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THE CORRELATION OF MATHEMATICAL LOGIC INTELLIGENCE AND LEARNING DISCIPLINE WITH THE ABILITY OF MATHEMATICAL CONCEPTUAL UNDERSTANDING IN DIFFERENTIATION LEARNING

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Abstract

This research aims to describe the relationship between mathematical logic intelligence and learning discipline with the ability to understand mathematical concepts and determine the achievement of KKM in the ability to understand mathematical concepts in differentiated learning. This research method is correlation research with a quantitative approach. The results of the research show that (1) There is a relationship between mathematical logic intelligence and students' ability to understand mathematical concepts. The results show that the Pearson product moment correlation coefficient is 0.736 which is in the strong relationship category and the determinant coefficient is 54.16%; (2) There is a relationship between learning discipline and students' ability to understand mathematical concepts, obtained by the Pearson product moment correlation coefficient of 0.661 which is in the strong relationship category and the determinant coefficient is 43.69%; (3) There is a relationship between mathematical logic intelligence and learning discipline and students' ability to understand mathematical concepts, resulting in a multiple correlation coefficient of 0.786 which is in the strong relationship category and a determinant coefficient of 61.77%; (4) From the results of data calculations, students' ability to understand mathematical concepts has the coefficient results of one sample t-test with Asymp. Sig (2-tailed) = 0.001, then 0.001 < 0.05 so it can be concluded that the ability to understand concepts with differentiated learning can help class IV A students at SDN 27 Singkawang achieve the minimum completeness criteria (KKM).

Keywords: *Ability of Mathematical Conceptual Understanding; Differentiated Learning; Learning Discipline; Mathematics; Mathematical Logical Intelligence*

Abstrak

Penelitian ini bertujuan untuk mendeskripsikan hubungan antara kecerdasan logika matematis dan kedisiplinan belajar dengan kemampuan pemahaman konsep matematis serta mengetahui ketercapaian KKM kemampuan pemahaman konsep matematis dalam pembelajaran *berdiferensiasi*. Metode penelitian ini merupakan penelitian korelasi dengan pendekatan kuantitatif. Hasil penelitian menunjukan bahwa (1) Terdapat hubungan antara kecerdasan logika matematis dan kemampuan pemahaman konsep matematis siswa diperoleh hasil koefisien korelasi *pearson product moment* sebesar 0,736 yang berada pada kategori hubungan kuat dan koefisien determinan sebesar 54,16%; (2) Terdapat hubungan antara kedisiplinan belajar dan kemampuan pemahaman konsep matematis siswa diperoleh hasil koefisien korelasi *pearson product moment* sebesar 0,661 yang berada pada kategori hubungan kuat dan koefisien determinan sebesar 43,69%; (3) Terdapat hubungan antara kecerdasan logika matematis dan kedisiplinan belajar dengan kemampuan pemahaman konsep matematis siswa diperoleh hasil koefisien korelasi berganda sebesar 0,786 yang berada pada kategori hubungan kuat dan koefisien determinan sebesar 61,77%; (4) Dari hasil perhitungan data kemampuan pemahaman konsep matematis siswa memiliki hasil koefisien *one sample t-test* dengan Asymp. Sig (2-tailed) = 0,001, maka 0,001 < 0,05 sehingga dapat disimpulkan bahwa kemampuan pemhaman konsep dengan pembelajaran *berdiferensiasi* dapat membantu siswa kelas IV A SDN 27 Singkawang dalam mencapai kriteria ketuntasan minimal (KKM).

Kata Kunci: Kecerdasan Logika Matematis; Kedisiplinan Belajar; Kemampuan Pemahaman Konsep Matematis; Pembelajaran Berdiferensiasi; Matematika

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Introduction

Education is a basic need for every human being. Therefore, everyone has the right to a good education in order to obtain a decent life. This has been regulated in the 1945 Constitution Chapter XIII concerning Education and Culture, Article 31 which states "every citizen has the right to education". Education begins with education in the family, then continues with formal education when a person reaches school age. However, most students don't like mathematics lessons, because mathematics questions are difficult to do, so many students always complain about the questions. Although basically students' ability to understand mathematical concepts is very different from other students. The level of success of students in mastering learning depends on the extent to which students master the learning concept (Sari & Sumarli, 2019). But by understanding a concept you can make it easier for students to learn mathematics. Elementary students' lack of understanding of concepts results in students having difficulty in the learning process. Students are unable to explain the material that has been presented and are unable to do the questions that have been given well. Students' lack of attention to the material being taught results in lessons being limited to memorizing concepts without understanding the meaning of the concepts being studied (Sumarli, et al., 2022). The ability to understand mathematical concepts is the ability to understand mathematical concepts, operations and relationships (Sudarman & Linuhung, 2017). Apart from that, students will also find it easier to accept new concepts. Understanding concepts is not just by memorizing but by studying concrete examples so that students are able to define them.

One of the things that can influence students' understanding of mathematical concepts is the mathematical logical intelligence possessed by the students themselves. High mathematical logical intelligence has a better ability to understand concepts than students with low mathematical logical intelligence (Manaksia, 2019: 7). Mathematical logical intelligence is one of the intelligences that students must have. Because with mathematical logical intelligence students can easily solve the mathematical problems given. This mathematical logical intelligence is a combination of the level of systematic calculation and reasoning. Mathematics is also the science that underlies the development of modern technology, has an important role in various scientific disciplines and advances human thinking (Sari et al., 2016). Mathematics subjects need to be given to all students starting from elementary school, to equip students with the ability to think logically, analytically, systematically, critically, innovatively and creatively, as well as the ability to collaborate (Rosmaiyadi, 2017). Logical-mathematical intelligence is very suitable for mathematics learning which prioritizes calculation and logic skills.

Apart from intelligence, learning discipline also influences the ability to understand mathematical concepts. Based on the researcher's initial observations, there are several factors that are considered to influence students' ability to understand concepts, including student learning motivation, learning independence, and learning discipline. One of the student behaviors that is more focused on in this research is learning discipline. Discipline associated with children's abilities in the 21st century involves the ability to think critically, communicate effectively, collaborate, adapt, and develop ethical character. Children are expected to have several skills that are very important to prepare them to face complex global challenges. The factor that has an influence on the ability to understand concepts is student learning discipline. Discipline is a series of self-processes to be obedient, orderly, obedient and orderly in learning so as to make students better and more responsible in the learning process. So it can be said that an important factor in increasing students' understanding of mathematical concepts is learning discipline (Muzamil, 2018).

Learning discipline is an internal factor that can influence students' ability to understand mathematical concepts because it arises from the students themselves. By creating a sense of discipline in students in the learning process, it will provide benefits and a way for students to be successful in learning. This is in line with Tu'u (Supardi, 2014: 82) who stated that discipline is a way for students to be successful in learning and later when working. Apart from that, teachers must also instill a disciplined attitude in students. Everything must prioritize discipline,

both in the world of education and in society. A person's learning discipline can be measured by several discipline indicators. This discipline indicator can be used as a tool to determine a person's level of discipline.

Apart from that, teachers must instill discipline in students. Teachers must also be able to read the class situation, not all students are easy to manage and not all students can be generalized in their teaching tricks. Therefore, teachers must have tricks that can enable each student to follow the lesson well. The differentiated learning process can be utilized by schools to give students the freedom to learn, because students do not have to be capable in all fields, but can explore themselves according to their respective abilities. The principle of differentiated learning in the independent curriculum is not only gaining understanding and learning experience, but also efforts to form a Pancasila student profile (Martanti et al., 2021). Moral values need to be integrated into learning, one of which is through Pancasila Education (Wadu et al., 2019).

Even though the government determines learning skills/outcomes in the curriculum, it is actually used as a pathway that leads Indonesian children to their final destination. Currently, Indonesia uses the 2013 Curriculum and the Independent Curriculum. In the Independent Curriculum, the education unit must design a curriculum that is adapted to the characteristics of the school and the unique needs of the teaching unit. This curriculum requires the role of teachers to implement differentiated learning.

However, in reality, Gusteti & Neviyarni, (2022: 637) stated that educational units have not created a curriculum that can truly be adapted to the needs of students in each institution. Thus, the Independent Curriculum is a curriculum that supports research with a focus on the needs and potential of students, project learning, adaptive abilities, flexible learning, implementation at various levels of education, character development,As is common knowledge, there are many different types of children in schools or even classrooms, each with unique interests, skills, and learning preferences. Therefore, in order for them to develop optimally, various educational services are needed that enable them to understand skills and lessons, according to the particularities and individuality of each individual. Therefore, a teaching method is needed that considers the unique qualities and differences of each student.This is also in line with the results of the researchers' pre-research, several problems were found.

Problems related to mathematics subjects are also found at SD Negeri 27 Singkawang. Based on interviews with class IV homeroom teachers and conducting pre-research at SD Negeri 27 Singkawang on March 7 2024, problems in mathematics subjects are specifically related to the student learning process. The first problem is that there are still some students who cannot work on the mathematics problems given by the teacher because the students' logical-mathematical intelligence is not yet functioning optimally. This is characterized by students' lack of skills in calculating and solving mathematical problems. This is also reinforced by the results of pre-research conducted by researchers on March 7 2024, namely by giving students who could not answer and these students wrote the answer in words and presented it in Fig. 1.

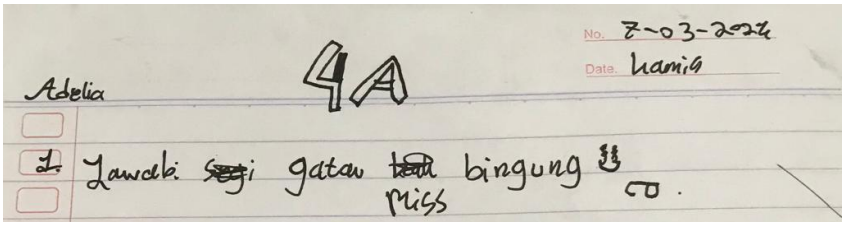

Figure 1. Mathematical Logic Intelligence Research Results

The second problem is violations of school rules committed by students, there are still students who do not attend school on time, some students are late in submitting assignments or ignore assignments given by the teacher, some students are not focused on paying attention to the teacher's explanations, there are some students talk or joke with friends when the teacher

explains the material, there are still many students who do their homework at school, and some students who do not get help from their parents in guiding students to do their homework means there are problems in the student's learning discipline department.

Then the third problem is that students' ability to understand mathematical concepts in mathematics learning is still relatively low because most of their scores are below the Minimum Completeness Criteria (KKM) standards. Based on the results of the researchers conducting pre-research by giving students 3 pre-research questions that were in accordance with the indicators of ability to understand mathematical concepts, it was found that the overall average score of students was 51, which is the Minimum Completeness Criteria (KKM) standard at SDN 27 Singkawang class IV in this independent curriculum determined with a value of 65. This is supported by the results of pre-research conducted by researchers on March 7 2024 and presented in Fig. 2.

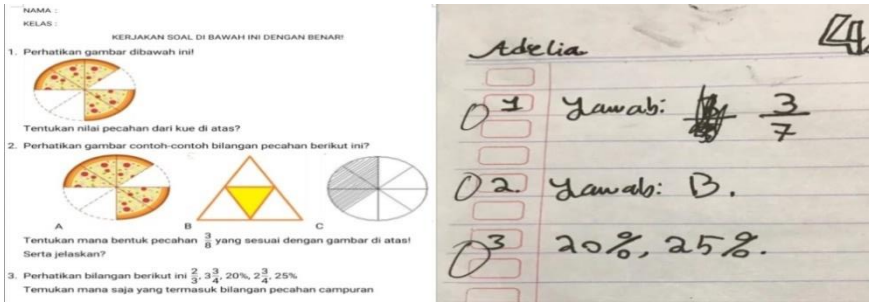

Figure 2. Pre-research Questions and Results Concept Understanding Ability

Based on Fig. 2, this can be seen in the picture above based on the answer of one of the students to question number 1 with the indicator restating a concept. It is hoped that the student can explain the value of the fraction in the picture of the pizza, but in reality the student cannot determine the value of the fraction. In question number 2 with indicators that provide examples and non-examples of the concept, the results of pre-research show that students cannot provide examples of images of the fractional values. In question number 3 with indicators of applying concepts or problem solving algorithms, the pre-research results show that students do not understand how to do it correctly. This identifies that students' ability to understand mathematical concepts is still relatively low

The fourth problem is student diversity, namely students who are bored because they have actually mastered the skills being taught, so learning is no longer challenging for them, students who are struggling hard to try to understand what is being taught, but because there is too big a gap between what they are capable of. do with what is being studied, ultimately students cannot make connections, students who have emotional problems, and students who have a great interest in certain fields.

The fact that students have diverse characteristics, with different uniqueness, strengths and learning needs, of course needs to be responded to appropriately. If not, then of course there will be a learning gap, where the achievement shown by the student does not match the potential achievement that the student should be able to demonstrate. One way we can respond to the characteristics of these diverse students is by implementing differentiated learning.

Based on the problems stated above, the researcher can conclude that these various problems indicate that students' logical-mathematical intelligence is not yet functioning optimally and that students lack discipline in learning mathematics, which can affect students' ability to understand mathematical concepts in students' mathematics learning. Starting from this description, researchers need to test whether there is a positive and significant relationship between mathematical logic intelligence and learning discipline and the ability to understand mathematical concepts in differentiated learning. Based on relevant research conducted by Fahrudin Ikhsan, Bachelor of Education, Mathematics Education Study Program, Faculty of Education, Widya Dharma University, Klaten 2017. Title "The Relationship Between Logical Mathematical Intelligence and Learning Discipline with Mathematics Learning Achievement

Jurnal Cakrawala Pendas Vol. 10, No. 4, October 2024, pp. 787-802

of Grade VII Students of SMP Negeri 4 Ngawen Gunung Kidul in the 2017/2018 Academic Year". This research was conducted on grade VII students of SMP Negeri 4 Ngawen Gunungkidul in the 2017/2018 Academic Year". From a population of 138 students, a sample of 108 students was taken as the subject of the research. Thus, this research aims to describe the relationship between mathematical logic intelligence and learning discipline with the ability to understand mathematical concepts and determine the achievement of KKM in the ability to understand mathematical concepts in differentiated learning.

Research Methods

This type of research was correlation research with quantitative methods related to numerical data that can be calculated mathematically and systematically. This research was conducted at SDN 27 Singkawang, on Jalan Alianyang, Pasiran sub-district, West Singkawang District Number 56C, Singkawang City. Research in class IV at SDN 27 Singkawang was carried out in June 2024 of the 2023/2024 academic year.The population in this study was all class IV students at SDN 27 Singkawang, there were 54 students consisting of two groups, namely groups A and B. The sampling technique was called purposive sampling. The sample in this study was the entire IVA class, totaling 29 students.

The data collection techniques used in this research were measurement techniques and questionnaire techniques. The data collection instrument in this research was about the ability of mathematical conceptual understanding in the form of essays consisting of 3 questions and a questionnaire sheet on mathematical logic intelligence and learning discipline. There were three data analysis techniques used in this research, namely a simple correlation test to describe the correlation between mathematical logic intelligence and the ability of mathematical conceptual understanding and to describe the correlation between learning discipline and the ability of mathematical conceptual understanding. Next, the multiple correlation test was to describe the correlation between mathematical logic intelligence and learning discipline with the ability of mathematical conceptual understanding. Then finally test the one sample t-test to determine the achievement of KKM in the ability of mathematical conceptual understanding in differentiated learning.

Results and Discussion

Results

In this section, the results of the research that have been formulated in the problem formulation section are presented. This research was conducted at SD Negeri 27 Singkawang. For student data used as research subjects by researchers, namely class IV A which consists of 29 students. Before conducting research, researchers have carried out trials and calculated validity, reliability, distinguishing power, and difficulty index on questions, questionnaires, and teaching modules in accordance with the contents of chapter III. The variables in this research were mathematical logic intelligence (X1), learning discipline (X2), and students' ability of mathematical conceptual understanding (Y). Mathematical logic intelligence and learning discipline are independent variables, while the ability of mathematical conceptual understanding is the dependent variable along with research results based on problem formulations one to four.

The correlation between mathematical logical intelligence and the ability of mathematical conceptual understanding in Students' Differentiated Learning Furthermore, a normality test was carried out on the data on the values of mathematical concept understanding ability and mathematical logic intelligence using the Shapiro-Wilk test.

Table 1. Output Table of Data Normality Test for Concept Understanding Ability Test and Logical Intelligence Questionnaire

Tests of Normality		
	Kolmogorov-Smirnov[a]	Shapiro-Wilk

	Statistic	df	Sig.	Statistic	df	Sig.
logical intelligence	.128	29	.200*	.958	29	.299
conceptual understanding ability	.163	29	.048	.934	29	.070

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

a. Lilliefors Significance Correction

The Shapiro-Wilk normality test shows that mathematical logic intelligence has a test value of 0.958 with a significance of 0.299 and the ability to understand concepts has a test value of 0.934 with a significance of 0.070. Therefore, the significance value is greater than 0.05, so the alternative hypothesis is accepted, meaning that both data are normally distributed.

Table 2. Output Table of Linearity Test of Mathematical Conceptual Understanding Ability and Mathematical Logical Intelligence Test Data

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
conceptual understanding ability * logical intelligence	Between Groups	(Combined)	3664.573	8	458.072	4.100	.005
		Linearity	3194.988	1	3194.988	28.597	.000
		Deviation from Linearity	469.584	7	67.083	.600	.748
	Within Groups		2234.462	20	111.723		
	Total		5899.034	28			

Using the linear regression analysis test shows that the Deviation from Linearity Sig value is obtained. is 0.748 greater than 0.05. So it can be concluded that there is a significant linear relationship between the Mathematical Logic Intelligence variable (X1) and the ability of mathematical conceptual understanding variable (Y).

Table 3. Pearson Product Moment Correlation Test

Correlations

		kecerdasan logika	kemampuan pemahaman konsep
logical intelligence	Pearson Correlation	1	.736**
	Sig. (2-tailed)		.000
	N	29	29
conceptual understanding ability	Pearson Correlation	.736**	1
	Sig. (2-tailed)	.000	
	N	29	29

**. Correlation is significant at the 0.01 level (2-tailed).

Using the Pearson product moment correlation test shows that the correlation coefficient obtained is 0.736 and the significance value is 0.000. Based on these results, it can be concluded that the alternative hypothesis is accepted, meaning that there is a relationship between mathematical logic intelligence and students' ability to understand mathematical concepts in the

strong category. The results of the correlation test were then retested to determine the determination of one variable using the coefficient of determination test. The results of the test are as follows:

KP = 0.7362 x 100%
= 54.16%.

Based on the results of these calculations, it can be concluded that logical mathematical intelligence has a very large influence of 54.16%, while the remaining 45.84% is influenced by other factors.

The correlation between learning discipline and the ability of mathematical conceptual understanding in students' differentiated learning.

Table 4. Recapitulation of Normality Test of Learning Discipline Questionnaire Data and the Mathematical Conceptual Understanding Ability Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
conceptual understanding ability	.163	29	.048	.934	29	.070
learning discipline	.172	29	.028	.939	29	.094

a. Lilliefors Significance Correction

Using the Shapiro-Wilk normality test shows that learning discipline has a test value of 0.939 with a significance of 0.094 and the ability to understand concepts has a test value of 0.934 with a significance of 0.070. Therefore, the significance value is greater than 0.05, so the alternative hypothesis is accepted, meaning that both data are normally distributed.

Table 5. Recapitulation of Linearity Test of Learning Discipline Questionnaire Data and the Mathematical Conceptual Understanding Ability Test

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
conceptual understanding ability * learning discipline	Between Groups	(Combined)	3189.618	8	398.702	2.943	.024
		Linearity	2580.927	1	2580.927	19.052	.000
		Deviation from Linearity	608.691	7	86.956	.642	.717
	Within Groups		2709.417	20	135.471		
	Total		5899.034	28			

Using the linear regression analysis test shows that the Deviation from Linearity Sig value is obtained. is 0.717 greater than 0.05. So it can be concluded that there is a significant linear correlation between the learning discipline variable (X2) and the ability of mathematical conceptual understanding variable (Y).

Table 6. Pearson Product Moment Correlation Test

Correlations

		kedisiplinan belajar	kemampuan pemahaman konsep
kedisiplinan belajar	Pearson Correlation	1	.661**
	Sig. (2-tailed)		.000
	N	29	29
kemampuan pemahaman konsep	Pearson Correlation	.661**	1
	Sig. (2-tailed)	.000	
	N	29	29

**. Correlation is significant at the 0.01 level (2-tailed).

Using the person product moment correlation test shows that the correlation coefficient obtained is 0.661 and the significance value is 0.000. Based on these results, it can be concluded that the alternative hypothesis is accepted, meaning that there is a relationship between learning discipline and students' ability to understand mathematical concepts in the strong category. The results of the correlation test were then retested to determine the determination of one variable using the coefficient of determination test. The results of the test are as follows:

KP = 0.661^2 x 100%

= 43.69%.

Based on the results of the calculation, it can be concluded that learning discipline has a very large influence of 43.69%, while the remaining 56.31% is influenced by other factors.

Correlation between Mathematical Logical Intelligence and Learning Discipline with Students' Ability of Mathematical Conceptual Understanding in Differentiated Learning.

Table 7. Recapitulation of Data Normality Test for Mathematical Logical Intelligence Questionnaire, Learning Discipline Questionnaire, and Mathematical Conceptual Understanding Ability Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
logical intelligence	.128	29	.200*	.958	29	.299
learning discipline	.172	29	.028	.939	29	.094
conceptual understanding ability	.163	29	.048	.934	29	.070

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

a. Lilliefors Significance Correction

Using the Shapiro-Wilk normality test shows that mathematical logic intelligence has a test value of 0.958 with a significance of 0.299, then learning discipline has a test value of 0.939 with a significance of 0.094 and the ability to understand concepts has a test value of 0.934 with a significance of 0.070. Therefore, the three data have a significance value greater than 0.05, so the alternative hypothesis is accepted, meaning that the three data are normally distributed.

Using a linear regression analysis test shows that the Deviation from Linearity Sig value is obtained. are 0, 748 and 0.717 which are greater than 0.05. So it can be concluded that there is a significant linear relationship between the variables Mathematical Logical Intelligence (X1) and Learning Discipline (X2) with the variable Ability of Mathematical Conceptual Understanding (Y).

Table 8. Multiple Correlation Test Output Results

Jurnal Cakrawala Pendas Vol. 10, No. 4, October 2024, pp. 787-802

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.786[a]	.617	.588	9.316	.617	20.982	2	26	.000

a. Predictors: (Constant), learning discipline, logical intelligence

Using the multiple correlation test shows that the correlation coefficient obtained is 0.786 and the significance value is 0.000. Based on these results, it can be concluded that the alternative hypothesis is accepted, meaning that there is a relationship between mathematical logic intelligence and learning discipline and students' ability to understand mathematical concepts in the strong category. The results of the correlation test were then retested to determine the determination of one variable using the coefficient of determination test. The results of the test are as follows:

KP = 0.786^2 x 100%
= 61.77%.

Based on the results of these calculations, it can be concluded that logical mathematical intelligence and learning discipline have a significant influence of 61.77%, while the remaining 38.23% is influenced by other factors.

The ability of mathematical conceptual understanding taught with differentiated learning goes beyond KKM

Table 9. Data Normality Test Output Results of Mathematical Conceptual Understanding Ability Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
conceptual understanding ability	.163	29	.048	.934	29	.070

a. Lilliefors Significance Correction

Using the Shapiro-Wilk normality test shows that the ability to understand concepts has a test value of 0.934 with a significance of 0.070. Therefore, the significance value is greater than 0.05, so the alternative hypothesis is accepted, meaning that the data is normally distributed.

Table 10. One Sample T-Test Output Results

One-Sample Test

	Test Value = 60					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper
conceptual understanding ability	3.557	28	.001	9.586	4.07	15.11

Using the One Sample T-Test, the Sig value is known. (2-tailed) is 0.001. Therefore, the significant value is smaller than 0.05, so the hypothesis Ho is accepted and Ha is rejected, meaning that the average value of students' ability of mathematical conceptual understanding in differentiated learning has exceeded the KKM.

Discussion

After the researcher carried out a correlation analysis and achievement of KKM in differentiated learning, the correlation coefficient and achievement of KKM in differentiated learning were obtained. Correlation is used to determine whether there is a relationship between the variables studied or not. To find out the closeness of the relationship, you can look at the magnitude of the correlation coefficient according to the guidelines, namely if the coefficient is closer to 1 or -1, then there is a close or strong relationship, whereas if the coefficient is closer to 0, then the relationship is weak. Based on the results of the research hypothesis test from the data presented above, a discussion of the research results was carried out. The results of the discussion include the following.

The relationship between mathematical logic intelligence and the ability to understand mathematical concepts in students' differentiated learning. From the calculated data, the results of analysis using Pearson product moment correlation show a positive and significant relationship between mathematical logic intelligence and the ability to understand mathematical concepts in differentiated learning. A positive relationship can be seen from the positive correlation coefficient value. This shows that the stronger the student's mathematical logic intelligence, the higher the student's ability to understand mathematical concepts in differentiated learning or the weaker the student's mathematical logic intelligence, the lower the student's ability to understand mathematical concepts in learning mathematics.

In everyday life, children who have mathematical logical intelligence tend to like counting activities and have high speed in solving mathematical problems (Yaumi, 2012). This is confirmed by research conducted (Abdelhamid et al., 2016) which found that the clear results of the relationship between all topics in mathematics and logical intelligence were greater than other intelligence patterns, especially in Pre-Calculus, so it is highly suspected that mathematical logical intelligence has an influence on understanding abilities. students' mathematical concepts.

The results of this research support Howard Gardner's theory of multiple intelligences, which states that mathematical logic intelligence plays an important role in understanding mathematical concepts. These findings are also in accordance with Piaget's theory of cognitive development, showing that mathematical logic intelligence influences the progress of students' understanding of concepts through the stages of cognitive development.

The results of this study are in line with several similar studies. Research conducted by Fauzi & Rohma (2023) entitled the influence of mathematical logic intelligence on students' ability to understand mathematical concepts. The research results concluded that there was a significant influence between mathematical logic intelligence and the ability to understand mathematical concepts of MI Miftahul Ulum Pandanarum students. The results of the simple linear regression test show that there is a positive influence between mathematical logic

intelligence and students' ability to understand concepts. Every 1% increase in mathematical logic intelligence has an effect on an increase of 0.242 in students' ability to understand concepts.

Apart from that, research conducted by Milsan et al (2018) entitled the relationship between mathematical logical intelligence and learning outcomes resulted in testing the research hypothesis by calculating the coefficient between X and Y using the Product Moment Correlation formula. From the calculation results of the hypothesis test, the calculated rxy value = 0.866, then compared with rtable at a significant level of 0.05, the rtable value for dk = 91 and $\alpha = 0.05$ is = 0.207, therefore calculated rxy > rtable, so H1 is accepted. The magnitude of the relationship or correlation between mathematical logical intelligence and mathematics learning outcomes after analysis showed a correlation of r = 0.866 with a coefficient of determination of 75%. Thus it is concluded that there is a significant relationship between mathematical logical intelligence and mathematics learning outcomes in Class V students.

So the conclusion that can be drawn is whether a student's mathematical logic intelligence is strong or weak, which is related to the ability to understand mathematical concepts. In other words, if a student's mathematical logic intelligence is strong, the higher the student's ability to understand mathematical concepts in differentiated learning or conversely, the weaker the student's mathematical logic intelligence, the lower the student's ability to understand mathematical concepts in differentiated learning.

The relationship between learning discipline and students' ability to understand mathematical concepts in differentiated learning. From the calculated data, the results of analysis using Pearson product moment correlation show a positive and significant relationship between learning discipline and the ability to understand mathematical concepts in differentiated learning. A positive relationship can be seen from the positive correlation coefficient value. This shows that the stronger the student's learning discipline, the higher the student's ability to understand mathematical concepts in differentiated learning or the weaker the student's learning discipline, the lower the student's ability to understand mathematical concepts in learning mathematics.

The research results above are also reinforced by several opinions that there is a significant relationship between learning discipline and the ability to understand concepts. The ability to understand mathematical concepts is one of the goals in mathematics learning which is emphasized in the process, because mastering the concepts will make it easier for students to learn and solve mathematical problems that are needed now and in the future, easily and precisely. One of the mathematical skills that is very important for students to have, and refers to mathematical ideas in solving a mathematical problem, namely the ability to understand concepts (Sari et al., 2020). Learning discipline and learning intensity influence the ability to understand concepts. These results are in accordance with previous research (Purwaningsih et al .,2020) which showed that the influence of learning discipline variables and learning intensity on the ability to understand concepts was 83%. The F value = 31.799 with a sig of 0.000 < 0.05, which means that learning discipline and learning intensity together influence the ability to understand concepts. The regression coefficient for learning discipline is 3.151 and learning intensity is -2.737. Based on the research results above, it can be concluded that there is a positive influence of learning discipline and learning intensity on the ability to understand concepts in linear algebra courses. Apart from that, research from Munte (2016) shows that the influence of learning discipline is 26% on learning outcomes. And research by Selang, Wahjoedi, & Wahyono (2015) shows that there is a significant influence between the intensity of studying economics on rationality in consumption with a coefficient of 0.407. Then there is also research from Pratiwi et al. (2021). The research results showed that the regression equation Y = 21.62 + 0.82 X. Then, based on hypothesis testing, the results showed that there was a significant influence of learning discipline on the ability to understand mathematical concepts. Furthermore, the Coefficient of Determination (KD) value obtained was 65% which was based on the results of calculations, meaning that the ability to understand mathematical concepts for class VII students was influenced by learning discipline by 65% while the remainder was

influenced by other factors that had not been researched, amounting to 35% was influenced by other factors that have not been studied.

So the conclusion that can be drawn is that whether a student's learning discipline is strong or weak is related to the ability to understand mathematical concepts. In other words, if a student's learning discipline is strong, the higher the student's ability to understand mathematical concepts in differentiated learning or conversely, the weaker the student's learning discipline, the lower the student's ability to understand mathematical concepts in differentiated learning.

The relationship between mathematical logic intelligence and learning discipline and the ability to understand mathematical concepts in students' differentiated learning. From the calculated data, the results of analysis using multiple correlation show a positive and significant relationship between mathematical logic intelligence and learning discipline and the ability to understand mathematical concepts. A positive relationship can be seen from the positive correlation coefficient value. This shows that the stronger the student's mathematical logic intelligence and learning discipline, the higher the student's ability to understand mathematical concepts in differentiated learning or the weaker the student's mathematical logic intelligence and learning discipline, the lower the student's ability to understand mathematical concepts in differentiated learning.

The existence of a relationship between logical-mathematical intelligence and learning discipline and the ability to understand mathematical concepts is because mathematical-logical intelligence and learning discipline are abilities needed by students in learning to improve their ability to understand concepts. As stated by Gagan Hartana (Uno & Umar, 2023: 116) that logical-mathematical intelligence is the ability to solve problems related to the need for mathematics as a solution. Thus, it is clear that logical-mathematical intelligence is related to students' positive attitudes towards mathematics.

The results of previous research explain that students with high mathematical logical intelligence tend to be able to understand a problem (Suhendri, 2011). Other research states that mathematical logical intelligence has a significant influence on mathematical abilities, where one part of mathematical abilities is the ability to understand a concept (Zulfairanatama & Hadi, 2013).

The results of this research are in line with several previous studies according to Ikhsan (2017). There is a positive and significant relationship between mathematical logic intelligence and learning discipline together with mathematics learning achievement in class VII students at SMP Negeri 4 Ngawen Gunungkidul for the 2017/2018 academic year. This is shown from the results of multiple correlation analysis, where the R value is 0.618 (<0.05). Then from Sari, et al (2019) The research results show: (1) There is an influence of discipline on mathematics learning outcomes. (2) There is an influence of self-confidence on mathematics learning outcomes (3) There is an influence of mathematical logical intelligence on mathematics learning outcomes (4) There is a joint influence of discipline, self-confidence and mathematical logical intelligence on mathematics learning outcomes with the regression equation namely $Y' = -9.638 + 0.143X1 + 0.250X2 + 0.433X3$. From Supardi's research data processing, (2015) the results were obtained: (1) there is an influence of learning discipline and logical mathematical intelligence together on mathematics learning achievement, (2) there is an influence of learning discipline on mathematics learning achievement (3) there is an influence of mathematical intelligence logic on mathematics learning achievement.

So the conclusion that can be drawn is that mathematical logic intelligence has a positive and significant influence on learning discipline, which in turn influences the ability to understand mathematical concepts and the strength or weakness of a student's mathematical logic intelligence and learning discipline, which has a relationship with the ability to understand mathematical concepts. In other words, if a student's mathematical logic intelligence and learning discipline are strong, the higher the student's ability to understand mathematical concepts in differentiated learning or conversely, the weaker the student's mathematical logic intelligence and learning discipline, the lower the student's ability to understand mathematical concepts in differentiated learning.

Jurnal Cakrawala Pendas Vol. 10, No. 4, October 2024, pp. 787-802

The ability to understand mathematical concepts in differentiated learning can exceed the minimum completeness criteria (KKM). In this research, researchers gave post-test questions after implementing differentiated learning to students to see students' ability to understand mathematical concepts. Then the researchers calculated the post-test results and students' KKM scores to see whether students could achieve the minimum completeness criteria (KKM) after implementing differentiated learning.

From the research results, it can be said that students' ability to understand mathematical concepts experienced significant differences. This is proven by the post test score which is higher than the pre-research results. The average value of students' pre-research ability to understand mathematical concepts was 51 and the average value of students' post-test ability to understand mathematical concepts was 70. In this study, a One Sample T-Test was carried out on post-test data with Asymp results. Sig (2-tailed) 0.001, so 0.001 < 0.05, which means that students' ability to understand mathematical concepts with differentiated learning can help class IV students at SDN 27 Singkawang in achieving the minimum completeness criteria (KKM). Differentiated learning can help students achieve the KKM because differentiated learning is learning that accommodates all student differences, is open to all and provides the needs needed by each individual in understanding fraction material.

Based on the research results of Purwanti et al (2022), it shows that students' understanding of mathematics increases by using differentiated learning with the MIKIR approach, whether in the above average group completing fraction operations using the KPK method, the average group completing fraction operations using butterflies or the below average group. The average completes fraction operations with the help of concrete objects, namely origami paper. According to research results from Susana et al. (2023), there is an increase in students' mathematical understanding abilities in each cycle. The increase in classical completeness in formative test results from Cycle I was 61.11% to Cycle II of 86.11%, namely reaching 25.00%. The average percentage of mathematical understanding ability in the pre-cycle was 59.98%, cycle I was 75.79%, and cycle II was 85.25%. Overall, there was an increase in mathematical understanding ability by 25.27%. It can be concluded that the application of differentiated learning in Opportunity material can improve students' mathematical understanding abilities.

So the conclusion that can be drawn is that differentiated learning is a learning strategy that allows teachers to adapt teaching methods based on the individual needs of each student. In this context, students' ability to understand mathematical concepts can be improved by using a differentiated approach that takes into account students' differences in abilities. By understanding the benefits and challenges of differentiated learning, teachers can improve students' ability to understand mathematical concepts in a more effective way and according to the individual needs of each student.

Conclusion

Based on the results of the research and discussion in the previous chapter, the research conducted by researchers at SDN 27 Singkawang can be concluded as follows.

1. There is a relationship between mathematical logic intelligence and ability to understand mathematical concepts in learning differentiation is in the strong relationship category.
2. There is a relationship between learning discipline and ability understanding of mathematical concepts in differentiated learning which is in the strong relationship category.
3. There is a relationship between mathematical logical intelligence and discipline learn with the ability to understand deep mathematical concepts differentiated learning which is in the strong relationship category.
4. The ability to understand concepts in differentiated learning carried out directly with students can exceed the minimum completeness criteria (KKM).

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