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Analysis Of The Ability To Understand Mathematical Concepts As Seen In The Face Of Students' Self-Confidence In The Material On Numbers Round Grade VII 1

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Abstract

This study aims to describe the relationship between self-confidence and students' mathematical conceptual understanding of integers in class VII-3 of SMPN 19 Medan in the 2025/2026 academic year. This study used a quantitative descriptive study using the Simple Random Sampling method, involving 32 students as a sample. The instruments used were a self-confidence questionnaire and a conceptual understanding ability test. Data were analyzed using Rank Correlation, a nonparametric method suitable for ordinal scale data. The analysis results showed a correlation coefficient (r-rank) of 0.889, indicating a very strong positive relationship between self-confidence and students' conceptual understanding. The higher the students' self-confidence, the better their mathematical conceptual understanding. Furthermore, the results of processing the questionnaire using a Likert scale showed an average achievement percentage of 65.09%, which is in the moderate category. This finding implies that although most students have fairly good self-confidence and conceptual understanding, efforts are still needed to achieve achievement in the high category.

Keywords : self-confidence, concept understanding, ranking correlation, integers

INTRODUCTION

Every individual is expected to receive an education to achieve a more decent standard of living. In other words, education is one of the individual's needs. Education plays a crucial role in determining the development and self-realization of individuals, especially for the development of the nation and state. Mathematics is a universal science that underlies the development of modern technology, plays a vital role in various disciplines and develops human thinking. According to Subarianto et al., (2019) , the rapid development in the field of information and communication technology is based on the development of mathematics in the fields of number theory, algebra, analysis, probability theory, and discrete mathematics.

According to Yulianto et al., (2020) , mathematics learning is a process of interaction between teachers and students that involves developing thinking patterns and processing logic in a learning environment deliberately created by teachers with various methods so

that the mathematics learning program grows and develops optimally and students can carry out learning activities effectively and efficiently. Mathematics is one of the important subjects applied in the educational process in Indonesia, this makes mathematics a core subject at every level of education in Indonesia (Lu'luilmaknun et al., 2021) .

Mathematics needs to be taught to all students to develop logical and analytical thinking skills. It's often said that mathematics is a daunting or difficult subject for school students to learn, as it's difficult to understand or difficult to find a way to calculate, making it challenging for students to learn. According to Saputri (2018) , mathematics can actually be a fun subject if teachers are creative in teaching and understand the child's character and cognitive abilities. There are so many benefits we can gain from mathematics in our daily lives.

Suardi (2018) views learning as a change in behavior within an individual and between the individual and their environment. These changes involve personality aspects reflected in the individual's changes, which, of course, also coincide with their interactions with their environment. As emphasized by Lu'luilmaknun et al. (2021) , the level of student engagement in the learning process is crucial. High student commitment is reflected in various aspects, from regular attendance and active participation in class discussions to independent efforts to understand the subject matter.

Conceptual understanding is a fundamental aspect of the learning process that can influence how individuals organize, store, and apply their knowledge. According to Nurhangesti, M. (2024), in the context of education, a good conceptual understanding is crucial because it helps students or learners master subject matter in depth and transfer that knowledge to various situations. However, conceptual understanding does not always develop automatically. (Nurfajriyanti & Pradipta, 2021) .

Several studies have shown that difficulties arise from a lack of conceptual understanding or the inability to organize and interpret new information introduced into the learning process. Comprehension skills are essential for mastering instructional materials that contain numerous formulas, enabling students to fully grasp the concepts and skillfully utilize the various procedures within them flexibly, accurately, efficiently, and appropriately (Dini et al., 2018).

The lack of mathematics learning outcomes is due to the learning process that is still centered on educators, where educators are the source of knowledge, and the lack of educator concern for students Dewi, (2021) . According to Yulia (2023) , educators still use conventional models and are not varied using other models. This kind of learning process reduces student motivation to participate in learning. The mathematics learning process in class must be able to provide an active relationship with the process of thinking, discussion, and question and answer, which can then trigger students' ability to understand mathematical concepts. One of the basic abilities that is important for students or students to have is the ability to understand mathematical concepts, by understanding mathematical concepts, students are able to construct the meaning and purpose of the learning objectives. According to Nurfajriyanti & Pradipta, (2021) that understanding itself means the process, actions, ways of understanding or comprehending each learning material given, especially mathematics learning. From understanding these mathematical concepts, students can develop the information obtained into an understanding of the concept of the material. So that students will be able to think creatively and students can understand the mathematical concept.

The concept understanding itself aims to help students understand, recognize, and be able to re-express the material that has been delivered, not just memorizing formulas or sentences that have been given by the teacher or reading sources that students read. This is in line with research conducted by Kartika (2018) , that the thing that influences the low ability to understand this concept is because students are less able to explain or re-express the concepts they get and present concepts in the form of mathematical representations so that students lack the ability to understand the concept (Panjaitan & Sinambela, 2023) .

In addition to the ability to understand mathematical concepts, there is another aspect that also plays an important role in the ability to understand learning materials, namely self *-confidence* . Self-confidence is an important aspect of personality for humans to have. According to Eliyah et al., (2018) said that self-confidence is an attitude of confidence in one's own abilities and viewing oneself as a whole person by referring to self-concept and self-confidence is also important to foster students' courage to show their abilities without caring about the opinions of their surroundings.

According to Nurfajriyanti & Pradipta (2021) , student self-confidence can influence how difficult or easy it is for them to understand a lesson. Students may feel inferior and even doubtful, making them unable to complete the questions. Therefore, it can be said that student self-confidence is crucial for their ability to understand material, especially mathematical concepts. If students feel doubtful and afraid when learning new material, they will reject and feel uncertain about the material they are about to learn.

According to Jalil, (2023) that the root of the problem of students' lack of confidence in learning lies in their inability to follow the learning process so that guidance is needed to create varied learning interactions that will encourage students to have high self-confidence so that it is easier to receive learning materials in class. Conceptually, self-confidence in learning mathematics is a person's belief in learning mathematics which is shown by a strong belief in responding to mathematics learning materials.

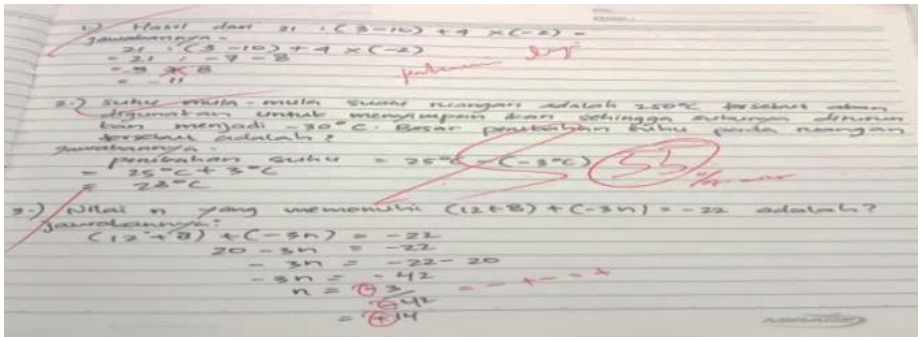

Figure 1. Work Practice for Class VII Students of SMP Negeri 19 Medan

Based on the results of interviews and observations conducted by researchers on one of the mathematics teachers of SMP Negeri 19 Medan who said that many students lack confidence in answering questions from the teacher. Things that indicate a lack of confidence in grade VII students are feeling afraid of being wrong in their own answers and opinions, often cheating on their friends' answers, nervousness to appear in front of the class if asked to work on problems, and also their scores are still low can be seen in Figure 1.1, therefore it can be concluded that the understanding of mathematical concepts viewed from students' self-confidence in integer material is still lacking. This is caused by the lack of student awareness in asking and answering questions. So seeing the importance of

understanding mathematical concepts for students of SMP Negeri 19 Medan, researchers are interested in knowing the implementation and benefits reviewed from student confidence. Based on the description above, researchers want to conduct a study entitled "Analysis of Mathematical Concept Understanding Ability Reviewed from Students' Self-Confidence in Integer Material for Grade VII SMP NEGERI 19 MEDAN"

METHOD

The research used in this study is quantitative research with a correlational approach. The correlational approach aims to determine the relationship between two or more variables, in this case, self-confidence and the ability to understand mathematical concepts in the topic of integers.

According to Creswell & Creswell (2018), quantitative research emphasizes the collection of numerical data that can be analyzed using statistical techniques, thus providing a clearer picture of the relationships between variables. A similar sentiment was expressed by Fraenkel, Wallen, & Hyun (2019), who emphasized that a quantitative approach is highly appropriate for identifying significant patterns of relationships in research data. Similarly, Neuman (2020) emphasized that correlational methods in quantitative research allow researchers to understand the extent to which a variable is related to another without the need for manipulation. This statement is reinforced by Ary, Jacobs, Irvine, & Walker (2018), who stated that correlation analysis helps researchers explore and determine the strength of relationships between variables in an educational context. Thus, the application of a quantitative correlation approach in this study not only provides an objective measurement basis but also strengthens the researchers' efforts in analyzing the relationship between self-confidence and the ability to understand mathematical concepts in junior high school students. This research was conducted at SMP Negeri 19 Medan, Medan City, North Sumatra Province. The research was conducted during the odd semester of the 2025/2026 academic year .

According to Sugiyono, (2018) , "Population is a generalization area consisting of subjects or objects that have certain qualities and characteristics that are selected by researchers to be studied and then conclusions are drawn." The population in this study was all students of class VI I of SMP Negeri 19 Medan for the academic year 2025/2026 . VII SMP Negeri 19 Medan which has 7 classes.

A sample is a subset of a population that serves as a source of data in research (Sugiyono, 2019) . In this case, each class has the opportunity to be sampled. The sampling method used in this study is purposive sampling. *Purposive sampling* is a technique for determining samples based on specific considerations. The considerations used in this *purposive sampling technique* can vary and depend on the needs of the research being conducted.

Research variables are basically anything in any form that is determined by the researcher to be studied so that information about it can be obtained, and then conclusions can be drawn.

Research variables are ideas that have various different qualities such as properties, characteristics, or phenomena that will state something by observing or measuring, and their values can differ in certain populations or situations Silaen, (2018) . There are two variables that will be measured in this study, student self-confidence is represented by

variable X and the ability to understand mathematical concepts is represented by variable Y.

RESULTS AND DISCUSSION

This research was conducted at SMPN 19 Medan located at Jl. Agenda No. 34 Medan, Sei Putih Barat, Medan Petisah District, Medan City, North Sumatra Province 20118. This research was conducted in class VIII of SMPN 19 Medan in the 2025/2026 Academic Year (Rahmi Fitria et al., 2024) . Before this research was conducted, the researcher first conducted a test on the test in the form of a Validity test, Reliability, Level of Difficulty test and discriminatory power in class VIII of SMPN 19 Medan (Sibarani et al., 2021) .

Data analysis

The data analysis used was to calculate non-parametric correlation and determination test.

Results of the Analysis of the Student Confidence Level Questionnaire and the Mathematical Concept Understanding Ability Test

In this study, data on students' conceptual understanding abilities were obtained from the results of 16 questionnaire statements and 7 mathematical concept understanding questions. In this case, the researcher will present the results related to relevant data and the research subjects. The researcher analyzed the students' answers based on their level of accuracy, which was assessed based on their mathematical concept understanding abilities (Sengkey et al., 2023) . Furthermore, from the results of this analysis, the researcher documented the students' responses in the tests that had been conducted, which are then presented below:

Number of items = 16
Answer score = 1-4
Lowest score = 1 x 16 = 16
Highest score = 4 x 16 = 64

$$\text{Range} = \frac{Skor\ tertinggi - skor\ terendah}{Jumlah\ kategori}$$

$$= \frac{64-16}{3}$$

$$= 16$$

So we get:
Low = 16-31
Medium = 32-47
Height = 48-80
Based on the level of student self-confidence categories above, we obtain:

Table 1. Results of the questionnaire data on students' self-confidence levels

Student self-confidence level	Number of students
Tall	2
Currently	30
Low	0
Total	32

From the results of the student questionnaire, as shown in the table, 0 out of 32 students were categorized as low self-confidence, or 0% of students had a low level of self-confidence. 28 out of 32 students had a moderate level of self-confidence, or 87.5%, and 2 out of 32 students, or 6.25%, had a high level of self-confidence.

Analysis of Mathematical Concept Understanding Ability based on high self-confidence level

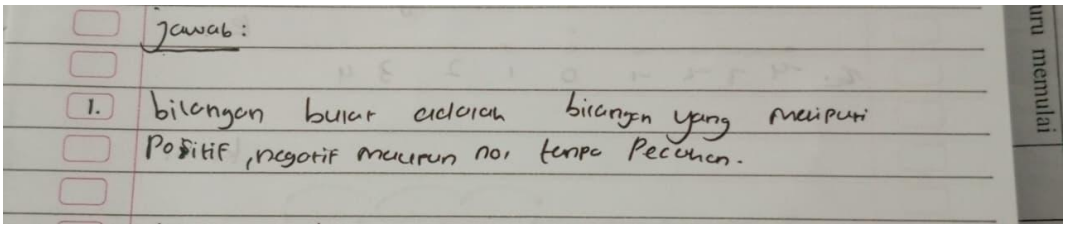

Figure 2. The answer restates the higher category concept.

Based on the student's written answers, it appears that he was able to restate the concept of integers using his own language. The student explained that integers include positive, negative, and zero numbers, and emphasized that integers do not have fractions. This indicates that the student has grasped the core concept of integers, not simply copying definitions from textbooks, but expressing them according to his understanding. This ability demonstrates the achievement of the conceptual understanding indicator in the aspect of restating concepts. Furthermore, from the way the student wrote his answers, it is apparent that he is confident in his abilities, as he dared to write his own version of the definition. Although there is still room for improvement in the use of language to be clearer and more systematic, overall the student's answers reflect an understanding of the concept of integers as well as confidence in his own ability to convey mathematical understanding.

Analysis of the ability to understand mathematical concepts based on the level of self-confidence of students in the medium category

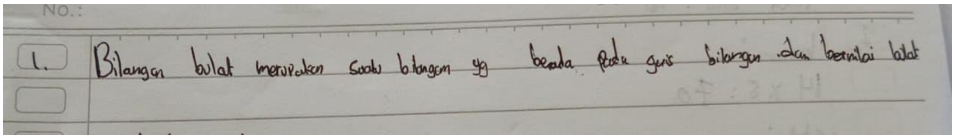

Figure 3. Answer restates the concept of the medium category

Students with moderate anxiety levels were able to restate the concept of integers quite well. This was evident in their written answers, where they explained that integers are on the number line and have whole values. This statement pointed to the correct concept, although it was incomplete, as it did not explicitly mention the scope of integers (e.g., integers include negative numbers, zero, and positive numbers) (Fajar et al., 2019) .

Moderate anxiety impacts students' accuracy in expressing concepts. Students can grasp the essence of integers, but tend to convey it briefly and without detail, possibly due to hesitation or a lack of confidence in writing a more complete answer. Thus, students in this category demonstrate a fairly good understanding in restating concepts, but still need encouragement to gain more confidence and add important details to enhance their explanations.

Discussion of Research Results

This research was conducted at SMPN 19 Medan using a quantitative descriptive method with the aim of describing the relationship between the ability to understand mathematical concepts in terms of students' self-confidence in class VII-1 SMPN 19 Medan.

This research was conducted at SMPN 19 Medan, the research was conducted as one meeting in class VII-3 consisting of 32 students. This research was conducted on September 4, 2025, in the odd semester of the 2025/2026 academic year. The sampling used in this study was simple random sampling, namely the random selection of sample members from the population. The material taught in this research material was integer material for students' mathematical concept understanding abilities (Putri et al., 2022). .

The purpose of this study was to determine the relationship between students' mathematical conceptual understanding and self-confidence in integers for grade VII-3 of SMPN 19 Medan in the 2025 academic year (Retno Kuncoro & Martila Ruli, 2022) . To achieve this goal, the researchers first distributed a self-confidence questionnaire to students as an instrument to group their self-confidence levels. Furthermore, a mathematical conceptual understanding test was conducted to obtain data relevant to the research variables (Febriantika, 2020) .

The data analysis results showed a correlation coefficient of r = 0.889. This value is close to 1, indicating a very strong positive relationship between self-confidence and students' mathematical conceptual understanding. Therefore, it can be concluded that the higher a student's self-confidence, the better their mathematical conceptual understanding, particularly for integers.

The results of this study support the theory that affective aspects, such as self-confidence, significantly contribute to learning success. Students with high self-confidence tend to be more confident in asking questions, participating in discussions, and persevering when faced with problems. This encourages active engagement in learning, thus fostering a better understanding of mathematical concepts (Oktavianda et al., 2022) .

Thus, it can be emphasized that self-confidence is a factor that deserves attention in the learning process. The implication of this finding is the need for teachers to strive to increase student self-confidence through innovative learning strategies, providing motivation, and creating a conducive classroom atmosphere so that students feel comfortable expressing their opinions and developing their potential optimally (Ferdiana & Mulyatna, 2020) .

CONCLUSION

Based on the analysis, it can be concluded that there is a very strong positive relationship between self-confidence and students' understanding of mathematical concepts. The higher a student's level of self-confidence, the better their understanding of mathematical concepts. This finding suggests that psychological aspects such as self-confidence play a crucial role in the learning process and academic achievement. Improved conceptual understanding is influenced not only by teaching methods but also by students' mental state.

Suggestion

Based on the significant findings of this study, it is hoped that self-confidence plays a crucial role in students' understanding of mathematical concepts. This strong positive

relationship provides a foundation for educators, schools, and future researchers to take concrete steps to improve the quality of learning. Therefore, this study proposes several suggestions that are expected to make a positive contribution to the educational environment.

1. For Educators: Teachers are expected to design learning strategies that focus not only on delivering material but also on building student confidence. Examples include providing constructive feedback, creating a supportive and non-judgmental classroom environment, and providing opportunities for students to experiment and make mistakes.
2. For Schools: Schools are advised to consider programs or activities that aim to improve students' overall self-confidence, such as guidance counseling, soft skills training, or extracurricular activities that can foster self-confidence.
3. For Future Researchers: It is recommended that future research delve deeper into the specific factors that influence students' self-confidence in mathematics learning. Research could also focus on developing intervention models or specific programs to increase self-confidence and measuring their effectiveness in improving understanding of mathematical concepts.

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