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THE EFFECT OF *ETHNOMATHEMATICS-BASED PROJECT-BASED LEARNING (PJBL)* ON THE NUMERACY LITERACY SKILLS OF STUDENTS AT PATUK II PUBLIC ELEMENTARY SCHOOL IN GUNUNGKIDUL, YOGYAKARTA

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ABSTRACT

This study aims to determine the effect of the ethnomathematics-based PJBL learning model on improving students' numeracy literacy skills in reading and writing numbers at Patuk II Public Elementary School, Gunungkidul. This research was motivated by students' low numeracy literacy skills, characterized by difficulty understanding basic mathematical concepts and low interest in learning. The research method used was quantitative with a one- group pretest-posttest design. The study sample involved 18 fourth-grade students at Patuk II Public Elementary School, Gunungkidul. Data were collected through observation, testing, and documentation. The research instrument consisted of essay questions designed to measure students' numeracy literacy, specifically on the topic of plane figures related to the local cultural context. The results showed that the implementation of ethnomathematics- based PJBL significantly improved students' numeracy literacy skills. The average pretest score of 46.39 increased to 84.33 in the posttest. Hypothesis testing using a paired sample t-test yielded a significance value of 0.000 (<0.05), indicating a significant difference between the pretest and posttest results. Thus, it can be concluded that the ethnomathematics-based PJBL model is effective in improving elementary school students' numeracy literacy skills.

Keywords: *Ethnomathematics, Literacy, Numeracy, Elementary School Mathematics, Project- Based Learning*

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INTRODUCTION

Education plays a very important role as it is one of the main factors in determining a person's success or failure in life. Education is also an active learning process for individuals so that they can construct their own knowledge. In the world of education, students are able to shape their knowledge through educational science, which includes several processes such as interventions by teachers to help students learn, relevant and challenging curricula, and effective learning methods that support student learning. (Suriadi et al., 2021) states that "Education is a valuable experience for children, which can shape them into individuals who are more critical in their thinking and able to develop positive characters as expected". Meanwhile, according to (Miftah Nurul Annisa, 2020) , education is a learning process that covers

both academic and non-academic areas, which aims to develop the knowledge, attitudes, and behavior of students.

In addition, Indonesia's younger generation needs to be equipped with 21st-century skills in order to compete in the global market in the future. Students are prepared to achieve success in any academic discipline and in all fields of study when they master 21st-century skills. Most of this information is presented visually or numerically. It will still take a long time before students in Indonesia can be said to have numeracy literacy.

Students' weak understanding of mathematics certainly affects their numeracy literacy skills. When students do not understand mathematical concepts, their ability to solve mathematical problems is hampered. As a result, students may become unfocused on the problem at hand because they feel panicked or unable to solve it before trying to use existing mathematical concepts. The application of learning models that can improve students' numeracy skills is one of the efforts made to improve these skills (Nurcahyono, 2023). Students' basic reading and arithmetic skills are laid on a solid foundation in elementary school. The success of children in mastering these skills is the responsibility of the school.

Numeracy literacy is an individual's ability to communicate, use, interpret, and apply various forms of mathematical elements (symbols and numbers) to solve practical problems in life (Winarni et al., 2021). From this, it can be concluded that numeracy helps in solving real world problems, understanding data presented in various forms, and making better predictions and assessments based on that analysis. Since solving real world problems is at the core of mathematics education, it is very important to develop numeracy skills.

The ability to understand and process numerical information, such as that found in tables and diagrams, and apply mathematical procedures to real-world situations (such as those encountered in commerce) is known as numeracy literacy. It is the ability to understand and apply mathematical ideas and information that distinguishes numeracy literacy from mathematical competence. A basic understanding of mathematics alone is not sufficient to develop numeracy. Students need to have a strong understanding of numeracy in order to make accurate judgments (Mahmud & Pratiwi, 2019).

Numeracy requires mathematical knowledge taught in school. However, learning mathematics does not always improve numeracy skills if the material is not designed in a certain way. According to Ratnasari (2020), "mathematical problems should help children improve their cognitive abilities, sharpen their reasoning, enhance their creativity, and develop innovative problem-solving strategies." In

addition, in the 21st century, there is an interesting and new issue in mathematics education today.

Many learning innovations are aimed at improving these skills. One of them is the use of numeracy literacy in education. If numeracy literacy is incorporated into mathematics learning in schools, there will be many benefits for students' future lives. Basically, numeracy was created to answer the challenges of the 21st century, where humans must not only be cognitively intelligent but also skilled. Improving students' numeracy skills must be supported by their environment, which consists of schools, families, and communities (Fauzi et al., 2021). Furthermore, increasing student engagement is often associated with better educational outcomes, making this an urgent issue in education.

School administrators have used new learning models and strategies, such as the Merdeka Curriculum, to attract students' interest. To begin improving educational excellence standards, several steps need to be taken. Problems arising in the mathematics learning process are still relatively high. This is due to the presence of symbols, numbers, and formulas that are often considered complicated. In addition, uninteresting learning methods make students feel bored, so many of them have difficulty understanding mathematics material. When students have difficulty understanding and applying mathematical ideas, principles, and formulas, it is reflected in their academic performance. The mathematical difficulties faced by instructors remain a source of frustration for them, no matter how hard they try to understand and learn.

Based on the observation data collected by researchers, there are problems at SDN Patuk II Gunungkidul, namely difficulties in using mathematical operations in everyday life and errors in understanding the concept of comparison. There are factors that have been found to influence low numeracy literacy at SDN Patuk II Gunungkidul, one of which is that many students dislike anything related to mathematics. (Saputro & Nurrahmi, 2023) "said that there are a number of factors that can hinder the learning process. One of the most hindering factors in mathematics learning is the difference in students' level of understanding of the material".

One method for addressing these obstacles is to explain to each child individually. However, this method is impractical because it takes a long time and may not produce the desired results in students' mathematics education. Therefore, with the right approach, students can improve their numeracy literacy through learning activities, and their progress can be tracked through analysis. Using an *ethnomathematics-based* Project-Based Learning model, researchers sought a solution to this problem. desired results in students' mathematics education.

Therefore, with the right approach, students can improve their numeracy literacy through learning activities, and their progress can be tracked through analysis. Using an *ethnomathematics-based* Project-Based Learning model*,* researchers sought a solution to this problem.

According to (Anggraini & Wulandari, 2020), this educational approach encourages students to play an active role in completing projects. *Ethnomathematics* is a teaching method that draws parallels between cultural practices and mathematical ideas. The field *of ethnomathematics* can be integrated into educational programs because of the strong relationship between a culture and its mathematical thinking. *Ethnomathematics* is a field of study that builds relationships between mathematical concepts and cultural aspects. Both the cultural context in which mathematical ideas are used and the way mathematical problems are solved reflect this relationship, taking into account the local culture and individual characteristics of students.

By introducing students to mathematical ideas through diverse cultural perspectives, *ethnomathematics* provides an alternative approach to traditional classroom learning. The fundamental goal of education, especially mathematics, is to instill an interest in knowledge and culture. Students' thinking can be expanded by integrating cultural components into mathematics education, which helps students connect mathematical ideas and cultural understanding. For example, *ethnomathematics based* project based learning that combines real world examples and local efforts can help students better understand mathematical ideas (Nurislamiati & Muh. Irfan, 2022).

Students are encouraged to build their own knowledge through the use of constructivist learning ideas in the PJBL (Project Based Learning) learning paradigm. One method that educators can use to manage the learning process of students in the classroom more effectively is through the application of a project-based learning model (PJBL). This approach is also an appropriate means of fostering students' critical thinking skills. In inquiry-based learning, each student is encouraged to research and explore an object, individual, or event systematically, critically, logically, and analytically, so that they are able to formulate conclusions independently with confidence. The essence of inquiry-based learning is the use of guiding questions to encourage students to engage in collaborative projects taken from a variety of subject materials. As they discuss various issues, students gain a better understanding of the fundamental ideas and features of their chosen field (Zakiah, 2020).

The Project-Based Learning *(PJBL)* method encourages students to find solutions to problems by completing projects. This exercise is a good way for students

to gain hands-on experience in project planning. The *Project-Based Learning (PJBL)* model has a positive impact on students' intrinsic motivation to create projects, problem-solving abilities, teamwork skills, and resource management knowledge. Based on this, the researchers decided to examine how the "Project-Based Learning (*PBL)*" model affects students' numeracy literacy skills at Patuk II Elementary School. Project-Based Learning (*PJBL)* is a paradigm for improving students' mathematical literacy, and this study aims to measure it.

Students are actively involved in finding solutions to real-world problems through the application of *the "Project Based Learning" (PJBL)* learning paradigm, which is used to respond to educational demands and bring innovation to the learning process. Patuk II Public Elementary School in Gunungkidul implements the *PJBL* approach to help students develop their critical thinking skills in numeracy literacy through the use of real-world projects that complement classroom learning. This methodology allows students to gain practical experience by completing projects, which are tasks involving complex challenges based on each skill and allowing them to work independently. Solving problems and creating useful products are the ultimate goals of this paradigm. The final results can take various forms, including print media, electronic media, appropriate technology, scientific publications, and so on.

RESEARCH METHOD

Quantitative research is an approach that utilizes numerical data to answer research questions. This approach focuses on objective measurements, standardized data collection, and the application of statistical analysis to test hypotheses or explain a phenomenon (Damanik et al., 2025). An experimental approach was chosen for this investigation. In experimental studies, researchers deliberately change one or more variables to see how they affect other variables under investigation. The variables that are changed are known as independent variables, while the variables whose effects are observed are known as dependent variables. This study used a quasi-experimental design approach for its investigation.

According to Sugiyono (2022), the experimental design used is a One-Group Pretest- Posttest Design, which involves testing only one group and does not include a control or comparison group. This method allows for more accurate findings because of the comparison between the pretest and posttest, which are given before and after learning, respectively.

This research design can be described as follows: O_1 X O_2

Explanation:

O_1 : *Pre-test* before treatment
X : Treatment of the experimental group

O_2: *Post-test* after treatment

The research procedure used for data collection consisted of several stages, including

(1) Observation guidelines. To obtain accurate data, direct observation was necessary. Both instructors and students were subjects of observation. Researchers wanted to see what instructors and students do during learning, so we conducted observations. In addition, the researchers wanted to know whether the plan and its implementation were appropriate, so they conducted observations (Husnidar, 2020). The main objective of this study was to find out how mathematics is taught at Patuk II Public Elementary School, Gunungkidul, Yogyakarta.

(2) Tests. This technique aims to assess students' thinking skills through the evaluation of their arithmetic skills and understanding of mathematical concepts. The tests used were in the form of descriptive questions, designed to encourage the development of students' analytical and creative abilities. In practice, *pre-tests* and *post-tests* were given using the same instruments. The *pre-test* was used to measure students' abilities before the implementation of the *ethnomathematics-based PJBL* learning model, while *the post-test* was used to assess the development of students' abilities after the model was implemented. The test results collected from the students were analyzed using the following formula:

$$\text{Value Knowledge} = \frac{\text{score obtained}}{\text{maximum score}} \text{ x } 100$$

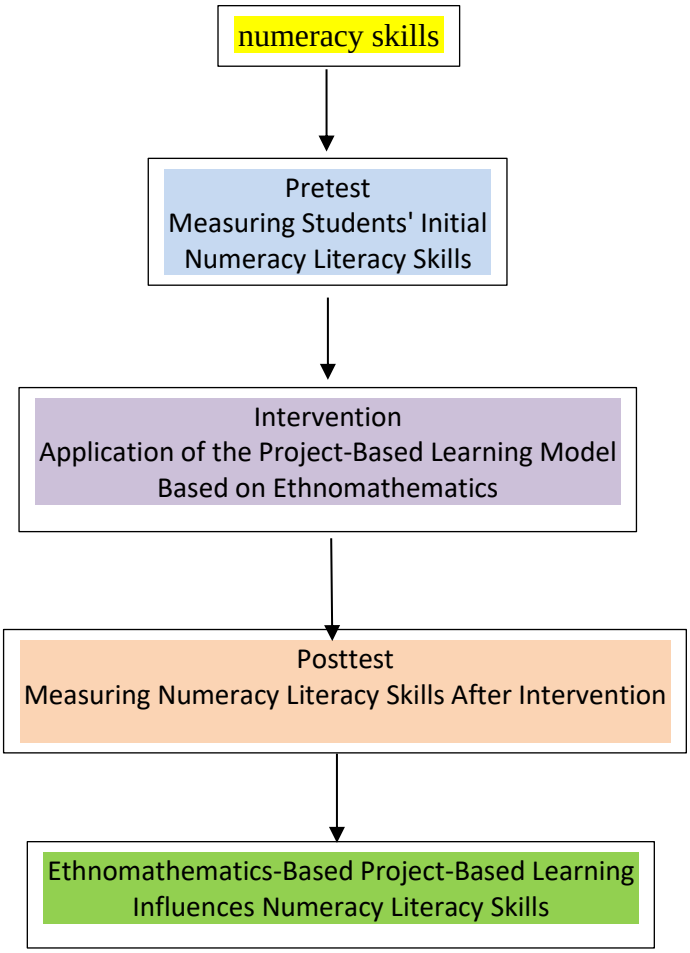
Score Explanation:

Score	Final Score
80-100	Very Good
70-79	Good
60-69	Fair
50-59	Poor
0-49	Needs Improvement

Finally, (3) Documentation, Documentation aims to collect and analyze records, whether written, visual, or electronic. Pictures of learning activities at the fourth grade level will be used in this study.

To facilitate the research process, a research chart was created as a conceptual basis to explain the relationship between theory, research variables, and the objectives to be achieved. In this study, the chart was based on the problem of low numeracy literacy among students at Patuk II Gunungkidul Public Elementary School,

particularly in the subject of flat shapes. To overcome this problem, a Project-Based Learning (PJBL) model was used in combination with an ethnomathematics approach. This combination is considered capable of creating more meaningful, contextual, and interesting learning for students because it relates mathematical concepts to everyday life and local culture. The following is an overview of the research chart:



RESULTS AND DISCUSSION

Research

The location of this study was Patuk II Elementary School in Gunungkidul. A total of 18 fourth-grade students from one class became the subjects of the study. To measure the participants' ability to learn ethnomathematics-based mathematics related to flat shapes, the researcher gave 10 descriptive pretest questions before providing therapy. After that, the researcher applied a special treatment, namely the Project-Based Learning model, in which students would build a small traditional house and then calculate parameters such as the area of flat shapes found in the building frame. The purpose of the post-test was to assess the extent to which students had

internalized the lesson information after receiving the treatment or therapy. This research consists of the following stages :

1. Research Preparation

   Preparation is key before starting research. That way, we can be sure that the research will run in an organized manner. The scope of the research includes:

   a) Collect preliminary data through observation and interviews to identify problems arising in the school environment by involving the principal and teachers.
   b) Selecting a research design and type that uses the Quasi-Experimental method with a One Group Pretest-Posttest Design model.
   c) This research will be conducted in the fourth grade with a total of 18 students.
   d) Developing research instruments in the form of observation sheets that lead to Project Based Learning models for Ethnomathematics-based numeracy literacy.
   e) Validating and analyzing instruments with the involvement of expert lecturers.

2. Research Implementation

   Fourth-grade students at Patuk II Public Elementary School have been the subject of data collection since June 2025. The data was then analyzed using SPSS software. The following are the results of the pretest and posttest data on numeracy literacy based on ethnomathematics using the Project Based Learning paradigm. The first step is to coordinate with the principal by submitting a letter of permission to conduct research at Patuk II Public Elementary School in the fourth grade. After receiving permission, the researcher conducts the research within the specified time frame. The following are the steps for implementing the Project-Based Learning model for ethnomathematics-based numeracy literacy at Patuk II Public Elementary School:

   a) On the first day, researchers administered a pretest to fourth-grade students at Patuk II Public Elementary School on the subject of mathematics, specifically flat shapes based on ethnomathematics.
   b) After administering the pretest, researchers provided information related to the material to be taught and the tools and materials needed to create projects for the following day.
   c) In the second meeting, learning was conducted by presenting material on flat shapes related to cultural elements. Students were invited to discuss examples of flat shapes found in traditional houses.
   d) After delivering the material, students carry out projects according to predetermined topics.
   e) On the third day, after all projects are completed, researchers measure the extent of students' understanding of the material that has been taught by giving them a post-test.

f) Researchers then conduct a joint reflection after teaching and hold a documentation session.

3. Description of Research Data Results

The research data presented in this discussion relates to the dependent variable, namely the numeracy literacy skills of students at Patuk II Gunungkidul Yogyakarta Public Elementary School, and the independent variable, namely the ethnomathematics-based Project-Based Learning (PBL) model. This study was conducted with the aim of observing the effect of the independent variable on the dependent variable, namely the numeracy literacy skills of students at Patuk II Gunungkidul Yogyakarta Public Elementary School.

To measure the effectiveness of the ethnomathematics-based Project-Based Learning paradigm, tests were given to fourth-grade students before and after its implementation. The results are as follows:

a) Pre-test Learning Outcome Data

Before starting the learning activities, students were given a pretest to measure their level of understanding of the material. The findings from the numeracy literacy pretest, which was based on ethnomathematics, are shown below in table 1.

Table 1. Pretest Results Data

Number	Name	Value
1	FBY	62
2	AL	50
3	FRN	27
4	ZAA	30
5	ZPA	52
6	AK	47
7	RZY	25
8	RPM	67
9	FFR	50
10	MAZ	70
11	MAN	55
12	ASN	67
13	EAN	42
14	RFA	27
15	JRD	32
16	AZU	55
17	AKA	32
18	AZA	45

Based on the pretest data that has been obtained and processed using SPSS software. The pretest results are explained in the following statistical table 2.

Table 2. Pretest Statistical Data

		Data Results *Pre-test*
N	Valid	18
	Missi Ng	0
Mean		46.39
Variance		221.781
Std. Deviation		14.892
Range		45
Minimum		25
Maximum		70
Sum		835

Based on the descriptive statistics above, it can be seen that the average score (*Mean*) on *the pretest* was 46.39 with a total score (*sum*) of 835, the lowest score (*minimum*) was 25, and the highest score (*maximum*) was 70.

b) Posttest Learning Outcome Data

After implementing the Project-Based Learning paradigm, a posttest was conducted to assess final skills. You can see the posttest results in the table 3.

Table 3. Posttest Result Data

Number	Name	Value
1	FBY	95
2	AL	90
3	FRN	100
4	ZAA	82
5	ZPA	90
6	AK	92
7	RZY	70
8	RPM	75
9	FFR	65
10	MAZ	95
11	MAN	82
12	ASN	80
13	EAN	75
14	RFA	100
15	JRD	70
16	AZU	85
17	AKA	97
18	AZA	75

Based on the scores obtained above, the posttest statistical data can be presented in table 4.

Table 4. Posttest Statistical Data

		Data Results *Posttest*
N	Valid	18
	Missing	0
Mean		84.33
Variance		122.235
Std. Deviation		11.056
Range		35
Minimum		65
Maximum		100
Sum		1518

Based on the descriptive statistics above, it can be seen that the average score *(Mean)* on *the posttest* was 84.33 with a total score *(sum)* of 1518, the lowest score *(minimum)* was 65, and the highest score *(maximum)* was 100.

c) Comparison of Pretest and Posttest Data Results

A comparison chart of the pretest and posttest results is presented in figure 1.

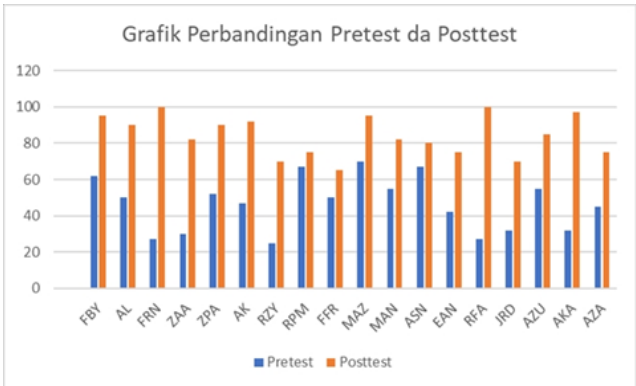


Figure 1. Comparison of Pretest and Posttest Data Results

From the results in the figure above, the graph shows a difference between the pretest data before the intervention and the posttest data after the intervention. The pretest scores are shown in blue and *the posttest* scores are shown in orange. The graph indicates an increase in learning outcomes after applying the *ethnomathematics-based Project-Based Learning* model.

Table 5. Comparison of Pretest and Posttest

Data	N	Nilai Tertinggi	Nilai Terendah	Mean
Pretest	18	70	25	46,39
Posttest	18	100	65	84,33

Based on the data above, there is a difference between the pretest and posttest results. The average pretest score was 46.39, while the average posttest score reached 84.33. Based on this data, the posttest score was higher than the pretest score, indicating an improvement in learning outcomes.

4. Data Analysis

The table 6 shows that the *Sig.* value follows a normal distribution. A significance level above 0.05 is considered to indicate a normal distribution. The data is normally distributed because the *posttest* significance value is 0.197 > 0.05, based on the data shown above. The data is normally distributed because the *posttest* significance value of 0.342 is higher than the significance level of 0.05.

Table 6. Normality Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	,166	18	,200*	,930	18	,197
Posttest	,140	18	,200*	,944	18	,342

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

a. Lilliefors Significance Correction

Whereas the results in table 7 show of the Levene's homogeneity test indicate that the data is homogeneous or has the same variance, with a significance value (sig) based on the mean of 0.199 > 0.05.

Table 7. Homogeneity Test

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Score	Based on Mean	1,718	1	34	,199
	Based on Median	1,514	1	34	,227
	Based on Median and with adjusted df	1,514	1	29,269	,228
	Based on trimmed mean	1,740	1	34	,196

The table 8 above shows that based on these calculations, the *pretest* mean is 46.39, while the *posttest* mean is 84.33. From these calculations, it can be seen that there is a difference in the mean before and after the implementation of the *ethnomathematics-based PJBL* learning model. The mean after the implementation of the ethnomathematics-based *PJBL* model is higher than before the implementation of *the ethnomathematics-based PJBL.*

Table 8. Hypothesis Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	46,39	18	14,892	3,510
	Posttest	84,33	18	11,056	2,606

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pretest - Posttest	-37,944	18,785	4,428	-47,286	-28,603	-8,570	17	,000

In addition, based on the data in the table, *the Sig. (2-tailed)* value is 0.000, which indicates that the Sig. value is less than 0.05. We reject and accept Ha if the *Sig. (2-tailed)* value is < 0.05, in accordance with the requirements for hypothesis testing. This shows that the quantitative literacy skills of students at SDN Patuk II have been positively influenced by the implementation of the *ethnomathematics* Project-Based Learning approach.

Discussion

This study was conducted at Patuk II Gunungkidul Public Elementary School. The research sample was one class, namely the fourth grade, consisting of 18 students. The purpose of the study was to determine whether the *ethnomathematics* based *Project Based Learning (PJBL*) model helped fourth grade students at Patuk II Public Elementary School improve their numeracy literacy in the 2024–2025

academic year. The students took a pretest to determine how successful this learning strategy would be.

The results obtained after implementing the *ethnomathematics* based *PJBL* model showed that the students' numeracy literacy skills had improved, according to the study. A comparison of the average pretest and posttest results showed a significant improvement, proving this point. Students still had difficulty understanding mathematical concepts in the real world, as evidenced by the relatively low average pretest score of 46.39. The posttest score of 84.33 showed a statistically significant improvement in students' numeracy literacy skills after being exposed to the *ethnomathematics* based *PJBL* paradigm.

The results of this study are in line with the findings (Setiarini & Wulandari, 2024): Jurnal Ilmiah Pendidikan Dasar, which shows that the application of the Tanean Lanjhang *ethnomathematics* based *PJBL* model also has a significant effect on improving the numeracy literacy of fourth grade students. In this study, the average posttest results of students were higher than the pretest results, and the paired sample t-test gave a significance value of 0.000 (<0.05). The similarity of these results reinforces that the integration of e*thnomathematics* in *PJBL* can improve numeracy literacy skills in elementary school students.

The findings of this study also reinforce the view that cultural integration in learning can be an effective strategy to overcome low student interest in mathematics. When students feel that the material being studied is close to their environment and culture, a positive attitude towards mathematics will be easier to form. Thus, ethnomathematics-based PJBL not only has an impact on improving numeracy literacy, but also on shaping students' attitudes and perceptions of the importance of mathematics in life.

Students benefited from this change because *ethnomathematics* based *PJBL* learning helped them connect abstract mathematical ideas with real world cultural situations. In this case, students were given culture themed projects that used geometric shapes, such as traditional buildings or local batik. Students were able to better understand and apply numeracy concepts, making the learning process more enjoyable.

The *PJBL* model also emphasizes collaborative work, independent investigation, and real-world problem solving. Students do not just learn passively, but are also actively involved in planning, creating products, calculating measurements, and presenting results. This approach encourages active student engagement, increases a sense of responsibility, and provides a meaningful and sustainable learning experience. Support from the ethnomathematics approach in *PJBL* learning has also proven effective in building connections between

mathematical concepts and real life. Students' critical and logical thinking skills are strengthened through culture-based learning, which also sparks interest and appreciation for local cultural history. Students acquire mathematical knowledge and 21st-century skills such as creativity, communication, teamwork, and problem solving through culture based projects.

Students' numeracy literacy improved after using the *ethnomathematics-based PJBL learning* model, based on the results of the initial and final tests. The results of the paired sample t-test applied to the initial and final test scores provided strong evidence. The results showed a Sig. value of less than 0.05, so that the *Sig. (2-tailed)* value was 0.000. Using hypothesis testing standards, the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted if the *Sig. (2-tailed)* value is below 0.05. The findings of the initial and final tests show that the application of the *ethnomathematics-based PJBL* method at Patuk II Elementary School significantly improved students' numeracy and literacy skills. In addition, improving numeracy literacy skills through ethnomathematics-based PJBL is also in line with the objectives of the Merdeka Curriculum, which emphasizes the importance of meaningful and contextual learning. By presenting projects that are relevant to everyday life and local culture, students not only learn abstract concepts but also understand the application of mathematics in real contexts. This shows that student involvement in project-based activities can increase learning motivation and foster a sense of ownership of the learning process.

CONCLUSION

This study concludes that the implementation of the ethnomathematics-based Project-Based Learning (PJBL) model significantly enhances students' numeracy literacy skills at Patuk II Public Elementary School, Gunungkidul. The comparison between the pre-test average score of 46.39 and the post-test average score of 84.33 demonstrates a substantial improvement of 37.94 points. Statistical analysis using the paired sample t-test revealed a significance value of 0.000 (<0.05), confirming that the difference between pre-test and post-test results is statistically significant.

The findings indicate that ethnomathematics-based PJBL not only improves students' ability to understand and apply mathematical concepts but also provides meaningful learning experiences by integrating cultural elements into mathematics instruction. This approach helps students connect abstract mathematical knowledge with real-life contexts, thereby strengthening their problem-solving, critical thinking, and collaborative skills.

Furthermore, the results align with the objectives of the 21st-century skills framework and the Merdeka Curriculum, which emphasize contextual and student-

centered learning. The integration of ethnomathematics into PJBL has proven to be an effective and relevant strategy to foster both academic achievement and cultural appreciation. Therefore, ethnomathematics-based PJBL can be considered an effective learning model to improve elementary students' numeracy literacy while supporting broader educational goals.

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