Bioeduca: Journal of Biology Education
http://journal.walisongo.ac.id/index.php/bioeduca
ISSN 2714-8009 (*print*), 2715-7490 *(online)*

Volume 6, Nomor 2, Tahun 2024
Hal. 109 – 124

The Influence of PBL-Based Worksheets on Interest and Learning Outcomes

Tri Wulansari[1], Muhammad Iqbal Filayani[2]
Program Studi Tadris Biologi, Fakultas Tarbiyah dan Ilmu Keguruan,
Universitas Islam Negeri Sayyid Ali Rahmatullah Tulungagung
*Email : Wulan280502@gmail.com

Article Information
Submitted: 02 – 02 – 2024
Received: 30 – 08 – 2024
Published: 30 – 09 – 2024

ABSTRAK

Penelitian ini dilatarbelakangi oleh kesulitan peserta didik dalam memahami materi yang diajarkan, proses pembelajaran yang cenderung membosankan, dan masih menggunakan bahan ajar kovensional. Penelitian ini bertujuan untuk mengetahui pengaruh penggunaan LKPD berbasis PBL pada materi pencemaran lingkungan terhadap minat dan hasil belajar siswa. Penelitian ini merupakan penelitian kuantitatif dengan Jenis penelitiannya *quasi experimental*. Metode pengumpulan data pada penelitian ini adalah angket, tes, dan dokumentasi. Uji coba kevalidan dilakukan oleh dosen ahli materi dan ahli media. Teknik analisis data yang digunakan yaitu analisis deskriptif kuantitatif . Hasil penelitian menunjukkan bahwa ada pengaruh yang positif dan signifikan antara penggunaan LKPD berbasis PBL dengan minat dan hasil belajar. Hal ini berdasarkan hasil uji manova menggunakan hasil angket dan nilai N-Gain yang diperoleh nilai Sig. (2-tailed) adalah 0,000. Berdasarkan kriteria pengambilan keputusan 0,000 < 0,05 maka H_0 ditolak dan H_a diterima, sehingga ada pengaruh penggunaan LKPD berbasis PBL dengan minat dan hasil belajar.

Kata kunci: Hasil Belajar, LKPD, Minat Belajar.

Publisher
Departement of Biology Education, Fakulcty of Science and Technology, UIN Walisongo Semarang

ABSTRACT

This research is motivated by students' difficulty in understanding taught material, the tendency of learning processes to be boring, and the continued use of conventional teaching materials. The aim of this study is to determine the influence of using PBL-based worksheets on students' interest and learning outcomes. This research is quantitative in nature with a quasi-experimental design. Data collection methods in this study include questionnaires, tests, and documentation. The validity test was conducted by subject matter experts and media experts. The data analysis technique used is quantitative descriptive analysis. The results show that there is a positive and significant influence between the use of PBL-based worksheets and interest and learning outcomes. This is based on the results of MANOVA tests using questionnaire results and N-Gain values, which obtained a Sig. (2-tailed) value of 0.000, indicating an influence of using PBL-based worksheets on interest and learning outcomes.

Keywords: *Learning Interest, Learning Outcomes, Worksheets.*

Copyright ©Year, **Bioeduca: Journal of Biology Education**

INTRODUCTION

The education process in schools is greatly determined by the learning process. The success in achieving learning goals is highly influenced by the learning process perceived by students (Nurmahudina, 2019). Based on the Merdeka Curriculum, there is freedom to use teaching materials that are suitable for students' needs. Teaching materials are one of the essential elements in the teaching and learning process (Wahyuni, 2022). The selection of appropriate teaching materials can support the achievement of learning objectives. Besides teaching materials, another aspect to consider for obtaining desired learning outcomes is the presence of engaging learning models.

Problem-Based Learning (PBL) is one of the learning models that teachers can choose during the learning process. Problem-Based Learning is an approach that uses real-world problems as a foundation for students' learning process (Fauzia, 2018). In using this learning model, students are encouraged to identify real environmental problems, analyze information, collaborate in finding solutions, and present their findings. This can enhance students' learning interest and reinforce their understanding of concepts.

Previous research conducted by Sujarwo on "Analysis of Problem-Based Learning Based Worksheets (LKPD) on Student Learning Outcomes" proved that the utilization of PBL-based LKPD as teaching material had a positive impact on improving learning outcomes (Sujarwo, 2021). Similarly, previous research by Ummah et al. on "Development of Global Warming Material-Based Problem-Based Learning Worksheets Integrated with Values to Improve Student Learning Outcomes" showed that PBL-based LKPD integrated with values was suitable for supporting learning modules on global warming (Ummah, 2018).

Based on observations conducted by researchers at SMPN 3 Kedungwaru, the current learning process still relies on conventional teaching materials, with teacher-centered and unidirectional approaches, which lack student involvement. As a result, students face difficulties in understanding the concepts or materials on environmental pollution taught, and the learning process tends to be dull. In SMPN 3 Kedungwaru, science teachers still often assign individual problem-solving tasks found in worksheets or textbooks. This leads to a lack of practice for students in developing problem-solving skills and applying learning concepts to real-world situations. Based on the researchers' observations, there is a need for a change in teaching materials to make them more engaging and enjoyable for students. The goal is to increase student interest in learning and improve learning outcomes.

METHODS

This research utilizes a quantitative approach. The quantitative approach is a research method conducted using deductive reasoning, starting from a theoretical framework, experts' ideas, or the researcher's understanding based on experience,

which is then developed into problem statements along with proposed solutions to obtain justification in the form of empirical data support in the field (Tanzeh, 2009). The experimental method employed in this research is quasi-experimental research, aiming to identify the effects of the treatment applied in the study. The experimental design used is the nonequivalent control group design, which is similar to the pretest-posttest control group design, but the experimental and control groups are not randomly selected. Both groups then undergo pre-tests to assess initial abilities and post-tests to assess the effects of treatment and final conditions. According to Sugiyono (2011: 116), the scheme of nonequivalent control group design can be depicted as shown in Table 1.

Table 1 Research Design, Nonequivalent Control Group Design

O_1	X	O_2
O_3	-	O_4

(Source: Sugiyono, 2011)

The data collection methods in this research include questionnaires, tests, and documentation. Questionnaires are used to obtain data on students' learning interests. Tests are used to obtain data on students' learning outcomes, while documentation is used to obtain documentation of activities in seventh-grade classes as the research sample. The test method employed in this research is pre-test and post-test. The research was conducted from February 1st to February 29th, 2024. The research took place at SMPN 3 Kedungwaru. The researcher used the N-Gain test to identify differences in learning outcomes improvement. Research using the average G-normalized gain of each group has shown the influence of increasing the capacity of each group (Wahab, 2021). The N-gain formula according to Lestari Karunia Eka & Mokhammad Ridwan Yudhanegara (2017:235)

$$Normal\ Gain = \frac{skor\ post\ test - skor\ pre\ test}{skor\ ideal - skor\ pre\ test}$$

Table 2 Criteria for N-Gain Level.

Average	Criteria
g > 0,7	High
0,3 ≤ g 0,7	Medium
0 < g < 0,3	Low
g ≤ 0	Failed

(Source: Lestari, 2017)

Data analysis in quantitative research involves three types of tests: validity tests, reliability tests, and prerequisite tests. Validity tests are conducted to evaluate the validity of an instrument, focusing on the instrument's quality in measuring

abilities. Validity is measured by seeking contributions from experts, such as relevant professors or teachers, to validate the test questions and interest questionnaires to be used. The next step is the reliability test of the instrument. An instrument is considered reliable if it provides consistent results when tested on the same group at different times. Reliability testing uses the Alpha Cronbach technique, and the result is interpreted as reliable if the coefficient (r11) < 0.6. This process also involves the use of SPSS 25 software for Windows to support data reliability analysis. According to Arikunto 2006, the Criteria for Instrument Reliability Correlation Index are as follows:

Table 3 Criteria for Instrument Reliability Correlation Index.

Correlation Value	Interpretation
0,800 – 1,000	Very reliable
0,600 – 0,779	Reliable
0,400 – 0,599	Quite reliable
0,200 – 0,399	Somewhat reliable
0,000 – 0,199	Not reliable

(Source: Arikunto, 2006)

The next step is to conduct prerequisite tests. Firstly, a normality test is conducted to determine whether the sample data comes from a population with a normal distribution. If the data is proven to have a normal distribution, the research can proceed to parametric tests; otherwise, if not, the research can switch to non-parametric statistical tests. The normality test results are interpreted based on the significance value, where a significance value > 0.05 indicates that the data is considered normal, while a significance value < 0.05 indicates data abnormality. Next, a homogeneity test is conducted to determine whether the homogeneity assumption is fulfilled in each category. If the homogeneity prerequisite is met, the research can proceed to the next data analysis stage. Data variance is considered homogeneous if p > 0.05, while non-homogeneity is indicated if p < 0.05. The homogeneity test also uses SPSS 23 software for Windows.

If the prerequisite tests are met, hypothesis testing can be conducted. Hypothesis testing is carried out to evaluate the influence of using PBL-based worksheets on students' interests and learning outcomes. The researcher applies t-tests to determine students' learning interests and t-tests to determine learning outcomes, as well as MANOVA analysis to determine the influence of using PBL-based worksheets on students' interests and learning outcomes. MANOVA tests analyze more than one dependent variable and allow one or more independent variables.

RESULTS AND DISCUSSIONS

This research involved 62 students as samples, with 31 students from class VII F as the experimental group and 31 students from class VII B as the control group. Before testing on students, researchers need to validate each research item. This aims to evaluate the validity of these items. In this study, validation was carried out by two experts, namely lecturers from the State Islamic University Sayyid Ali Rahmatullah Tulungagung, Mr. Nanang Purwanto M.Pd. and Mrs. Dr. Eni Setyowati, S. Pd., MM. Based on this validation, it can be concluded that the questionnaire and test are feasible and can be used in the study with some improvements. Here is the general assessment table from the experts.

Table 4. Validation Test by Experts

	Validator 1			Validator 2		
	Questionnaire	**Test**	**Media**	**Questionnaire**	**Test**	**Media**
Result	83%	86%	86%	81%	78%	82%
Average	80%			85%		
Percentage	61% - 80%			81% - 100%		
Conclusion	Valid			Very Valid		

Based on the table above, it can be seen that the average value by validator 1 is 80%, while by validator 2 is 85%. This indicates that the questionnaire, items, and media evaluated by both validators are considered valid and very valid. After obtaining validation from experts, the researcher used 25 statements in the questionnaire, 20 multiple-choice questions, and 5 essay questions covering the indicators that students must achieve. These instruments were piloted on 27 students from class VIII-E who had studied environmental pollution material. The results of the pilot test have been used as data and can be seen in table:

Table.5 Results of the Validity Test of the Interest Questionnaire

NO	Rhitung	Rtabel	Sig.	Criteria	Remark
1.	0.651	0.3809	0.000	r hitung > r tabel = valid	Valid
2.	0.707	0.3809	0.000	r hitung > r tabel = valid	Valid
3.	0.688	0.3809	0.000	r hitung > r tabel = valid	Valid
4.	0.765	0.3809	0.000	r hitung > r tabel = valid	Valid
5.	0.729	0.3809	0.000	r hitung > r tabel = valid	Valid
6.	0.770	0.3809	0.000	r hitung > r tabel = valid	Valid
7.	0.779	0.3809	0.000	r hitung > r tabel = valid	Valid
8.	0.624	0.3809	0.000	r hitung > r tabel = valid	Valid
9.	0.721	0.3809	0.000	r hitung > r tabel = valid	Valid
10.	0.760	0.3809	0.000	r hitung > r tabel = valid	Valid
11.	0.644	0.3809	0.000	r hitung > r tabel = valid	Valid
12.	0.693	0.3809	0.000	r hitung > r tabel = valid	Valid
13.	0.766	0.3809	0.000	r hitung > r tabel = valid	Valid

14.	0.808	0.3809	0.000	r hitung > r tabel = valid	Valid
15.	0.814	0.3809	0.000	r hitung > r tabel = valid	Valid
16.	0.716	0.3809	0.000	r hitung > r tabel = valid	Valid
17.	0.816	0.3809	0.000	r hitung > r tabel = valid	Valid
18.	0.585	0.3809	0.001	r hitung > r tabel = valid	Valid
19.	0.674	0.3809	0.000	r hitung > r tabel = valid	Valid
20.	0.653	0.3809	0.000	r hitung > r tabel = valid	Valid
21.	0.682	0.3809	0.000	r hitung > r tabel = valid	Valid
22.	0.534	0.3809	0.003	r hitung > r tabel = valid	Valid
23.	0.583	0.3809	0.001	r hitung > r tabel = valid	Valid
24.	0.650	0.3809	0.000	r hitung > r tabel = valid	Valid
25.	0.723	0.3809	0.000	r hitung > r tabel = valid	Valid

Table.6

Pilot Test Validity Results of Multiple Choice Test

NO	Rhitung	Rtabel	Sig.	Criteria	Remark
1.	0.633	0.3809	0.000	r hitung > r tabel = valid	Valid
2.	0.444	0.3809	0.020	r hitung > r tabel = valid	Valid
3.	0.443	0.3809	0.021	r hitung > r tabel = valid	Valid
4.	0.722	0.3809	0.000	r hitung > r tabel = valid	Valid
5.	0.444	0.3809	0.020	r hitung > r tabel = valid	Valid
6	0.408	0.3809	0.035	r hitung > r tabel = valid	Valid
7.	0.545	0.3809	0.003	r hitung > r tabel = valid	Valid
8.	0.551	0.3809	0.003	r hitung > r tabel = valid	Valid
9.	0.519	0.3809	0.006	r hitung > r tabel = valid	Valid
10.	0.484	0.3809	0.011	r hitung > r tabel = valid	Valid
11.	0.393	0.3809	0.000	r hitung > r tabel = valid	Valid
12.	0.433	0.3809	0.024	r hitung > r tabel = valid	Valid
13.	0.444	0.3809	0.020	r hitung > r tabel = valid	Valid
14.	0.427	0.3809	0.026	r hitung > r tabel = valid	Valid
15.	0.438	0.3809	0.022	r hitung > r tabel = valid	Valid
16.	0.561	0.3809	0.002	r hitung > r tabel = valid	Valid
17.	0.443	0.3809	0.021	r hitung > r tabel = valid	Valid
18.	0.444	0.3809	0.020	r hitung > r tabel = valid	Valid
19.	0.547	0.3809	0.003	r hitung > r tabel = valid	Valid
20.	0.716	0.3809	0.000	r hitung > r tabel = valid	Valid

Table.7 Pilot Test Validity Results of Essay

NO	Rhitung	Rtabel	Sig.	Criteria	Remark
1.	0.787	0.3809	0.000	r hitung > r tabel = valid	Valid
2.	0.510	0.3809	0.007	r hitung > r tabel = valid	Valid
3.	0.604	0.3809	0.001	r hitung > r tabel = valid	Valid
4.	0.605	0.3809	0.001	r hitung > r tabel = valid	Valid
5.	0.821	0.3809	0.000	r hitung > r tabel = valid	Valid

Based on tables 5, 6, 7, it can be seen that both the questionnaire and the test instrument are considered valid because Calculated R > Table R. Next, reliability testing was carried out on the questionnaire and test instruments. This test describes the level of consistency of the questionnaire and test items in producing similar measurements each time they are used. The reliability test was conducted using the SPSS program.

Table 8 Reliability Test of the Questionnaire Instrument

Cronbach's Alpha	N of Items
.955	25

Based on Table.8, it can be seen that the overall reliability value reaches 0.955. This value is in accordance with the standard reliability index of the instrument which is in the range of 0.800 to 1.000. Therefore, it can be concluded that the questionnaire about learning interest is very reliable.

Table 9 Reliability Test of Multiple Choice Test Questions Instrument

Cronbach's Alpha	N of Items
.839	20

Based on Table.9, it can be seen that the overall reliability value of the multiple-choice test question instrument reaches 0.839. This value is in accordance with the standard reliability index of the instrument which is in the range of 0.800 to 1.000. Therefore, it can be concluded that the multiple-choice test question instrument is very reliable.

Table 10 Reliability Test of Essay Test Questions

Cronbach's Alpha	N of Items
.689	5

Based on Table.10, it can be seen that the overall reliability value of the essay test question instrument reaches 0.689. This value is in accordance with the standard reliability index of the instrument which is in the range of 0.600 to 0.779. Therefore, it can be concluded that the essay test question instrument is reliable. After the instrument pilot test was conducted, the next step is data collection. Data on learning interest is collected through questionnaire completion, while data on learning outcomes are obtained through pretests and posttests scores. The interest sheets given to students consist of 25 statements, which include positive and negative statements. These interest sheets and tests were given to each class that became the object of the study. After the posttest was completed, the interest questionnaire

was given to the experimental and control classes. Here is the table of the list of student interest scores:

Table.11 Student Interest Questionnaire

	Experiment	control
Highest Score	95	87
Lowest Score	86	50
Average	89,64	71,80

The average score of the experimental group questionnaire is 89.64 while for the control group is 71.80. This shows that the average score of the experimental group questionnaire is higher than the average score of the control group questionnaire. The test results conducted by the researcher using a pre-test to measure students' initial abilities and a post-test to assess students' learning outcomes. This test consists of 20 multiple-choice questions and 5 essay questions related to environmental pollution systems. Here are the test results from both classes:

Table.12 Student Learning Outcomes

	Pre test		Posttest	
	Experiment	**control**	**Experiment**	**control**
Highest Score	60	56	97	88
Lowest Score	24	28	76	72
Average	36,80	41,22	84,64	78,12

After obtaining the N-Gain values from student learning outcomes, the next step is to analyze their averages according to the criteria set for that level of N-Gain. Here is the table of the Average N-Gain Test Results:

Table.13 Average N-Gain Test Results

Class	N-Gain score	N-Gain (%)	Analysis Result	Remaks
VII-B	0,62258	62,1034	$0,3 \geq 0,62 \leq 0,7$	Medium
VII-F	0,75484	75,6577	$0,3 \geq 0,75 \geq 0,7$	High

The next data analysis step is to perform prerequisite tests with normality and homogeneity tests.

Table. 14 Results of Normality Interest Questionnaire

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		31
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	9.26152083
Most Extreme Differences	Absolute	.112
	Positive	.086
	Negative	-.112
Test Statistic		.112
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

Based on the table above, it can be observed that the Sig. value is greater than 0.05, which is 0.200 > 0.05, thus the result indicates that the data distribution is normal. The next data analysis in the form of normality test of N-Gain of student learning outcomes using SPSS is:

Table. 15 Results of Normality Test of N-Gain of Student Learning Outcomes

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		31
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.09976003
Most Extreme Differences	Absolute	.101
	Positive	.065
	Negative	-.101
Test Statistic		.101
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

Based on the table above, it can be observed that the Sig. value is greater than 0.05, which is 0.200 > 0.05, thus the result indicates that the data distribution is normal. After the data was tested for normality, the data was tested for homogeneity.

Homogeneity testing is a process of testing to determine whether the data from the samples in the experimental and control groups have similar types or variations. The results of the homogeneity analysis of the questionnaire data were calculated using SPSS software.

Table.16 Results of Homogeneity Interest Questionnaire

Test of Homogeneity of Variances

hasil minat belajar

Levene Statistic	df1	df2	Sig.
.892	6	20	.519

The results of the homogeneity test of the questionnaire show a significance value (Sig.) of 0.519. The Sig. value of 0.519 > 0.05, so the questionnaire data is considered homogeneous. Homogeneity testing analysis of student learning outcomes using SPSS.

Table.17 Results of Homogeneity Test of N-Gain of Student Learning Outcomes

Test of Homogeneity of Variances

Hasil Belajar Siswa

Levene Statistic	df1	df2	Sig.
.010	1	60	.920

The results of the homogeneity test of the test can be observed from the Sig. value which is 0.920. The Sig. value of 0.920 > 0.05, thus the result indicates that the learning outcome data is homogeneous.

After the prerequisites were tested, the next step was to test the hypothesis using the t-test and MANOVA. In this study, the Independent Sample Test was used to test whether there is an effect of using PBL-based worksheets on students' learning interest and the effect of PBL-based worksheets on students' learning outcomes, while MANOVA was used to determine whether there is an effect of using PBL-based worksheets on students' interest and learning outcomes.

Table.18 Independent Sample Test on Student Learning Interest

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil Angket Minat Belajar	Equal variances assumed	29.353	.000	10.366	60	.000	17.039	1.721	14.397	21.201
	Equal variances not assumed			10.366	34.104	.000	17.039	1.721	14.342	21.335

The table of the Independent Sample Test results of student learning interest in environmental pollution material shows a Sig. (2-tailed) value of 0.000. According to the decision-making criteria, namely 0.000 < 0.05, Ho is rejected and Ha is accepted, indicating a positive and significant effect between the use of PBL-based worksheets on environmental pollution material on student learning interest in class VII at SMPN 3 Kedungwaru. These findings are in line with Armania's research in 2018, which states that students' learning objectives can be achieved more easily if their interest in learning is high. Conversely, if students' interest in learning decreases, their interest in a particular field or subject will also decrease. The research results from Aprianita, 2019 also indicate that the majority of students responded positively to the implementation of PBL-based worksheets in learning, expressing their enjoyment in using the worksheets. Additionally, students also stated that the use of these worksheets helped reduce boredom and fatigue, as well as facilitated their understanding and acceptance of the material taught by the teacher.

Table.19 Independent Sample Test on Learning Outcomes using N-Gain values

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Hasil Belajar Siswa	Equal variances assumed	.010	.920	5.100	60	.000	.132	.026	.080	.184
	Equal variances not assumed			5.100	59.910	.000	.132	.026	.080	.184

The table of the Independent Sample Test results of student learning outcomes in environmental pollution material shows a Sig. (2-tailed) value of 0.000. According to the decision-making criteria, namely 0.000 < 0.05, Ho is rejected and Ha is accepted, indicating a positive and significant effect between the use of PBL-based worksheets on environmental pollution material on student learning outcomes in class VII at SMPN 3 Kedungwaru. Similar findings were also obtained from Wardinin & Lufri's research in 2019, which stated that Problem-Based Learning (PBL)-based Student Worksheets (LKPD) can serve as a guide in the learning process that encourages students to learn more actively and can improve learning outcomes.

Table 4.17 Multivariate Test Results

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.995	5709.468[b]	2.000	59.000	.000	.995
	Wilks' Lambda	.005	5709.468[b]	2.000	59.000	.000	.995
	Hotelling's Trace	193.541	5709.468[b]	2.000	59.000	.000	.995
	Roy's Largest Root	193.541	5709.468[b]	2.000	59.000	.000	.995
Model_Pembelajaran	Pillai's Trace	.690	65.564[b]	2.000	59.000	.000	.690
	Wilks' Lambda	.310	65.564[b]	2.000	59.000	.000	.690
	Hotelling's Trace	2.223	65.564[b]	2.000	59.000	.000	.690
	Roy's Largest Root	2.223	65.564[b]	2.000	59.000	.000	.690

a. Design: Intercept + Model_Pembelajaran

b. Exact statistic

Based on the recapitulation of the MANOVA test results, it can be seen that the Pillai's Trace, Wilk's Lambda, Hotelling's Trace, Roy's Largest Root values in the class have significance values less than 0.05, namely 0.000 < 0.05. Thus, all Pillai's Trace, Wilk's Lambda, Hotelling's Trace, Roy's Largest Root values are significant. Therefore, Ho is rejected and Ha is accepted. This indicates a positive and significant effect of using PBL-based worksheets on environmental pollution material on the interest and learning outcomes of class VII students at SMPN 3 Kedungwaru. This is consistent with the research conducted by Lestari and Suyoso in 2018, which found that the utilization of Problem-Based Learning (PBL)-based Student Worksheets (LKPD) is effective in enhancing both interest and learning outcomes. There was an improvement in learning outcomes with the use of PBL-based LKPD, reflected by a normalized gain value of 0.58, placing it in the moderate category. Meanwhile, there was a significant increase in learning interest with a normalized gain value of 0.3, also falling into the moderate category. These results indicate that the use of PBL-based LKPD can enhance both students' interest and learning outcomes.

CONCLUSION AND RECOMENDATION

Based on the research results, it can be concluded that there is a positive and significant influence between the use of Problem-Based Learning (PBL)-based Student Worksheets (LKPD) and both interest and learning outcomes. This is based on the MANOVA test results using questionnaire data and N-Gain values, which yielded a Sig. (2-tailed) value of 0.000. According to the decision-making criteria, where 0.000 < 0.05, H_0 is rejected and H_a is accepted, indicating an influence of using PBL-based LKPD on both interest and learning outcomes. For future researchers, it is hoped that this study can serve as an additional reference in the development of similar research using various variables, as well as addressing the weaknesses found in this study. Thus, future research can complement and enrich understanding in efforts to enhance and improve the quality of education.

ACKNOWLEDGMENT

The researcher would like to express gratitude to the supervisor. Thank you to the biology education validator lecturers from UIN Sayyid Ali Rahmatullah Tulungagung. The researcher also extends gratitude to the science teacher of class VII at SMPN 3 Kedungwaru who has greatly assisted the researcher in collecting

research data at the school. Finally, the researcher extends thanks to the students of class VII B and VII F who willingly participated as research subjects.

REFERENCES

Aprianita, T., & Suraiya, N. (2019). Efektivitas Penggunaan Lembar Kerja Peserta Didik (LKPD) Berbasis Problem Based Learning (PBL) Pada Pelajaran IPS. Pencerahan, 13(1), 49-62.

Armania, Marzan, et al. Analisis hubungan kemampuan komunikasi matematis dan minat belajar siswa smp dengan menggunakan pendekatan realistic mathematic education. JPMI (Jurnal Pembelajaran Matematika Inovatif), 2018, 1.6: 1087-1094.

Jurnal Cendekia : Jurnal Pendidikan Matematika, 5.2 (2021), 1011–24 <https://doi.org/10.31004/cendekia.v5i2.573>

Citra Gusyanti, S. (2021). Analisis Lembar Kerja Peserta Didik (LKPD) Berbasis Problem Based Learning Terhadap Hasil Belajar Siswa. Cybernetics: Journal Educational Research and Social Studies, 123-130.

Decy Arwini, Ni Putu, 'Dampak Pencemaran Udara Terhadap Kualitas Udara Di Provinsi Bali', *Jurnal Ilmiah Vastuwidya*, 2.2 (2020), 20–30 <https://doi.org/10.47532/jiv.v2i2.

Ghozali, Imam. 2018. Aplikasi Analisis Multivariate dengan Program IBM SPSS

25. Badan Penerbit Universitas Diponegoro: Semarang

Lestari, Karunia Eka dan Mokhammad Ridwan Yudhanegara. 2017. Penelitian Pendidikan Matematika. Bandung: PT. Refika Aditama.

Mahardika Arsa Putra, Gede Yoga, and I Gusti Ayu Tri Agustiana, 'ELKPD Materi Pecahan Dalam Pembelajaran Di Sekolah Dasar', *MIMBAR PGSD Undiksha*, 9.2 (2021), 220 <https://doi.org/10.23887/jjpgsd.v9i2.35813>

Mardhatillah, N. (2023). Pengaruh Penggunaan LKPD Berbasis Problem Based Learning Terhadap Hasil Belajar Siswa Pada Mata Pelajaran Pendidikan Agama Islam di SMA N 1 Kampar Timur (Doctoral dissertation, Universitas Islam Negeri Sultan Syarif Kasim Riau).

Mashuri, Sufri, Hasan Djidu, and Retno Kusuma Ningrum, 'Problem-Based Learning Dalam Pembelajaran Matematika: Upaya Guru Untuk Meningkatkan Minat

Dan Prestasi Belajar Siswa', *Pythagoras: Jurnal Pendidikan Matematika*, 14.2 (2019), 112–25 <https://doi.org/10.21831/pg.v14i2.25034>

Muslimah, Muslimah Muslimah, 'Dampak Pencemaran Tanah dan Langkah Pencegahan', *Jurnal Penelitian Agrisamudra*, 2.1 (2017), 11–20 <https://doi.org/10.33059/jpas.v2i1.224>

Mutia, Z. N. (2023). *Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Problem Based Learning (PBL) Dalam Meningkatkan Hasil Belajar Pada Mata Pelajaran Pendidikan Agama Islam* (Doctoral dissertation, UIN Raden Intan Lampung).

'[No Title Found]', *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 5.2

Nugroho, Muhammad Agil, Tatang Muhajang, and Sandi Budiana, 'Pengaruh Minat Belajar Siswa Terhadap Hasil Belajar Mata Pelajaran Matematika', *JPPGuseda | Jurnal Pendidikan & Pengajaran Guru Sekolah Dasar*, 3.1 (2020), 42–46 <https://doi.org/10.33751/jppguseda.v3i1.2014>

Rizki, W., Nurmaliah, C., & Sarong, M. A. (2018). Pemanfaatan Lembar Kerja Peserta Didik (LKPD) berbasis Problem Based Learning (PBL) terhadap peningkatan hasil belajar siswa pada materi sistem ekskresi manusia di MTsN Rukoh Kota Banda Aceh. BIOTIK: Jurnal Ilmiah Biologi Teknologi dan Kependidikan, 4(2), 136-142.

Riyani, Ni Luh Venny Eka, and I Gusti Agung Ayu Wulandari, 'Pengembangan LKPD Interaktif Berbasis STEAM Pada Kompetensi Pengetahuan IPS Siswa Kelas V Di SD No. 3 Sibanggede', *Jurnal Ilmiah Universitas Batanghari Jambi*, 22.1 (2022), 285 <https://doi.org/10.33087/jiubj.v22i1.2046>

Ricardo dkk, "Impak Minat dan Motivasi Belajar terhadap Hasil belajar Siswa", dalam *Jurnal Pendidikan Manajemen Perkantoran Vol. 2, No. 2, Juli 2017,* hal. 192

Rusman, *Model-model pembelajaran: mengembangkan profesionalisme guru* (Jakarta: Rajawali Pers/PT Raja Grafindo Persada, 2011)

Sari, Danning Wulan; Filayani, Muhammad Iqbal. Interactive Powerpoint Nervous System Material: A Learning Media Development Research. Bioeduca: Journal of Biology Education, 2023, 5.2: 111-124.

Sari, Rini Indah, and Siti Sri Wulandari, 'Pengembangan Lembar Kegiatan Peserta Didik (LKPD) Berbasis Pendekatan Saintifik Mata Pelajaran Humas Dan Keprotokolan Semester Gasal Kelas XI OTKP Di SMK YPM 3 Taman', *Jurnal Pendidikan Administrasi Perkantoran (JPAP)*, 8.3 (2020), 440–48 <https://doi.org/10.26740/jpap.v8n3.p440-448>

Sari, Suci Mahya, 'Pengembangan Perangkat Pembelajaran Problem Based Learning (PBL) Dalam Pembelajaran Matematika Di SMA', *Jurnal Serambi Ilmu*, 21.2 (2020), 211–28 <https://doi.org/10.32672/si.v21i2.2235>

Sugiyono. (2011). Metode Penelitian Kuantitatif, Kualitatif dan R&D. Bandung:

Alfabeta

Slameto, Belajar & Faktor-faktor yang Mempengaruhinya, (Jakarta: Rineka Cipta, 2015), hal. 180

Sembiring, Rosali Br, and . Mukhtar, 'Strategi Pembelajaran dan Minat Belajar Terhadap Hasil Belajar Matematika', *Jurnal Teknologi Pendidikan (JTP)*, 6.2 (2013) <https://doi.org/10.24114/jtp.v6i2.4996>

Setiawati, Siti Maa'rifah, 'Telaah Teoritis: Apa Itu Belajar ?', *Helper : Jurnal Bimbingan Dan Konseling*, 35.1 (2018), 31–46 <https://doi.org/10.36456/helper.vol35.no1.a1458>

Sirait, Erlando Doni, 'Pengaruh Minat Belajar Terhadap Prestasi Belajar Matematika', *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 6.1 (2016) <https://doi.org/10.30998/formatif.v6i1.750>

Sujarwo, Citra Gusyanti, 'Analisis Lembar Kerja Peserta Didik (LKPD) Berbasis Problem Based Learning Terhadap Hasil Belajar Siswa', *Cybernetics: Journal Educational Research and Social Studies*, 2021, 123–30 <https://doi.org/10.51178/cjerss.v2i4.320>

Sutrisno, M. Meningkatkan Minat Dan Hasil Belajar Tik Materi Topologi Jaringan Dengan Media Pembelajaran. Ahlimedia Book, 2020.

Sofyan, Herminarto; KOMARIAH, Kokom. Pembelajaran problem based learning dalam implementasi kurikulum 2013 Di SMK. Jurnal Pendidikan Vokasi, 2016, 6.3: 260-271.

Syifa, N. H., Wiyanto, W., & Astuti, B. (2021). Penggunaan LKPD Berbasis PBL dalam Pembelajaran Daring untuk Meningkatkan Hasil Belajar Fisika. UPEJ Unnes Physics Education Journal, 10(3), 227-232.

Universitas Negeri Medan, Wisnu Prayogo, Fairuza Marhamah, Universitas Negeri Medan, Hafiz Achmad Fauzan, Universitas Negeri Medan, and others, 'Strategi Pengendalian Pencemaran Industri Untuk Pengelolaan Mutu Air Sungai Dan Tanah Di DAS Diwak, Jawa Tengah', *Jurnal Sumberdaya Alam Dan Lingkungan*, 8.3 (2021), 123–32 <https://doi.org/10.21776/ub.jsal.2021.008.03.4>

Van Berkel, Henk, et al. (ed.). Lessons from problem-based learning. OUP Oxford, 2010.

Wahab, Abdul, Junaedi Junaedi, and Muh. Azhar, 'Efektivitas Pembelajaran Statistika Pendidikan Menggunakan Uji Peningkatan N-Gain Di PGMI', *Jurnal Basicedu*, 5.2 (2021), 1039–45 <https://doi.org/10.31004/basicedu.v5i2.845>

Wardinin, N. & Lufri. 2019.Student worksheet validity based on problem based learning (PBL) equipped with educational games in biological science materials for junior high school grade VIII. Advances in Social Science, Education, and Humanities Research, 464:248-253

Widiyani, Afifah, and Puri Pramudiani, 'Pengembangan Lembar Kerja Peserta Didik (LKPD) Berbasis Software Liveworksheet Pada Materi PPKn', *Dwija Cendikia: Jurnal Riset Pedagogik*, 5.1 (2021), 132 <https://doi.org/10.20961/jdc.v5i1.53176>

Wulandari, A. P., Annisa, A., Rustini, T., & Wahyuningsih, Y. (2023). Penggunaan Media Pembelajaran terhadap Keterampilan Berpikir Kritis IPS Siswa Sekolah Dasar. Journal on Education, 5(2), 2848-2856.

Yohannes, Benny Yohannes, Suyud Warno Utomo, and Haruki Agustina, 'Kajian Kualitas Air Sungai Dan Upaya Pengendalian Pencemaran Air', *IJEEM - Indonesian Journal of Environmental Education and Management*, 4.2 (2019), 136–55 <https://doi.org/10.21009/IJEEM.042.05>

Yulia, S., Buyung., & Relawati. (2018). Pengembangan lembar kerja siswa (lks) berbasis problem based learning pada materi bilangan di kelas viii smp negeri 22 kota jambi. Jurnal Pendidikan Matematika, 2(1), 61-70.

Yustianingsih, Rizza, Hendra Syarifuddin, and Yerizon Yerizon, 'Pengembangan Perangkat Pembelajaran Matematika Berbasis Problem Based Learning (PBL) Untuk Meningkatkan Kemampuan Pemecahan Masalah Peserta Didik Kelas VIII', *JNPM (Jurnal Nasional Pendidikan Matematika)*, 1.2 (2017), 258 <https://doi.org/10.33603/jnpm.v1i2.563>

Yuwono, Muhammad Ridlo, and Muhammad Wahid Syaifuddin, 'Pengembangan Problem Based Learning Dengan Assessment for Learning Berbantuan Smartphone Dalam Pembelajaran Matematika', *Beta: Jurnal Tadris Matematika*, 10.2 (2017), 184–202 <https://doi.org/10.20414/betajtm.v10i2.116>