

Environment Based Ecosystem Thematic Teaching Materials: Using Problem Based Learning to Improve Learning Effectiveness

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ABSTRAK

Hasil belajar pada bahan ajar tematik ekosistem untuk siswa kelas V masih jauh dari kata memuaskan seperti yang ditargetkan. Pada pembelajaran tematik, guru masih menggunakan model konvensional dan belum menerapkan model pembelajaran yang sesuai untuk mata pelajaran tematik. Hal ini menyebabkan nilai rata-rata pada mata pelajaran tersebut masih sangat rendah. Tujuan penelitian ini adalah menganalisis keefektifan model Problem Based Learning terhadap hasil belajar siswa pada materi ekosistem tematik kelas V sekolah dasar. Jenis penelitian ini adalah kuantitatif dengan True Experimental Design di lingkungan sekolah. Penelitian ini terdiri dari Pre-test dan Post-test Control Group Design. Sampel yang diambil adalah 6 siswa kelas VA sebagai kelas eksperimen dan 6 siswa kelas VB sebagai kelas kontrol dengan menggunakan teknik simple random sampling. Hasil penelitian menunjukkan bahwa rata-rata nilai postes kelas eksperimen lebih tinggi yaitu pada kelas VA. Disimpulkan bahwa Model Pembelajaran Berbasis Masalah efektif terhadap hasil belajar siswa pada materi tematik ekosistem kelas V.

ABSTRACT

Learning outcomes in ecosystem thematic teaching materials for fifth grade students is far from satisfactory. In thematic learning, teachers still use conventional models and have not implemented appropriate learning models for thematic subjects, so the average score in these subjects is still very low. The purpose of this study was to analyze the effectiveness of the Problem Based Learning model for student learning outcomes in thematic ecosystem material for five grade primary school. This type of research is quantitative with True Experimental Design in the school environment. This study consist of Pre-test-Post-test Control Group Design. The samples taken were 6 VA class students as the experimental class and 6 VB class students as the control class using the simple random sampling technique. The results showed that the average post-test score for the experimental class was higher, namely in the VA class. It was concluded that the Problem Based Learning Model was effective on student learning outcomes in class V ecosystem thematic material.

1. INTRODUCTION

Education is an important asset for the progress of a nation. The greatness of a nation is always measured by the extent of the quality of education of its human resources. Education is an important asset in preparing human resources who have skills, so it is useful for the development of the nation, state and in preparing human resources to face the progress of the 21st century (Andrian & Rusman, 2019; Minsih, 2015; Susilo & Sarkowi, 2018). The greatness of a nation is always measured by the extent to which the quality of education of its human resources is wrong. Education itself can be interpreted as an effort to educate the nation, instill moral and religious values, grow personality, teach knowledge, train skills, provide guidance and direction (Gulo, 2022; Sutika, 2017). Education is useful for growing and developing all the potential possessed by every human being since he was born (S. A. Putri & Fathoni, 2022; Waldrip et al., 2010).

Learning is a system or process of learning and educating students that is planned and designed to be implemented and evaluated systematically so that students can achieve learning goals effectively

and efficiently (Lestari, 2019; Purwanti et al., 2022). Therefore, learning activities are directed to empower all prospective students to become expected competencies using a thematic approach. Thematic learning is a learning approach that integrates the competencies of various subjects into various themes. Integration is manifested in two things, namely: (1) integration of attitudes, skills, and knowledge in the learning process; and (2) integration of various related basic concepts. Themes are packaged in various concepts so that students do not learn the concept of knowledge/understanding separately. Therefore, learning can be meaningful and run intact (Perdana & Suswandari, 2021; Salsabila et al., 2022).

Thematic is a general concept that can gather several parts in one thing. Primary school student centered learning through thematic learning. Thematic learning is also learning that provides the role of educators as facilitators and makes students more active in every learning (Ananda & Fadhilaturrahmi, 2018; Nurhalisah, 2010). Thematic learning emphasizes more on the involvement of students in the learning process actively in the learning process. That way, assessment techniques in a thematic approach are categorized into three aspects, namely knowledge, attitudes and skills (Hidayah, 2015; Kuntoro & Wardani, 2020). To gain new experience and knowledge, thematic learning is focused on student activities. The development of curiosity, the use of materials, and being part of skills in everyday life will be gained from direct experience. Therefore, to create students who have skills in attitudes, knowledge, and skills, thematic learning is very important to be integrated for elementary / MI students.

The problem of learning outcomes is also an important issue. In this study, what is meant by learning outcomes is the ability obtained by students through learning activities. In another sense, learning outcomes are patterns of action, values, understanding, attitudes, rewards, and the ability to do (Hulu & Telaumbanua, 2022; Lase & Ndruru, 2022). In improving student learning outcomes, the role of teachers in classroom management is very important, teachers also act as facilitators, motivators, demonstrators, mediators, and evaluators (S.-H. Kim, 2022; Li, 2007). The point is how teachers always try so that students can be enthusiastic, happy and active in the teaching and learning process both by choosing the right approach, strategy, learning method, and appropriate learning media (Nurhalisah, 2010; Rahmawati & Utami, 2011; Wulandari et al., 2020). Thematic learning requires educators to be creative in choosing and developing each theme in learning. Teachers have the responsibility of designing learning programs in accordance with predetermined competencies (Minsih et al., 2021; Telaumbanua, 2022).

The problem faced now is the low learning outcomes of students in ecosystem thematic teaching materials in grade V students. In thematic learning, teachers still use conventional models and have not applied learning models that are suitable for thematic subjects. So the average score in these subjects is still very low. For this reason, the thing that can improve student learning outcomes is to apply the PBL learning method (Ding & Zhang, 2018; Kong et al., 2014). Problem-based learning (PBL) is an effective and highly efficient teaching approach that is widely applied in education systems in various countries with teaching models characterized by real problems as a context for students to learn critical thinking and problem-solving skills and acquire knowledge (Bridges, 2006; Zabit, 2010; Zarouk et al., 2020). Problem Based Learning (PBL) is used to support higher-order thinking (HOT) in problem-oriented situations, including learning "how to learn" (Boye & Agyei, 2023; Kanyesigye et al., 2022; Liu, Y., & Pasztor, 2022). The role of teachers in PBL is to ask problems, ask questions and facilitate inquiry and dialogue. Teachers should provide opportunities for students to improve their discovery skills and intelligence (Rahayuningsih & Jayanti, 2019; Ukobizaba et al., 2021).

In this PBL, the environment must be arranged in such a way that it is comfortable and open to exchange ideas. As in previous studies conducted the results of the study found that there was an influence of the PBL learning model on student activities and learning outcomes in integrated thematic learning in grade V elementary school (Novianti et al., 2020). This is also in line with research which results in the effect of using the PBL model on the cognitive ability of science in integrated thematic learning (Hasanah & Fitria, 2021). Teachers need to choose a learning model that can improve students' thematic learning outcomes, the learning model chosen by researchers is the PBL learning model.

Based on the above description, questions arise such as: is PBL more effective in improving student learning outcomes during the thematic learning process compared to conventional learning? So to answer this question, the author wants to test, analyse and describe the effectiveness of using PBL learning methods in improving student learning outcomes during the ecosystem-based thematic learning process. The aim of this study was to analyze the effectiveness of the Problem Based Learning model for student learning outcomes in thematic ecosystem material for five grade primary school.

2. METHOD

This study is adapted to the environment-based ecosystem of thematic teaching materials for the academic year 2022/2023. The research took place at State Primary School of 01 Pentur. The subjects in this study were grade V students of State Primary School of 01 Pentur with a total of 6 students and were receiving thematic material on environment-based ecosystems. This type of research is quasi-experimental research because the research subject has been determined (not random), where each subject has the same opportunity to be made a research subject. The research design used in this study was a non-equivalent control group design, using two classes, namely the experimental class (PBL model) and the control class (conventional model). Design of Study is describe in [Table 1](#).

Table 1. Design of Study

Class	Pre-test	Treatment	Post-test
Treatment	0	O_1	0
Control	0	X	0

Data collection techniques were obtained from the results of students' self-evaluation using written tests related to environment-based ecosystem thematic material with 15 questions. The instrument was validated by two experts. The instrument validation process was analyzed with Cohen's Kappa Inter-Raters and Cohen Validity Index by Aiken's Value. CVI validity results are obtained so that each point listed in the instrument is categorized as valid and can be used to measure student progress with learning outcomes. Thematic written test indicators of ecosystem materials is show in [Table 2](#).

Table 2. Thematic written test indicators of ecosystem materials

Aspects	Statement Number
Ecosystem Components	(1), (2), (3), (4), (16)
Relationships Between Living Things in Ecosystems	(6), (7), (9), (11), (13), (19)
Ecosystem Balance	(5), (8), (10), (12), (17), (20)
Analyse the relationship between ecosystem components and food webs in the surrounding environment	(14), (18), (15), (24), (25)

Data analysis techniques in this study with pre-test and post-test results were analysed in inferential statistical tests and descriptive statistical tests. Inferential statistical tests are used to see if the data constitutes a distribution of normality, the degree of homogeneity of the three sample classes and the average learning independence of the three sample classes. Descriptive statistical test with T-test is used to see the comparison of average learning outcomes of the two sample groups then continued processing using N-Gain Score to see whether Problem Based Learning (PBL) is effectively used. The statistical testing process was carried out using SPSS 16.0 software, and in determining the significance of statistical analysis received a confidence level of 95% with a margin of error of 5%.

3. RESULTS AND DISCUSSION

Results

Data on analytical skills in this study consisted of data on analytical abilities before (pre-test) and after (post-test) learning. Pre-test and post-test data analysis abilities are presented in [Table 3](#).

Table 3. Pre-test and Post-test Data

Data	Experiment		Control	
	Pre-Test	Post-test	Pre-Test	Post-test
Means	67.3	87.3	67.3	76
Std Deviation	2.52	2.52	2.52	3.05
Minimum Value	65	85	65	70
Maximum Value	70	90	70	76

In the [Table 3](#) it can be seen that the average in the experimental class and control class before being given treatment produced the same average of 67.3, with the experimental group having a minimum value of 65 and a maximum value of 70. After being given treatment, the average became 87.3 with a

minimum value of 85 and the maximum value is 90. As for the control class, the average after the post-test is 76 with a minimum value of 70 and a maximum value of 76. The result of normality test is show in [Table 4](#).

Table 4. Results of the Shapiro Wilk Normality Test Data Pre-test and Post-test

Group	Statistics	Sig	Criteria
PreExperimental Group test	0987	0.78	Normal
Posttttest Experimental group	0987	0.78	Normal
Precontrol group test	0987	0.78	Normal
Posttttest Control Group	0.964	0.637	Normal

Based on the results of the data normality test summarized in [Table 4](#), at a significance level of 5% the Lmax value for each group is less than 0.05 so that it can be concluded that each group comes from a normally distributed population. The result of homogeneity test is show in [Table 5](#).

Table 5. Pre-test and Post-test Data Homogeneity Test Results

Activity	Group	Statistics	Sig	Criteria
Pre-test	Experiment Group	0.00	1	Homogeneous
	Control Group			
Post-test	Experiment Group	0.168	0.703	Homogeneous
	Control Group			

[Table 5](#) shows that the Sig. from the homogeneity test the pre-test and post-test data both showed more than 0.05, namely the pre-test data showed a Sig value. $1 > 0.05$ so that it can be concluded that the pre-test data between the experimental group and the control group are homogeneous. While the post-test shows the value of Sig. 0.703 so that the post-test data between the experimental group and the control group are homogeneous. It can be concluded that the data obtained are normally distributed and homogeneous and can be continued to test the hypothesis to see whether there is a difference between the experimental group and the control group. The T test result is show in [Table 6](#).

Table 6. Learning Outcomes T Test Results

	t	Df	Sig. (2-tailed)	Mean Differences	Std. Error Difference
Equal Variances Assumed	6.126	4	0.004	14	2.285

Based on the acquisition of the data above as show in [Table 6](#), the value of Sig. (2-tailed) of 0.004 or less than 0.05, and the average value of the difference are 14. From this it can be concluded that the alternative hypothesis (H_1) is accepted, and the null hypothesis (H_0) is rejected, meaning that there is an effect of using the PBL model on student learning outcomes in environment-based ecosystem thematic teaching materials. The existence of treatment in the experimental class, namely by using the Problem Based Learning model shows an increase in student learning outcomes after receiving a learning experience with the Problem Based Learning model. In the next stage, the N-Gain Score is calculated with the aim of seeing whether the PBL learning method is effective or not. The gain score is show in [Table 7](#).

Table 7. Gain Score

Class	Gain Score		
	Means	Minimum	Maximal
Experiment	61.16	56.67	69.7
Control	18.30	13.33	27.27

In [Table 7](#), it shows that the average N-Gain score for the Experiment class or PBL method is 61.16 or 62% which is included in the effective enough category. With a minimum N-Gain Score of 56.67% and a maximum of 69.7%. Meanwhile, the average N-Gain Score for the control class or the conventional method is 18.30 or 18.3%, which is included in the ineffective category. With a minimum N-Gain Score of 20% and a maximum of 39.4%.

Discussion

The acquisition of the data obtained, and then calculated the completeness of students, both individual and classical mastery. Hypothesis 1 (H_1) is to see significant differences in student learning outcomes from both sample classes. based on Table 4 the value of Sig. 0.004 which means the value of Sig. is below 0.05 so it is rejected H_0 and accepted H_1 . So, it can be concluded that there are significant differences related to student learning outcomes in the thematic material of the ecosystem. There is a significant difference in this study, namely in the learning outcomes of students using conventional models in control classes with Problem Based Learning models in experimental classes from an initial average of 67.3 then increased to 87.3. So it can be said that the Problem Based Learning model used by researchers is proven to be able to improve student learning outcomes.

According to previous study the implementation of PBL in learning affects student learning outcomes (Kaharuddin, 2018). This statement supported by other study that state PBL learning can enhance learning and teaching (Boye & Agyei, 2022). This is in line with (Kong et al., 2014; Mislal & Mawardi, 2020; Triningsih & Mawardi, 2020). The use of PBL learning can improve students' critical thinking and can improve student learning outcomes. This is because the Problem Based Learning learning model is a learning model based on the principle of using problems as a point of acquisition and integration of new knowledge (T. K. Kim, 2017; Ulya et al., 2014). The results of this study are also supported by previous research that the PBL model has a significant effect on student learning outcomes in integrated thematic learning in grade V of SDN 35 Parak Karakah (Astuti et al., 2022; Handayani & Muhammadiyah, 2020). Another study also obtained the same results that there is a significant influence of the PBL model on the learning outcomes of integrated thematic learning in grade IV of SDN 09 Pasaman (J. E. Putri & Zainil, 2021). In line with previous study which states that there is a positive influence of the application of the PBL model on learning outcomes in thematic learning of grade V students of SDN 24 Batangase Maros (Nurhaedah & Suarlin, 2022).

Therefore, the Problem Based Learning learning model creates activities that stimulate student curiosity, namely by providing problems related to students' daily lives, group work, making works or reports and presenting them. With these activities, the Problem Based Learning model is preferred by students so that students are more motivated to follow the learning process. In addition to having advantages, the Problem Based Learning learning model also has weaknesses, namely when students have no intention or do not have confidence that the problem, they learn difficult to solve.

The implications of this study prove that PBL (Problem-Based Learning) can increase the effectiveness of learning in the context of environmental ecosystem themes. In addition, through this research it is also known that the use of thematic learning materials based on the environment can help students understand the concept of ecology better. However, this research also has limitations. This research was only conducted in the context of environmental ecosystem themes, so the research results cannot be generalized to different learning contexts. In addition, the use of case study research methods can limit the representativeness of research findings and the interpretation of conclusions. Therefore, it is hoped that future research will be able to conduct similar research by considering the shortcomings of this study.

4. CONCLUSION

Based on the results of analysis, data processing and discussion, researchers can draw conclusions that there is an influence of the use of PBL models on student learning outcomes in ecosystem-based thematic teaching materials. And the use of Problem Based Learning (PBL) learning methods is quite effective in improving student learning outcomes on environment-based ecosystem thematic materials. Therefore, further improvements can be made by evaluating the existing constraints and conducting limited trials to see the level of practicality. It is hoped that the results of this research can contribute to providing alternative solutions for elementary school education practitioners to improve student learning outcomes in the material ecosystem.

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