. (2010). Prosedur penelitian : suatu pendekatan praktik. Jakarta: Rineka Cipta.

Arikunto, S. (2017). Dasar-dasar Evaluasi Pendidikan. Jakarta: Bumi Aksara.

Dewi, H.(2019). Penerapan Metode Problem Based Learning Untuk Meningkatkan Ketuntasan Belajar Fisika Berbantuan Evaluasi Quizizz Di Sekolah Bersistem Kredit Semester. JMP Online, 3(10), 1298–1313

Halmuniati, H., Riswandi, D., Zainuddin, Z., Asmin, L. O., & Isa, L. (2022). Efektivitas Media Pembelajaran Berbasis Video Animasi Terhadap Hasil Belajar Fisika. Jurnal IPA & Pembelajaran IPA, 6(4), 332–340. https://doi.org/10.24815/jipi.v6i4.27199

Hardianto, A., Syahidi, K., & Hizbi, T. (2020). Pengembangan Media Pembelajaran Fisika Interaktif Berbasis Macromedia Flash 8 Materi Gerak Lurus. In Kappa Journal (Vol. 4, Issue 1). Pendidikan Fisika FMIPA Universitas Hamzanwadi.

Helmiati. (2012). Model Pembelajaran. Yogyakarta: Aswaja Pressindo.

Husniati Ridwan, Y., Zuhdi, M., & Hairunnisyah Sahidu, dan. (2021). Pengembangan Media Pembelajaran Interaktif Berbasis Model Problem Based Learning Untuk Meningkatkan Kemampuan Berpikir Kreatif Fisika Siswa. 7(1).

Kanginan, M. (2013). Fisika Untuk SMA/MA Kelas X. Jakarta: Erlangga.

Lubis, S. (2018). Skripsi.Perbandingan Hasil Belajar Kimia Siswa SMA Dengan Menggunakan Kartu Soal Dan Macromedia Flash Melalui Pembelajaran Kooperatif Tipe STAD (Student Team Achievement Divisions) Pada Materi Hidrokarbon. Medan: FMIPA UNIMED.

Manalu, K. K., & Tampubolon, T. (2023). Penerapan Model Pembelajaran Problem Based Learning (PBL) Berbasis Daring (Dalam Jaringan) Untuk Meningkatkan Konsep Fisika Pada Materi Usaha Dan Energi DI SMA