
THE EFFECT OF PROBLEM BASED LEARNING ASSISTED BY FLIPBOOK ON STUDENTS' PHYSICS LEARNING OUTCOMES IN OPTICAL GEOMETRY MATERIAL

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Abstrak

Penelitian ini dilatarbelakangi oleh pembelajaran yang masih menggunakan model pembelajaran konvensional dan media yang kurang interaktif, sehingga peserta didik tidak mendapatkan hasil belajar yang maksimal. Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran berbasis masalah berbantuan media flipbook dalam meningkatkan hasil belajar siswa pada materi optik geometri. Jenis penelitian yang digunakan adalah Quasi Experiment. Berdasarkan hasil pengujian hipotesis menggunakan uji t yang diperoleh menggunakan IBM SPSS 26.00 didapatkan nilai signifikansi $0,001 < 0,05$. Hal ini menunjukkan bahwa terdapat pengaruh model pembelajaran berbasis masalah berbantuan media flipbook terhadap hasil belajar siswa pada materi optik geometri.

Kata Kunci: Model Pembelajaran berbasis masalah, Flipbook, Hasil Belajar

Abstract

This research is motivated by learning that still uses conventional learning models and less interactive media, so that students do not get maximum learning outcomes. This study aims to determine the effect of problem-based learning models assisted by flipbook media in improving student learning outcomes in geometric optics material. The type of research used is Quasi Experiment. Based on the results of hypothesis testing using the t-test obtained using IBM SPSS 26.00, a significance value of $0.001 < 0.05$ was obtained. This shows that there is an effect of problem-based learning models assisted by flipbook media on student learning outcomes in geometric optics material.

Keywords: Problem based learning model, Flipbook, Learning outcomes

1. Introduction

Education plays a major role in the development of a country. An important part of an education system is the selection of a learning model. Learning models currently be used is problem-based learning (Puteri, 2023). Problem based learning also allows students to exchange ideas, analyze problems in different ways, and think of opportunities to solve problems (Santia & Nurmayani, 2023). Students who use the problem-based learning model have higher learning results than those who use the traditional learning models (Harahap, 2019). Other studies on

problem-based learning models in education also support this, showing that using these models affects students' learning results in physics (Suindhia, 2023). Physics learning also cannot be said to be good because it is still memorization and does not develop the thinking process (Manurung, 2021).

Student learning results are impacted by the Problem Based Learning learning model (Sari et al., 2022). In order to accomplish learning objectives in the classroom, learning models are a crucial component of teaching and learning activities (Putri et al., 2021). Problem based learning models supported by learning media have an impact on student learning outcomes, especially in science subjects including physics (R. Rahayu et al., 2022). Problem based learning models assisted by media have proven to be effective and have an influence in improving students' physics learning outcomes (Almardiah, 2022). Media is any object used as a tool to convey information or learning in the form of audio, visual, or audiovisual (Suryani et al., 2018).

One of the interactive learning media that teachers can use in learning is flipbook. Flipbooks have several benefits, such as being portable, small, and simple to copy. They are also affordable, conserve paper when used as flipbooks, and may be utilized on portable electronic devices to accommodate students' learning needs (I. M. Rahayu, 2021). Flipbook is media that can display various formats, not only text but also images, videos, and audio can be inserted into them, making the learning process more interesting and effective (Lestari et al., 2022). The assist of flipbook media on the Problem Based Learning Model encourages students to take an active role in their education. It is anticipated that this approach will be engaging for students and influence their learning results (Utami et al., 2022). Research has demonstrated the enormous impact that flipbooks and problem-based learning have on enhancing student learning outcomes (Anjarsari et al., 2022).

The researcher is interested in carrying out research-based on the above description with the following title The Effect of Problem Based Learning Assisted by Flipbook on Students' Physics Learning Outcomes in Optical Geometry Material.

2. Method

The study was conducted at MAS Plus Al-Ulum Medan. Population of the study was all students of class XI IPA MAS Plus Al-Ulum Medan in the 2024/2025 academic year. The

sampling technique used a saturated or census sampling technique so that two class samples were obtained, there is the control class and the experimental class with a total sample of 71 people. The kind of study that is employed is Quasi Experiment.

This research was conducted in 3 stages: 1) Preparation stage, this stage is the initial stage that must be carried out before conducting research, namely researchers seek information by conducting observations at schools and providing questionnaires to students and conducting interviews with physics teachers related to problems that students are facing in learning physics. 2) Implementation stage, At this point, the researcher carried out a pretest in both classes, and provided different treatments during the learning process where the experimental class used a problem based learning model which assisted by flipbook media and the control class was given treatment using conventional learning, conducting a posttest in both classes, and collecting data. 3) The final stage of the research includes data processing activities to be further analyzed and interpreted according to theory.

This study uses two different kinds of variables., namely: 1) Independent variables, which are meant in this study is learning use a problem-based learning model which assisted by flipbook. 2) The dependent variables referred to in this research are student learning outcomes in optical geometry material. The data needed in this research are data on student learning outcomes in optical geometry material in class XI IPA MAS Plus Al-Ulum Medan. To obtain the data, a optical geometry learning outcome test was used composed of twenty multiple choice questions.

3. Result and Discussion

3.1 Research Result

This research is a quasi experimental research conducted at MAS Plus Al-Ulum Medan in the 2024/2025 academic year. The population taken was all students of class XI IPA, with a sample of class XI IPA 1 as many as 35 students, and XI IPA 2 as many as 36 students. Class XI IPA 1 was identified as the experimental class that received instruction using the Problem Based Learning paradigm based on the selection results. As the control group, Class XI IPA 2 was taught using conventional method.

Post-test Data Description

After being given different treatments to the two samples, the control group used conventional learning methods, while the experimental group used the Problem Based Learning model. There are differences the posttest results of the two classes in Table 1.

Table 1. Post-test Data Distribution

Data	Experiment	Control
$\sum n$	35	36
Amount	2835	2670
Average	81	76,11
Maximal	95	95
Minimal	65	55
Standar Deviation	7,15	9,64

The average value of the learning outcomes for the experimental class and the control class differed, according to the post-test data. The experimental class's average was 81, whereas the control class was 76.11. These findings suggest that, generally speaking, the experimental group outperformed the control group on the posttest; this discrepancy resulted from the different ways that the experimental and control classes were treated.

Post-test Normality Test

To ascertain whether or not the data is regularly distributed, a normality test is performed. Using SPSS software and the Shapiro-Wilk calculation, the data normalcy test tests the following hypothesis:

H_0 : Data distribution is normally distributed

H_a : Data distribution is not normally distributed

H_0 is allowed if $\text{sig.} > 0.05$, according to the testing criteria. Table 2 displays the findings of this study's normality test.

Table 2. Post-test Normality Test

Shapiro Wilk	Post-test	
	Group control	Group experiment
sig	0.406	0.067
α	0.05	0.05
Decision	Data is normally distributed	Data is normally distributed

The sig. value is determined using the Shapiro-Wilk normality test at a significance level of 5%, or 0.05. The conclusion that the sample is drawn from a regularly distributed population is reached by applying the normality hypothesis test's rules, which state that if $\text{sig.} > \alpha$ (0.05), then H_0 is accepted and H_a is rejected. According to Table 2, the experimental group's posttest normality test results indicate a sig. value of 0.067 ($\text{sig.} > 0.05$) while the control group's results show a sig. value of 0.406 ($\text{sig.} > 0.05$). Thus, the post-test results for both the experimental and control groups indicate that the data is normally distributed.

Post-test Hypothesis Test

To ascertain the impact of implementing a flipbook assisted problem-based learning model in the experimental class and a traditional learning model in the control class, the post-test hypothesis test employs a one tailed t-test. The following is the research hypothesis for the post-test:

H_0 : There is no difference in learning outcomes between the two sample classes

H_a : There is a difference in learning outcomes between the two sample classes

The testing criteria are H_0 is accepted if $\text{sig.} > 0.05$. The output of the hypothesis test in this study be able to see in Table 3.

Table 3. Post-test Hypothesis Test

	Post-test
Asymptotic significance (2-tailed)	0.001
α	0.05
Decision	H_a accepted

The sig. (2-tailed) value was derived from the hypothesis test using the t-test at a significance level of 5% or 0.05. The hypothesis test's rules, which state that if sig. (2-tailed) $> \alpha$ (0.05), then H_a is accepted and H_0 is rejected, were the basis for the judgment. There is a difference between the average pretest learning outcomes of students in the experimental group and those in the control group, as indicated by Table 3 results of the hypothesis test of the sig.(2-tailed) value of the posttest results, which are 0.001 (sig.(2-tailed) < 0.05).

3.2 Discussion

Based on hypothesis testing with a t-test at a significance stage of 5% or 0.05, the sig.(2-tailed) grade of the posttest results was obtained, namely 0.001 (sig.(2-tailed) < 0.05). Students in the experimental class scored an average posttest of 81, whereas students in the control class scored an average post-test of 76.11, indicating a substantial difference between the two types of pupils.

Due to the experimental class's usage of a problem-based learning approach using flipbooks, there was a difference in learning results between the experimental class and the control class. Students who used the problem-based learning model outperformed those who used the traditional learning approach in terms of their learning outcomes. This is consistent with research showing that using a problem-based learning strategy can enhance students' learning outcomes in physics (Robiyanto, 2021).

4. Conclusion

Using IBM SPSS 26.00, the t-test results showed a sig. (2-tailed) value with a significance value of $0.001 < 0.05$, indicating that the problem-based learning model with flipbook media on geometric optics material has an impact on students' learning outcomes in physics.

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