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Analysis of Students' Relational Understanding Ability Through the Application of Blended Learning Method

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abstract

The students' relational understanding by applying blended learning are described in this study. The research method is descriptive quantitative that performed by pre-experimental with a one-shot case study design. This study involves 33 students of class VIII in one of the Karawang State Junior High Schools, which was selected by purposive sampling. There are five questions on the post-test that use as instrument tests. The quantitative data analysis is based on the statistical descriptive and statistical tests. The results show that students who have a high category are six students (18%), the medium category is 25 students (76%), and the low category is two students (6%). The average of all students in the sample class is 61.36, still below the KKM=76. The median test obtained $0,149 \geq 0,025$, such that H_0 is rejected or H_a is accepted. It suggests that at the 95% confidence interval, the median student's relational understanding ability after applying the blended learning method could not reach the KKM.

Keywords:

Blended Learning Method, Relational Understanding



Open Access

INTRODUCTION

The impact of the coronavirus disease 2019 (COVID-19) pandemic is still prolonged and is being felt by the world of education. The Ministry of Education, Culture, Research, and Technology (Kemendikbud Ristek) said the implementation of Limited Face-to-face Learning (PTMT) was dynamic while still adjusting to the Implementation of Micro-Community Activity Restrictions (PPKM) in each region. This was confirmed by the Director-General of Early Childhood Education, Primary and Secondary Education (Dirjen PAUD Dikdasmen) Kemendikbud Ristek Jumeri in a virtual education talk show. The implementation of PTMT is based on the Decree of the Four Ministers and the Instruction of the Minister of Home Affairs Number 14 of 2021. It can be implemented in a district that is declared an orange or red zone with specific requirements. With this policy, student arrivals to school will be limited, both in the number of days and the number of students per class. For example, students come to school one day or three days a week, and the rest is distance learning. In order for the health protocol to be implemented, each class is filled by half the number, half the next day.

Facing conditions like this, both principals and teachers look for alternative ways that are appropriate and effective for use in teaching and learning activities. One alternative that can be used is to learn using the blended learning method. According to the current situation, the blended learning method can be implemented with various methods and strategies (Masyulah et al., 2021). According to Charman (Arifin & Abduh, 2021) revealed that blended learning is a learning approach that combines conventional learning (face to face) and distance learning with online learning resources using a variety of media options (text, images, diagrams, sound, video) that teachers and students from the internet can access. Bersin (Idris, 2018) describes the history of blended learning that developed in the training world at first, and in educational institutions, the primary learning source is the trainer/facilitator.

Blended learning is a collaboration between educators and students to improve student learning experiences. By experimenting with various learning strategies, evaluation, and continuous improvement through technology integration can enrich students' learning experiences and make learning meaningful. According to Sutopo (Aslamiyah et al., 2019) blended learning can improve the quality and quantity of a more competent relationship between humans in the learning environment, this is because blended learning is equipped with mixing technology and good relationships give birth to social, constructive encouragement and learning experiences. The principle of blended learning is communication between face-to-face learning reviews and online written communication (Riinawati, 2021). The application of the blended learning method can run well and be successful if an educator and students work together to do their best to meet the learning objectives (Masyulah et al., 2021). Learning components that complement each other in achieving the goals of various learning systems are to create a contributive learning atmosphere so that students optimally develop their potential (Ramadania & Aswadi, 2020).

According to Husaman (Abroto et al., 2021) the characteristics of blended learning are as follows: (1) Learning combines many methods of delivering teaching materials, teaching models, and various technology-based teaching materials; (2) As a combination of direct or face-to-face teaching, independent learning and online learning; (3) The learning experienced by students is a good combination of delivery methods and learning styles; and (4) The teaching and contributions of parents have an equally important position, namely as supporters, while teachers or instructors act as facilitators.

Blended learning can help overcome the problem of learning environments that cannot accommodate the diverse characteristics of students (Hendrik et al., 2021). In mixed learning, students are more flexible in learning time. Directing students to be more self-controlled and improve their individual learning abilities. By implementing the blended learning method, there will be changes, where the learning process does not only listen to material descriptions from the teacher but students can use e-learning facilities that can be accessed anywhere and anytime (Ramadania & Aswadi, 2020). This learning can show better differences in terms of motivation, interest, and student learning outcomes compared to other methods, especially methods in direct learning (Usman, 2018), so this method becomes an appropriate and effective alternative way that can be used in the learning process teach.

The blended learning method in this study is directed at improving students' relational understanding skills. As is well known, this relational understanding plays an important role in mathematics, because students who have a relational understanding are more likely to recognize functional relationships in concepts and correctly represent them than students who have operational understanding (Rahmi et al., 2021). Moreover, abstract mathematical objects and materials in mathematics lessons are not easy to understand, reducing students' interest in learning (Hariyanti et al., 2021). Thus, this study aims to determine whether the blended learning method can optimize students' relational understanding abilities.

METHODS

This study uses quantitative research methods with descriptive data analysis. Quantitative descriptive analysis was used to process the data obtained through the post-test. The post-test questions are in the form of material about quadrilaterals and triangles.

The type of research used is pre-experimental with a one-shot case study research design. The one-shot case study research design is a quasi-experimental study carried out without a comparison group and also without a pre-test (Wijayanti, 2019). In this case, the blended learning method acts as an independent variable, while the ability to understand relational as the dependent variable is observed in this study. Can be illustrated as follows:

Table 1. One-shot Case Study Research Design

X	O
Learning methods blended learning	Post-test to measure relational understanding ability

The instrument used was an essay test consisting of five questions. The subjects were 33 students in class VIII in one of the public junior high schools in Karawang, which were selected by purposive sampling technique. The observational data on students' relational understanding abilities in the learning process using the blended learning method was analyzed.

Based on the data analysis, students' relational understanding abilities can be described when applying blended learning which refers to five indicators of relational understanding abilities as follows: (1) The ability to classify objects based on whether or not the requirements that make up the concept are met; (2) The ability to restate the concepts that have been learned; (3) Ability to provide examples and counter examples of the concepts learned; (4) Ability to apply concepts in an algorithmic manner; and (5) The ability to relate various concepts (internal and external mathematics). The quantitative data analysis is based on the statistical descriptive and statistical tests. Subsequent calculations correspond to appropriate descriptive statistics (percent, mean, SD, or correlation); visualizing data (boxplot diagram); and interpret data. In the calculation with differential statistical tests by testing for normality, and hypothesis testing using the median test (sign test) on one sample.

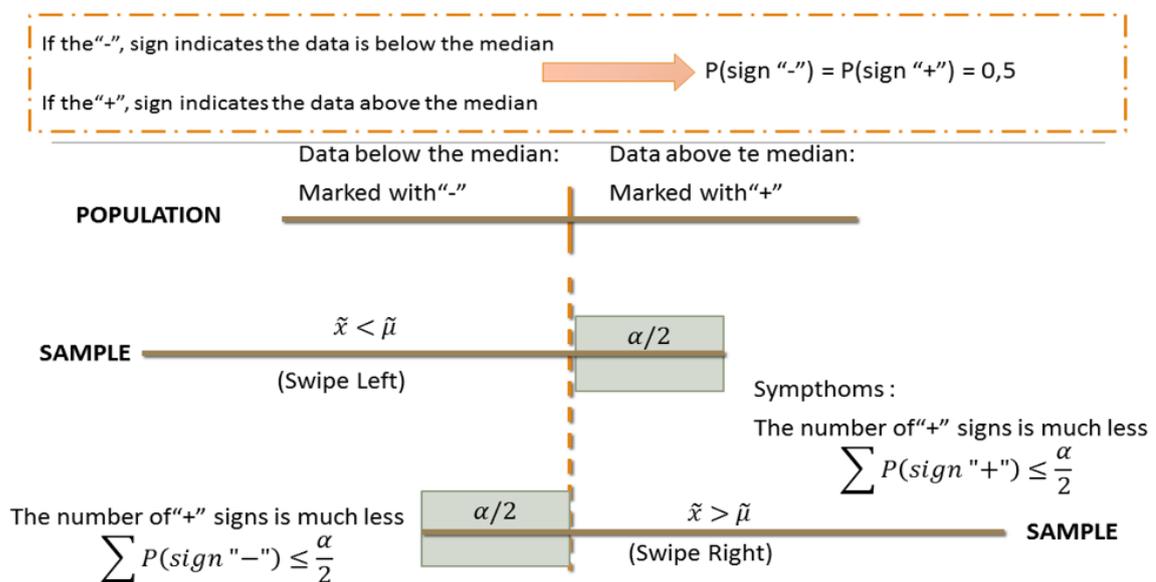


Figure 1
Sign Test Step

RESULT AND DISCUSSION

Result

Data from the students' relational understanding ability test results were processed using IBM SPSS.25. The descriptive statistics of the test data are presented in the table below.

Table 2. Descriptive Statistics Test of Students' Relational Comprehension Ability

Statistics	
Mean	61.36
Median	60.00
Mode	55
Std. Deviation	20.321
Range	90
Minimum	0
Maximum	90

The results of the descriptive statistics in Table 1 are represented graphically as follows.

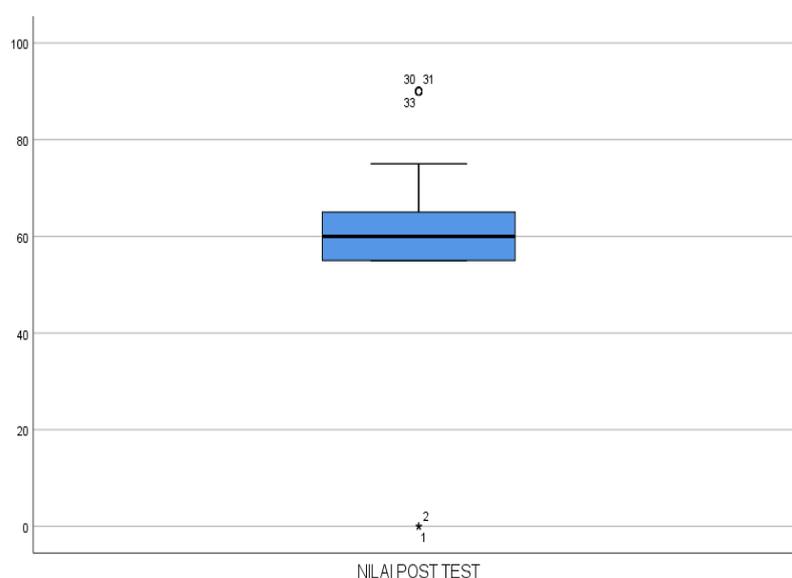


Figure 2

Boxplot Diagram of Students' Relational Understanding Ability Test

Based on the boxplot diagram, it is known that there are three data that are the top outlier (major outlier) and one bottom outlier (minor outlier). This shows that there are three students whose scores are higher than the other students (exceeding the upper quartile deviation limit). However, there is also a student whose score is very low compared to other students (over the lower quartile deviation limit). Furthermore, students' relational understanding abilities will be analyzed based on their level (high, medium, and low categories) using the following criteria.

Table 3. Criteria for Relational Understanding Ability

No	Criteria	Interval	Frequency	%	Category
1	$x < \bar{x} - s$	$x < 41$	2	6	Low
2	$\bar{x} - s \leq x \leq \bar{x} + s$	$41 \leq x \leq 82$	25	76	Medium
3	$x > \bar{x} + s$	$x > 82$	6	18	High

Description : x states the student's score on the relational comprehension ability test

The categories of student abilities based on the above criteria are represented through the following pie chart.

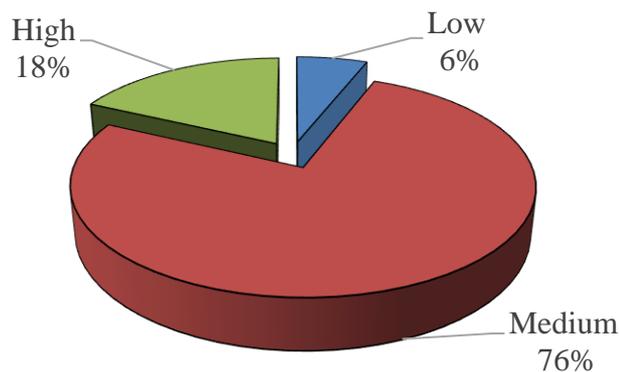


Figure 3

Pie Chart Percentage of Relational Understanding by Category Level

The table and figure above show that most of the students have relational understanding abilities in the moderate category, with a percentage gain of 76%. Meanwhile, a small percentage of students in the high and low categories obtained percentages of 18% and 6%, respectively.

In order to find out whether students' relational understanding abilities after applying the blended learning method can reach the Minimum Completeness Criteria (KKM = 76), hypothesis testing is carried out for one sample. Previously, the normality assumption test was carried out first, so that the results were obtained as presented in Table 3.

Table 4. Analysis of Post-test Results Normality Test

One-Sample Kolmogorov-Smirnov Test		
		Post-test value
N		33
Normal Parameters ^{a,b}	Mean	61.36
	Std. Deviation	20.321
	Most Extreme Differences	
	Absolute	.316
	Positive	.193
	Negative	-.316
Test Statistic		.316
Asymp. Sig. (2-tailed)		.000 ^c

In Table 4, the data normality test uses the Kolmogorov-Smirnov test by comparing the value of probability numbers or Asymp. Sig (2-tailed) with a significance level of 0.05 or 5%. Based on the Kolmogorov-Smirnov test, the Asymp value is obtained. Sig (2-tailed) of 0.000, the result is smaller than the significance level of 0.05, it can be concluded that the data is not normally distributed. Thus, hypothesis testing for one sample is carried out by testing the median of one sample, with the formulation of the hypothesis as follows.

H_0 : $Me = 76$, median of students' relational understanding ability after applying the blended learning method can reach the KKM.

H_a : $Me \neq 76$, the median ability of students' relational understanding after the application of the blended learning method could not reach the KKM.

In summary the results of the sign test (testing the median of one sample) based on the hypothesis can be seen through the following calculations:

The least sign is “+” so $x = 11$ and $n = 24$

$$P(\text{Sign } +) = \sum b(x, n, 0,5)$$

$$P(\text{Sign } +) = \sum b(11, 24, 0,5)$$

Based on the binomial table, the results obtained

$$P(\text{Sign } +) = 0,148782$$

Based on Figure 2, if $P(\text{sign}) \leq \frac{\alpha}{2}$ namely $P(\text{sign}) \leq 0.025$, then H_a is accepted and H_0 is rejected. From the calculation results obtained $0,148782 \geq 0,025$, this means that H_a is accepted, H_0 is rejected. The results of this test concluded that at the 95% confidence interval, the median student's relational understanding ability after the application of the blended learning method could not reach the KKM.

Discussion

In implementing blended learning, the teacher demonstrates skills or presents information step by step to guide students in understanding the material to be taught. Based on the descriptive analysis of the students' relational understanding ability towards the application of the blended learning method, from 33 students, six of them were in the high category or 18%; the medium category was 25 students (76%), and the low category was two students (6%). The average of all sample class students is 61.36, still below the $KKM = 76$. This is in line with the results of hypothesis testing, which shows that students' median relational understanding ability after applying the blended learning method cannot reach the KKM. It indicates that the implementation of the blended learning method is not optimal and still requires a lot of improvement, especially in the current COVID-19 pandemic, where face-to-face learning is limited.

Obstacles experienced while implementing blended learning were especially felt during the online distance learning phase, namely the reduced level of student participation. Technical obstacles are the main factor influencing the lack of participation. The technical obstacles referred to include unstable signals, limited

internet quota, inadequate communication tools (handphones), lack of support from parents. Meanwhile, the limited face-to-face phase has not been implemented optimally. The interaction between teachers and students is limited because they must continue to carry out health protocols while carrying out PTM by maintaining a safe distance. These obstacles are factors that cause the implementation of the blended learning method could not optimize students' relational understanding abilities.

CONCLUSION AND IMPLICATION

Conclusion

Based on the exposure of the research results, it can be concluded that learning mathematics with the blended learning method in class VIII students at one of the Karawang State Junior High Schools is considered unable to optimize students' relational understanding abilities. The hypothesis test result shows that at a 95% confidence interval, the median ability of students' relational understanding after applying the blended learning method cannot reach KKM = 76.

Implication

Theoretical Implications

1. The selection of the right learning method can affect the achievement of students' relational understanding abilities.
2. Student participation and parental support have an influence on relational understanding abilities. Students with high participation and support certainly have better relational understanding abilities than students with moderate and low participation and support.

Practical Implications

The results of this study are used as input for principals, teachers and prospective teachers. Improving themselves in relation to the teaching that has been done and the students' relational understanding abilities that have been achieved by paying attention to appropriate learning methods and increasing student participation and parental support in the teaching and learning process.

Further researchers should be able to develop this research by reaching out to other factors that affect students' relational understanding abilities, so that the research results can really prove that the blended learning method can optimize students' relational understanding abilities.

Conclusions and implications for further implementations should be provided. Theoretical implications and practical significance of the study are discussed. Implications for further implementations, suggestions for further research, and limitations of the current study are provided.

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