



Problem-Based Learning Model Using Oodlu Digital Media On Learning Outcomes

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ABSTRACT: This study aims to evaluate the effectiveness of using problem-based learning with Oodlu tools in enhancing the learning of IV students in natural sciences (science and general studies). A quantitative and qualitative approach is used in this research. A learning-based model is used in three learning sessions using Oodlu media to enhance student engagement and enhance learning. A comparative study was conducted with students from the study group (N=15) who received the Oodlu media-based problem-based learning model and the control group (N=15) who received the corresponding learning model. Data analysis showed significant differences in learning outcomes between the two groups. Significant improvements in learning outcomes were demonstrated for science students participating in the problem-based learning model and Audlemedia. The integration of Problem-Based Learning with Oodlu media has been proven to be effective in improving the intermediate learning outcomes (N-gain test). This confirms This means that the implementation of problem-based learning has a significant impact on the quality of learning of school children.

Keywords: Problem Based Learning, Oodlu, Learning Outcomes, IPAS

Abstrak: Penelitian ini, IV. Hal ini bertujuan untuk mengevaluasi Efektivitas penggunaan pembelajaran berbasis masalah dengan menggunakan perangkat Oodlu untuk meningkatkan hasil belajar sains (IPA dan ilmu pengetahuan umum) di kalangan siswa sekolah dasar. Penelitian ini menggunakan pendekatan kuantitatif dan kualitatif: model pembelajaran berbasis masalah diterapkan di tiga lingkungan belajar dengan menggunakan perangkat Oodlu untuk meningkatkan keterlibatan siswa dan meningkatkan kinerja. Studi perbandingan dilakukan antara dua kelompok siswa: kelompok eksperimen (N=15) yang menerima model pembelajaran berbasis masalah berbasis media Oodlu, dan kelompok kontrol (N=15) yang menggunakan model pembelajaran. Analisis data menunjukkan perbedaan yang signifikan dalam hasil pembelajaran antara kedua kelompok. Sebuah studi menunjukkan bahwa siswa yang berpartisipasi dalam pembelajaran berbasis masalah memiliki dan media Oodlu menunjukkan peningkatan keterampilan belajar sains dan teknologi yang signifikan. Integrasi model pembelajaran dengan media Oodlu terbukti efektif meningkatkan hasil belajar SMA (uji N-gain). Hal ini menegaskan bahwa penerapan pembelajaran berbasis masalah mempunyai dampak yang signifikan terhadap peningkatan belajar siswa.

Kata-kata Kunci: Problem Based Learning, Oodlu, Hasil Belajar, IPAS

ARTICLE HISTORY

Received July, 26, 2024

Revised Sept, 27, 2024

Accepted Oct, 30, 2024

Keywords : Problem Based Learning, Oodlu, Learning Outcomes, IPAS

Kata Kunci: Problem Based Learning, Oodlu, Hasil Belajar, IPAS

Doi: <http://doi.org>

Please cite this article in APA style as: Sulistiyawati, E. & Ruslinawati. (2024). Problem-Based Learning Model Using Oodlu Digital Media On Learning Outcomes

INTRODUCTION

Technological advances are not only felt by adults; elementary school-age children can now also experience the results of current technological developments. This, of course, also has an impact on the world of education, both in terms of infrastructure and content in the form of methods, models, strategies and approaches to learning. Therefore, there is a need for skilled and professional human resources such as educators and education staff. Because having skilled and professional educators and education staff will create quality education (Ngongo et al., 2019). A teacher in the modern technological age has to use digital technology to design creative, excellent, and diverse learning environments (Putri, 2022). In order to promote students' active participation in the acquisition of knowledge, attitudes, and more profound behavior, this will transform the teacher-centered learning process—which initially focused on the role of the teacher in the classroom—into student-centered learning (Angraini et al., 2017). Critical thinking, problem-solving, metacognition, communication, invention, creativity, teamwork, and literacy are among the 21st-century talents. These abilities may be attained via improving the standard of instruction, encouraging student participation, placing a strong emphasis on problem- or project-based learning, and making use of the right resources. The role of teachers is also vital in implementing 21st-century learning to create a better future for the nation's children (Zubaidah, 2016).

The accomplishment of student learning objectives and the growth of critical thinking abilities might be hampered by restrictions on creative teaching techniques and procedures. Students get disinterested in the learning process as a result of teachers' continued use of traditional teaching techniques and learning resources that they are unable to optimize, such as lectures (Alfianti & Hadiyanti, 2024). Using the Problem-Based Learning (PBL) model encourages innovations in the learning process, such as website-based applications. Website applications are currently widely used and are relevant to learning, so using website-based applications can be an alternative for overcoming learning problems teachers and students face (Subagja, 2022). This problem-based learning model is designed to involve students in problem-solving and encourage them to participate actively and think critically in learning (Saputra, 2016). The problem-based learning model reflects a 21st-century learning approach, where the syntax or steps in this model are based on characteristics that can support 21st-century skills. Students are free to develop new ideas based on problems that require creativity and critical thinking and find solutions to these problems; then, they are asked to communicate them for later evaluation and conclusions to be drawn (Setiawan, 2021).

One of the problems in science learning is that many teachers still use conventional or monotonous learning methods, which cause students to be less active and bored, resulting in low student learning outcomes (Ari & Wibawa, 2019). Teachers need help in determining learning models and methods that suit student characteristics. Teachers also face obstacles when using learning media components. This obstacle is caused by the fact that engaging media must be adapted to the characteristics of different students, and the material with the media must also be adapted (Suriani et al., 2022; Novita, et.al., 2024). This happens because teachers are not used to implementing innovative learning models in the learning process (Maghfiroh & Julianto, 2014).

Based on the initial observations at SDN Mangkubumen Kidul No. 16, carried out on May 22 2024, several problems were found in the learning process. Learning tends to be teacher-centred, while teachers still need to be fully active and creative in learning activities, so science learning outcomes in these schools are relatively low. Only five students—80 with an average score of nine—met the Minimum Completion Standards (KKM), according to the results of the class IV Mid-Semester Assessment (PTS). Ten

students who fell short of the KKM obtained an average score of six. The Mid-Semester Assessment (PTS) results indicate that 60% of pupils are still not at the KKM.

The use of the Problem-Based Learning model has been the subject of several scientific investigations, such as Febrita & Harni (2020). This paradigm enhances students' time processing, problem-identification, and summarization abilities. Through problem-solving from real-world experience gained through observation, questioning, attempting, reasoning, presenting, and producing, students are positioned as active thinkers in the Problem-based Learning paradigm. By employing the Problem-Based Learning methodology, students may enhance their abilities and comprehension. By teaching students to work in groups to solve issues, this method enhances their critical thinking abilities and learning objectives (Hasannah et al., 2021). The implementation of Problem-Based Learning includes several aspects, one of which is student-centred Learning, requiring students to be skilled and sensitive in solving problems in their social environment collaboratively. Students must understand ideas relevant to the problem, gain learning experiences related to problem-solving skills, and foster critical thinking patterns (Malikha, 2018).

Problem-based Learning is a student-centred learning model where problems are solved gradually in a scientific way so that students can gain an understanding of the problem (Mayasari et al., 2022). This learning model emphasizes collaborative Learning and allows students to solve a problem. Student actions to solve issues utilizing the abilities of recognizing, evaluating, producing, and presenting learning outcomes based on experience are the main focus of problem-based learning (Yuafian & Astuti, 2020). According to (Kurniawan et al., 2020), the teacher's job in problem-based learning is to provide an efficient and productive learning environment in addition to acting as a mediator and facilitator throughout the learning process.

Websites are a means that can facilitate and provide convenience in implementing an effective and efficient learning process. Through the website, teachers can provide lesson materials, assignments and assessments to help students learn and complete assignments (Hendrawati et al., 2021). Currently, many technologies based on website learning media can be used, one of which is Oodlu. Oodlu is a website that provides free game-based Learning to its users. Teachers can use this website by entering questions as questions from lessons that have been carried out first, then can explain to students how to use the website. Using the Oodlu website, students can answer questions while refreshing their minds because this website system is an assessment question interspersed with available games (Sari et al., 2023). Oodlu, as an innovative learning media, can be used by teachers to create questions, deliver material, create class groups, give prizes to students, and find out student learning outcomes (Rahayu, 2022).

Research by Nirwana et al. (2024) shows that applying the Problem-Based Learning learning model encourages innovations in utilizing the latest technology to support the learning process. This can be done using interactive media and game-based assessments, making Learning more fun and less tedious. This finding is supported by research by Kurniasih & Rusnilawati (2023), Yuniarsi & Sapri (2022), Nuralita et al. (2020), dan Dewi & Wulandari (2019) This shows the effectiveness of the Problem-Based Learning model in increasing student achievement. In addition, a study conducted by Wardani (2020) revealed that the implementation of the Problem-Based Learning model received very positive responses from students.

Further study is required to acquire complete results, even if prior research indicates that adopting the Problem-Based Learning learning paradigm effectively enhances student learning accomplishment. The usefulness of this model learning paradigm across a range of educational levels, learning media, and learning materials needs to be investigated in this study. Not the same. This study investigates the extent to which the Problem-Based Learning

learning paradigm influences the learning outcomes of primary school students using Oodlu media as instructional assistance. It is intended that this study will serve as a solid basis for future investigations into the use of Oodlu media in the Problem-Based Learning learning paradigm at various educational levels.

RESEARCH METHOD

This study combines experimental techniques with a quantitative methodology. Design or comparison of the control group and the method used. This method compares conditions in experimental and control groups, strengthening the validity of quasi-experiments. Aside from that, this study evaluates student learning results using pre- and post-test instruments in conjunction with the Learning approach, which is backed by Oodlu media.

The data used in this research were fourth-grade students at SDN Mangkubumen Kidul No. 16 in Surakarta, Central Java, which was chosen as the research sample. The experimental group's students were 15, and the control group was 15. The experimental group used Oodlu to implement this learning method, while the control group used PowerPoint media and learning models.

Pre-test and post-test methodologies form the basis of the data gathering strategy employed in this study. Multiple-choice questions are used in this study to assess student learning outcomes and verify their validity. Students in class IV at SDN Mangkubumen Kidul No. 16 were used to test the validity of this instrument. The table below, Table 1, displays the validity findings.

Table 1. Validity Test of Learning Outcome Instruments

No. Item	r_{count} Value	r_{table} Value $\alpha = 5\%$	Descriptions
1	0,421	0,374	Valid
2	0,211		Invalid
3	0,005		Invalid
4	0,586		Valid
5	0,427		Valid
6	0,496		Valid
7	0,543		Valid
8	0,455		Valid
9	0,543		Valid
10	0,213		Invalid
11	0,585		Valid
12	0,408		Valid
13	0,364		Invalid
14	0,089		Invalid
15	0,415		Valid

Based on the validity test results above, ten multiple-choice questions with a significance value > 0.374 were declared valid, and five other questions were declared invalid. Therefore, only valid instruments will be used in this research. Unauthorized materials will be removed from the survey. After completion of acceptance testing, the next step is to perform a reliability test on the device as shown in Table 2 below.

Table 2. Reliability Test of Learning Outcome Instruments

r_{count} Value	r_{table} Value $\alpha = 5\%$	Descriptions
0,564	0,374	Reliable

With the r_{table} The resulting value of the learning tool is 0.374, and Table 2 shows the Cronbach Alpha The reliability index of the test instrument was 0.564, indicating that it is reliable. Standard tests such as normality test and homogeneity test were used to analyze the data in this study. The Shapiro-Wilk test determines whether the data are normally distributed, is used to apply the data normalcy test. In the meanwhile, the homogeneity test determines the homogeneity of a sample by using the F test. The hypothesis about the learning results of class IV pupils was investigated through the utilization of Oodlu media and the Problem-Based Learning paradigm. With a significance level of 0.05, an N-gain test and a T-test were run to assess the efficacy of this learning model. SPSS version 26 was used for all statistical analyses.

1. Independent t-test

The means of two sets of unrelated data are compared using an independent t-test. Although it is not always necessary, it is ideal for this test to be conducted on normally distributed and homogenous data. The pre- and post-test data of the experimental class and the pre- and post-test data of the control class can be used to test the hypotheses because the data in this study meet the conditions for an independent t-test.

Pre-test independent t-test

H_0 = Prior to implementation, However, no significant difference was found in students' learning outcomes. In the problem-based learning model, multimedia is used in science and science learning in the 4th grade of primary school as opposed to implementing the contextual approach utilizing PowerPoint media. ($\mu_1 = \mu_2 = \mu_i = \mu_j$)

H_1 = Before implementation, there was a noticeable difference in the learning results of students while utilizing the Problem-Based Learning model with Oodlu media as opposed to the contextual model with PowerPoint media in science and scientific education for class IV primary schools.

Post-test independent t-test

H_0 = Before applying the problem-based learning model, there were no significant differences in student learning outcomes. using Oodlu media compared to applying the contextual model using PowerPoint media in science and scientific learning for class IV primary schools. ($\mu_1 = \mu_2 = \mu_i = \mu_j$)

H_1 = Prior to the implementation of the problem-based learning model, there were significant differences in student learning outcomes. using Oodlu media and the content-based learning model using PowerPoint media in 4th grade science education. ($\mu_i \neq \mu_j, i \neq j$)

2. Dependent t-test

Finding the average difference between two sets of related data is the goal of the dependent t-test. In order to investigate the following hypothesis, pre- and post-test data from the experimental class are analyzed in this test.

H_0 = There are no significant differences in student learning outcomes before applying the problem-based learning model using Oodlu media opposed to applying the contextual model using PowerPoint media in science and scientific learning for class IV primary schools. ($\mu_1 = \mu_2$)

H_1 = There were significant differences in student learning outcomes before the implementation of Oodlu's media-based learning model compared to PowerPoint media-based model in the classroom science lesson. ($\mu_i \neq \mu_j$)

3. n-gain Test

The researchers analyzed the scores obtained after the pre-test and post-test assessments. In this analysis, the n-test was used to determine the effectiveness of the treatment. (Ramadini et al., 2021).

$$N\text{-Gain} = \frac{S_{post} - S_{pre}}{S_{max} - S_{pre}}$$

N gain criteria:

$g > 0,7$ = High

$0,3 < g < 0,7$ = Medium

$g < 0,3$ = Low

FINDINGS AND DISCUSSION

The three phases of the study were pre-test, therapy and post-test. The pre-test was administered to experimental and control students groups to gauge their starting proficiency. The two groups were subsequently given different treatment after that. The experimental class used the Problem-Based Learning learning approach, which made use of Oodlu media, to conduct three sessions of learning on June 07–09, 2024. Activities for the introduction, middle, and end of each session are all included.

In the core learning activities, researchers apply Problem-Based Learning syntax, which consists of 5 stages as follows: (1) Student orientation to the problem: at this point, teachers urge students to comprehend and come up with solutions for the challenge they have been given. (2) Assigning assignments to students, they debate and collaborate to locate the information, resources, and equipment needed to address an issue. (3) Students are taught to undertake investigations (look for information, references, and sources) to provide topics for group discussions. This includes guiding both individual and group investigations. (4) Before presenting their work, students will build and present their group discussions to identify answers to the given difficulties. The outcomes will then be presented in the form of work. (5) After analyzing and assessing the problem-solving process, students and their groups present their findings and draw conclusions or summaries based on feedback from other groups.

In the first stage, students observe learning videos about real-life problems. Next, in the second stage, students discuss with their groups to complete the tasks on the worksheet. Students begin to carry out investigations at the stage of guiding individual and group investigations, and the teacher monitors student involvement during the investigation process. In the next stage, students begin to present the results of their project work. In the final stage, students and the teacher discuss group work results, draw conclusions, and reflect on the material they have studied.



Figure 1. Initial Activities

Figure 1 shows the initial learning stage, in which the teacher instructs students to watch videos related to real-life problems and then guides them to answer questions related to the video.



Figure 2. Group Activities

Figure 2 shows group activities where students work on projects given by the teacher. Students use worksheets and follow the teacher's workflow instructions.



Figure 3. Presenting Work Results

Figure 3 shows each group presenting and presenting the results of their work and other groups providing input.

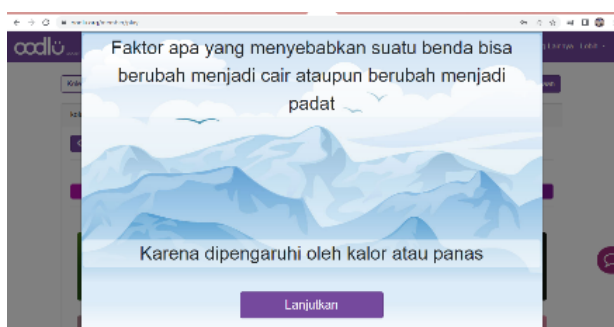


Figure 4. Oodlu Media

Figure 4 is a visual from Oodlu media. After learning while playing using Oodlu, students will draw conclusions from the material they have studied, then the teacher will review it to provide feedback.

Following the validity and reliability assessment of the research tool, the pre- and post-test data collection method was employed in this study. The experimental and control groups were then subjected to homogeneity and normalcy testing. The following are the outcomes of data processing with SPSS.

Table 3. Normality Test

Test Name	Group	Level of significance $\alpha = 0,05$	Significance Value
<i>Pre-test</i>	Experiment	0,05	0,047
	Control		0,140
<i>Post-test</i>	Experiment		0,139
	Control		0,064

The experimental and control groups' significant values in this table were 0.139 and 0.064 in the post-test and 0.047 and 0.140 in the pre-test, respectively. Given that this number is greater than 0.05, it may be concluded that the data is normally distributed.

Table 4. Homogeneity Test

Data 1	Data 2	Level of significance $\alpha = 0,05$	Significance Value
<i>Pre-test</i> Experiment	<i>Pre-test</i> Control	0,05	0,165
<i>Post-test</i> Experiment	<i>Post-test</i> Control		0,209
<i>Pre-test</i> Experiment	<i>Post-test</i> Experiment		0,210

Table 4's calculations demonstrate that the significance value is more than 0.05. This demonstrates the homogenous distribution of the data. Thus, using normally distributed and homogenous data, an independent t-test was performed, as indicated in Table 5.

Table 5. Independent T-Test for Pre-test Data

Sig. (2-tailed)	Level of significance (α)	Status
0.162	0.05	Ho accepted

The two-tailed significance level (Sig.) pre-test in Table 5 was $0.162 > 0.05$. This shows that the null hypothesis (H₁) is rejected and the null hypothesis (H₀) is accepted. Therefore, there is no significant difference in learning outcomes before using the problem-based learning model. Oodlu environment compared to the model using the PowerPoint environment in Grade IV of the primary school science course. The post-test data was then subjected to an independent t-test.

Table 6. Independent T-Test for Post-test Data

Sig. (2-tailed)	Level of significance (α)	Status
0.038	0.05	Ho rejected

The significance level (2-tailed) post-test for the data in Table 6 was $0.038 < 0.05$. This means the model for the use of PowerPoint media is strongly influenced by the adoption of problem-based learning methods using Oodlu media in science and science-related science in the fourth grades of primary schools.

Table 7. Dependent T-Test for Pre-test and Post-test Data

Sig. (2-tailed)	Level of significance (α)	Status
0.000	0.05	Ho rejected

This depends on the t-test giving a significant value. $0.000 < 0.05$ (2 tails). Therefore, the null hypothesis (H_0) is rejected and the hypothesis (H_1) is accepted. IV in primary schools. When using Oodlu media in classroom science education, learning outcomes are greatly affected when problem-based learning methods are used. The improvement in student outcomes before and after using this learning method is measured by the N-gain score.

Table 8. N-Gain Test (Post-test for Experimental and Control Group)

Nimber of Student	Average experimental post-test scores	Average control post-test scores	Highest Scores	N-Gain	Status
30	73.6	65.6	100	0.2753	Low

Table 8. N-Gain Test (Pre-test for Experimental Group)

Nimber of Student	Average experimental post-test scores	Average control post-test scores	Highest Scores	N-Gain	Status
30	67.7	73.6	100	0.6609	Medium

, the experimental and control groups' post-test values were 0.2753 ($g < 0.3$), included in the low category. In contrast to the contextual model via PowerPoint media, the Problem-Based Learning model shows better results. In the meanwhile, the experimental group's N-Gain value for the pre- and post-test data was 0.6609 ($0.30 < G \leq 0.70$), falling within the middle range. The learning outcomes for students are improved by the successfully used learning model, as this chart demonstrates.

Data study demonstrates that utilizing Oodlu media in conjunction with the Problem-Based Learning approach can enhance students' learning results in science and related topics in fourth-grade primary school. Both the control and experimental courses had similar learning outcomes during the pre-test phase.; this shows that students' initial skills in the two classes were identical. Previously, teachers used additional textbooks and less diverse learning models, causing student learning outcomes to be less than optimal. The problem-based learning model using Oodlu media is applied to the experimental class to provide more variations in learning models and reduce monotony. This increases students' active involvement through group investigations, making the learning process more effective and enjoyable.

This learning can stimulate students' interest in scientific problems, encourage scientific research, and increase students' sense of responsibility towards the environment (Asyhari & Hartati, 2015). In the 1990s, before technology developed as rapidly as it does today, educators often taught material monotonously. This can give rise to boredom in the learning process. To overcome these problems, teachers must develop new, innovative learning to create fun and exciting learning for students (Syifa, 2023). The success of the learning process will be maximized if the teacher can make students active and directly involved in learning so that learning will be more memorable (Kurniasih & Rusnilawati, 2023).

It has been shown that using Oodlu media in conjunction with the problem-based learning methodology helps pupils comprehend the material. According to this study, scientific learning results are significantly impacted when teachers and students use this

paradigm in an interactive way. The ability of the students in the experimental class to answer every question on the post-test demonstrates their active participation in the learning process and their growing capability. The opinion of Kurniasih & Rusnilawati (2023) states that The Problem-Based The learning learning model can be used as a practical learning solution because it engages students in interesting learning experiences and motivates them to solve problems in real-world situations. This impacts improving student learning outcomes in line with the opinion of Isma et al. (2021) The Problem-Based The learning learning model can be used as a practical learning solution because it engages students in interesting learning experiences and motivates them to solve problems in real-world situations. This impacts improving student learning outcomes in line with the opinion of Isma et al. (2021) that learner achievement in learning might be boosted by problem-based learning. Furthermore, this study methodology can boost pupils' potential for creative ideas, increase their engagement in the learning process, and support educators in meeting learning objectives.

Apart of that, Hadi (2021) also states that Problem-based learning methods should be applied to strengthen students' knowledge through problem solving, discovery and problem solving. Students need supporting media to improve learning outcomes, such as using interactive media containing educational games (R. Wulandari et al., 2017). his is in line with the opinion of Seftiana & Delia (2021) that learning through interactive games using the Oodlu web effectively improves student learning outcomes. Apart from that Swarjana (2022) Sari (2023) stated that using appropriate learning media can increase students' interest in learning. Teachers can use interactive multimedia learning media such as Serious Games, which are exciting and widely used in the digital era; one media type is Oodlu. The existence of game interludes inserted between questions on the Oodlu application or website indirectly trains intellectual intelligence, emotional intelligence and psychomotor skills. With the help of learning media, teachers can explain the learning material (A. P. Wulandari et al., 2023).

CONCLUSION

Students' learning results in elementary school can be effectively improved by combining Oodlu media with the problem-based learning approach. Oodlu media promotes learning activities and student engagement. The problem-based learning approach, on the other hand, encourages students to study on their own and use critical thinking to solve real-world issues. Students' academic achievement and enthusiasm to learn may rise as a result. In this study, There was a significant difference in students' learning results after using problem-based learning using Oodlu media of 73.6, while the control group's average posttest score was 65.6. This learning model's impact fell into the middle range.

This research's limitation is that it only focuses on science learning outcomes and has limited facilities and infrastructure, such as student learning devices. Future research should investigate other variables and alternative learning models to improve understanding and the quality of education. This research concludes that the Problem-Based Learning learning model using Oodlu media can be an alternative learning method to improve students' academic achievements.

The results of this research have important theoretical and practical implications. Choosing a problem-based learning model using Oodlu media has significantly improved learning outcomes compared to using a contextual learning model with PowerPoint. In addition, using appropriate learning media will increase students' enthusiasm for learning, contributing to good learning outcomes. These findings can be material for further research and development and discussion between teachers, students and parents to improve academic achievement.

ACKNOWLEDMENT

I want to thank my supervisor, Mrs. Rusnilawati, who accompanied me from beginning to end in writing this article. I would also like to thank my parents, siblings and friends, who have given me support and good wishes. I also express my deepest gratitude to the sources who provided helpful information for this research.

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