Case Method: Analysis of Student's Mathematic Understanding Ability

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Abstract. This study aims to describe the Case Method: Analysis of students' mathematical problem solving abilities. The data collection technique in this study used a literature review. The bibliographic research used is journals, books, articles Data analysis techniques use descriptive analysis techniques to analyze data by describing the collected data. Students' mathematical understanding falls into the lower category as there are still many who do not understand the purpose and objectives of learning due to a lack of conceptual understanding of the material presented When conveying concepts, teachers should include examples of problems that evoke and involve various mathematical concepts, and use the case method to classify mathematical objects, so that students can find more meaning from the information provided by the mathematical objects, cases, and students learn to think more precisely, based on what they discover, analyze themselves and apply it to other cases by comparing different situations and cases Currently, the most controversial is the application of case law to apprenticeship.

Keywords: Case, Method, Ability, Understanding, Mathematical.

1 Introduction

The ability to understand everyone in education needs to be developed In each study, students must take an active role in self-control, character, and skill to understand each lesson Comprehension is the ability to understand, interpret and draw conclusions from what has been learned Thus, an exceptional generation is born and becomes the successor of the country.

Students can be said to have good understanding when they are able to relate new knowledge to the old knowledge they have received As several experts have stated, "conceptual understanding is defined as a person's ability to express, explain, translate or represent the knowledge they have acquired in their own way," Uno said. B, Hamzah and Mohamad, Nurdin (Anggalarang 2018: 7) According to (Sudijono 2011: 50), the ability of a person to comprehend or comprehend something and then be known and remembered is what understanding means.

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Decree No 22 of 2006 of the Ministry of National Education, which contains standards for the content of primary and secondary teaching units, stipulates that students must be able to understand mathematical concepts by explaining the relationship between concepts and by applying the concepts. Or algorithms to solve problems with flexibility, accuracy, efficiency and precision (Ministry of National Education, 2006) Based on this, (Sianturi and Nasution; 2021) say that education is a learning process that aims to shape a person's character, nature and knowledge to better understand the different types of learned knowledge. Understanding is fundamental for students to explain the process of learning mathematics (Sugriani, 2019) Education can take place anywhere, one of which is in schools (Susiaty and Haryadi, 2019)

Learning mathematics is a means or a way to find answers to problems faced by humans such as how to use information, use knowledge, know shapes and sizes, use knowledge about counting as proposed by (Hasratuddin 2015 in Parnabhakti 2020). This is in line with the research that was conducted (Muliana 2022) that mathematics is a dry, abstract, theoretical science, full of confusing symbols and formulas, which are based on unpleasant experiences when learning mathematics at school, which has contributed to shaping students' negative perception of mathematics.

The above statement reinforces the notion that mathematics is a science that is difficult to learn, complicated, unpleasant, and even considered to have no direct benefits in real life (Maskar, 2018). Difficulties in learning mathematics from an early age even up to the university level are considered normal because mathematics is an abstract and difficult subject to be understood (Anderha and Maskar, 2021).

Therefore, in learning mathematics, most students rely on memorization rather than understanding math problems (Sariningsih, 2014). Memorization in learning mathematics has an impact on ignorance of the meaning contained in the concept so that when working on questions they often make mistakes and do not find solutions to the problems (Nursaadah & Amelia, 2018). Based on the explanation above, it can be stated that students only focus on getting answers from assignments given and then handed over to the teacher to be corrected whether the answer is right or wrong so it can be stated that students have not understood the real mathematical concept.

One of the important factors in math learning today is the significance of developing students' mathematical understanding abilities. Mathematical understanding is an important foundation for thinking in solving mathematical problems as well as real life problems. Besides that, the ability to understand mathematics is useful for the development of other mathematical abilities, namely communication, problem solving, reasoning, connection, representation, critical thinking and math skills. As stated, (Wulan et al, 2020) Mathematical understanding helps students solve and complete mathematical problems with the concepts that have been studied. The process of understanding and applying learning concepts that allows students to justify the concepts from their perspective (Rahayu et al, 2018). Based on this, it can be concluded that the importance of mathematical understanding in the learning process is so that learning objectives can be achieved properly and maximally (Sudianto, 2019).

Case-Method learning is a discussion learning method, a less popular methodology for educators who have so far been successful in educating and promoting learning and professional development according to Christensen et al. (1991), Barnes et al. (1994), and Garvin (2003). The use of Case-Method in learning mathematics is a strong supporter, discussing teaching

materials related to algebra, social arithmetic, linear equations, lines and angles, data presentation and many more Corey [3].

Case-Method learning energizes students to express their points of view and propose problem-solving methodologies. It too gives students an understanding of concepts and their ability to apply them successfully. Cases given in learning are cases related to students' real lives, describing authentic, complex problems that require solving through critical analysis of the given case (Barnes et al. 1994; Boehrer 1994; Kim et al. 2006).

Case-Method teaching is carried out in the classroom by first providing cases related to learning or teaching materials so that students can observe, understand the cases for analysis and determine solutions to be decided, and give reasons. In this case, students first consider the information presented in the case, develop alternatives of action, analyze the effects of each alternative, and recommend the path to be taken. Corey [3] further suggests that students learn inductively through case studies in four ways. (1) Learning by discovery: students interpret and find meaning in the information given in cases, such as gathering information that may be randomly distributed through the case, (2) Learning through investigation: students learn to think sharply, use evidence wisely, recognize hidden assumptions, and following the line of reasoning to the end, (3) Learning Through Practice: Students study more than one case during a semester, Daily practice leads to a way of analyzing case situations that becomes intuitive, and then can be applied to problem with new situation, such as classroom learning, (4) Learning by contrast and comparison: Through comparing students will compare situations in different cases, students learn that what may work in one situation may not work in another.

Syafri, (2019) argues that understanding is related to students' mathematical ability in mathematics; Mathematical ability is the ability to solve mathematical or real-world problems Math skills include mathematical reasoning, mathematical communication, mathematical problem solving, conceptual understanding, mathematical comprehension, creative and critical thinking.

From some of the above explanations, it can be concluded that the understanding of concept is the result of a teaching and learning process characterized by the ability to explain or define information in one's own words. Moreover, understanding of concept is how a person interprets and interprets learned knowledge, and understanding is not simple achieved by remembering experience and reproducing learned knowledge.

2 Metodology

The data collection technique used was documentary research. According to Utami and Dewi (2020), the purpose of a literature search is to publish to readers the perspectives of other researchers who are closely related to current research, to connect research to existing literature, and to fill in between previous studies. Literature research is carried out to find, investigate and obtain information from previously conducted research to serve as a reference for data processing and conclusions. The documentary search is a search in a journal, book, or article that meets the criteria.

After collecting all the data, the following step is to analyze the data in order to draw conclusions. The data procedure used by the author in this study used data obtained from a

literature study and then analyzed using a descriptive analysis method (Dewi, 2018). Maskar and Anderha (2019) also stated that descriptive analysis a type of analysis that involves the collection, processing, presentation, and interpretation of quantitative or percentage data that can be presented in tabular or graphical form chart. How to carry out the descriptive analysis method by describing the facts and then analyzing them, not only explaining, but providing sufficient explanation and understanding (Putri & Dewi, 2020). Descriptive research is research that attempts to describe and explain something, such an existing condition or relationship, the developing of an idea, an ongoing process, the consequences or effects of an event, or research on an ongoing trend (Linarwati, 2016 in Dewi, 2021).

3 Results and Discussion

Ena Suhena Praja, et al (2021) studied the analysis of mathematical comprehension on vector topics among class XI vocational high school students during the Covid-19 pandemic. The aim of this study was to analyze the mathematical understanding of vector material by students of class SMK XI. The results of the study show that students with high ability have higher mathematical understanding ability, accounting for 90%, and students with average ability have average mathematical understanding ability, accounting for 56.7% In other words, students with high ability have high mathematical understanding and students with average ability have average mathematical understanding.

Sri Wahyuni, et al (2022) studied the analysis of students' mathematical understanding of statistical material. With the aim is to determine the description of statistical materials on the ability to understand mathematics of junior high school students. The results showed that: 1) Students with lower math comprehension skills still could not understand the questions, so the answers were not perfect Students with intermediate and high mathematical understanding are able to understand problems and solve them well Therefore, students with low ability cannot classify things according to certain characteristics, while students with medium and high comprehension can. 2) Students with low comprehension ability can use, utilize, and select some procedures or operations, but they are not perfect in writing steps At the same time, students with intermediate and high mathematical understanding ability can understand the problem, so that students with intermediate and high understanding ability can use, utilize, and select certain procedures or operations on statistical materials. 3) Students with low, medium, and high comprehension abilities can understand and solve problems correctly and correctly, enabling students with low, medium, and high comprehension abilities to apply problem-solving concepts or algorithms to statistical materials.

Nabila et al (2022) conducted a study on the analysis of the mathematical comprehension ability of junior high school students using the TIMSS algebra textbook. The study results show that the math comprehension ability of junior high school students in Bekasi County is still at a low level. It can be seen from the five students who worked on the test questions, there was only one student who had the ability to understand mathematics in the high category. Students do not seem to understand the concept of algebraic material that has been studied. Most students think algebraic material is difficult to understand, so students lose interest in understanding the material. Further research on 3 students with each different category showed that students with high mathematical understanding abilities were able to solve problems and were considered to

meet the indicators of mathematical understanding abilities, students with moderate mathematical understanding abilities were seen to still make mistakes in solving problems even though students were considered to have it is enough to have a good mathematical understanding, and students with low mathematical understanding abilities are considered not to understand the given problem so that the student cannot solve the problem properly.

John C Voss and Hans Thomas Aretz (2009) review the case method: an effective method for integrating basic and clinical sciences into preclinical medicine courses. RESULTS: First- and second-year medical classes of 40-95 students prepared and actively participated in single-session case discussions and were able to effectively apply basic scientific principles to solving clinical problems . Conclusions: The case method represents a feasible and resource-efficient teaching format that can promote critical thinking and integrate basic scientific principles into preclinical courses.

John Gerring (2007) studies Is there (workable) case law for decision-making? The logic of the analysis of the results remains the same, but lacks a certain degree of certainty in the conclusions. Most social science case studies classified as groundbreaking take the latter form In fact, this is the implicit logic behind most single case analyses, whether or not the authors relate them to Eckstein's label The key cases can be effectively distinguished according to their primary objective: to confirm or invalidate a given hypothesis There are positive and negative arguments, and the intention of the author directly depends on the correctness of the method That said, it's almost always easier to disprove a theory than to prove it with a case In fact, a theory understood as deterministic can be refuted by a well-chosen case. Likewise, we are unlikely to accept a theory based on the results of a single case study Positive arguments are more difficult.

John Burgoyne and Alan Mumford (2021) examine lessons learned from case law. Results This report shows how a more theoretical approach to thinking about the learning process in the case method can lead to a fuller understanding of the issues underlying the wealth of ideas about good practice, as well as the strengths and weaknesses of the case method. The specific question is to what extent the ability of case law to bring reality and practical action to learners is debated. Theoretical analysis also highlights the extent to which case-based practice and rationale recognizes, understands and responds to learner differences in learning processes and styles, individual strategies embedded in these areas and the various individual contexts in which they exist The case method can easily homogenize learners.

Based on those journals and articles that have been analyzed, it can be seen that each student has a different understanding in the implementation of learning. With this difference in understanding, it becomes the basis for providing mathematical problems in the form of a case method. By providing a case method in learning, it will teach students to understand cases by analyzing cases, collecting information related to cases and distributing case solutions.

4 Conclusions

From the results of the analysis, it can be seen that the mathematical understanding of the students has not reached a high level because there are still many students who cannot understand the intention and purpose of the learning (mathematical problems) due to insufficient

understanding of concepts. Material introduced. When transferring concepts, teachers should include examples of problems that elicit and involve various mathematical concepts, and use the case method to classify mathematical objects so that students can find more meaning from the information provided by the cases . Students will learn to think more clearly about the evidence they find, analyze it, and apply it to other cases by comparing different situations and cases Currently, the most controversial is the application of case law to apprenticeship.

References

[1] Aida Khoerunnisa & Nita Hidayati, 2022, Analisis Kemampuan Pemahaman Matematis, *Jurnal Pendidikan Matematika, Volume 6 Nomor 1 Tahun 2022*

[2] Constance M. Bowe, John Voss & H. Thomas Aretz, 2009, Case method teaching: An effective approach to integrate the basic and clinical sciences in the preclinical medical curriculum, Article in medical teacher, ISSN 0142–159X print/ISSN 1466–187X online/09/090834–8 ß 2009 Informa Healthcare Ltd., DOI:10.1080/01421590902922904

[3] Cucu Nugraha & Haerudin, 2022, Analisis Kemampuan Pemahaman Matematis Siswa Kelas VIII SMP Negeri 2 Klari Materi Relasi dan Fungsi, Jurnal Didactical Mathematics, https://ejournal.unma.ac.id/index.php/dm,DOI: http://dx.doi.org/10.31949/dmj.v2i2.2074

[4] Damhuri Hasibuan, Lily Rohanita Hasibuan, 2022, Analisis Kemampuan Pemahaman dan Penalaran Matematis Siswa Mts Tarbiyah Islamiyah Ulumahuam Kelas VIII Materi Teorema Phytagoras, https://jurnal.unsur.ac.id/prisma, DOI: https://doi.org/10.35194/jp.v11i1.2168,

[5] Dina Fakhriyana & Salma Riayah, 2021, Optimalisasi Pembelajaran dalam Jaringan (Daring) dengan Media Pembelajaran Video Interaktif Terhadap Pemahaman Matematis Siswa, Jurnal Pendidikan Matematika (Kudus), P-ISSN 2615-3939 | E-ISSN 2723-1186, Volume 4, Nomor 1, Juni 2021, hal. 19-30, https://journal.iainkudus.ac.id/index.php/jmtk

[6] Ena Suhena Praja dkk, 2021, Analisis Kemampuan Pemahaman Matematis Siswa Smk Kelas Xi Pada Materi Vektor Selama Pandemi Covid-19, *Teorema*: *Teori dan Riset Matematika*, *6*(1), 12–24, Maret 2021, p-ISSN 2541-0660, e-ISSN 2597-7237 © 2021, https://jurnal.unigal.ac.id/index.php/teorema/article/view/4539

[7] Hilya A & Dani Firmansyah, 2022, Analisis Kemampuan Pemahaman Matematis Siswa Ditinjau dari Soal TIMSS, Fakultas Keguruan dan Ilmu Pendidikan Universitas Batanghari Jambi, ISSN 2088-5857(Print), ISSN 2580-7463 (Online), DOI 10.33087/dikdaya.v12i1. ...

[8] John Burgoyne & Alan Mumford , 2001, Learning from the Case Method, Lancaster University Management School, 24th January 2001

[9] John Gerring, 2007, Is There a (Viable) Crucial-Case Method?, *Boston University, Massachusetts,* Volume 40 Number 3, http://cps.sagepub.com, http://online.sagepub.com

[10] Meilani dkk, 2022, Analisis Kemampuan Pemahaman Matematis Siswa Terhadap Materi Bangun Datar Kelas VII, Jurnal Jendela Pendidikan, ISSN: 2776-267X (Print)/ISSN: 2775-6181 (Online), https://www.ejournal.jendelaedukasi.id/index.php/JJP , Volume 2 No. 02 Mei 2022

[11] Nabila Vara Shafiyyah & Agung Prasetyo Abadi, 2022, Analisis Kemampuan Pemahaman Matematis Siswa SMP dengan Menggunakan Soal TIMSS Materi Aljabar, Jurnal Didactical Mathematics, Volume 4, Nomor 1, April 2022, https://ejournal.unma.ac.id/index.php/dm, DOI:http://dx.doi.org/10.31949/dmj.v2i2.2074

[12] Sofia Nurul Hikmah, Very Hendra Saputra, 2022, Studi Pendahuluan Hubungan Korelasi Motivasi Belajar Dan Pemahaman Matematis Siswa Terhadap Hasil Belajar Matematika, Jurnal Ilmiah Matematika Realistik (JI-MR), Vol. 3, No. 1, Juni 2020, 7-11, E-ISSN: 2723-6153, http://jim.teknokrat.ac.id/index.php/pendidikanmatematika/index

[13] Sri Wahyu Purwaningsih dkk, 2022, Analisis Kemampuan Pemahaman Konsep Matematis Siswa Smp Kelas Vii Pada Materi Bentuk Aljabar, Jurnal Pembelajaran Matematika Inovatif, Volume 5, No. 3, Mei 2022, DOI 10.22460/jpmi.v5i3.639-648

[14] Sri Wahyuni, Angra Meta Ruswana, Yoni Sunaryo, 2022, Analisis Kemampuan Pemahaman Matematis Siswa Smp Pada Materi Statistika, J-KIP (Jurnal Keguruan dan Ilmu Pendidikan) Vol. 3, No. 2, Juni 2022, pp. 404-413, e-ISSN 2722-6069.
[15] Yulia Nurlisna & Attin Warmi, 2021, Analisis Kemampuan Pemahaman Matematis Siswa Smp Pada Materi Lingkaran Berdasarkan Jenis Kelamin, Prosiding Seminar Nasional Matematika dan Pendidikan Matematika (Sesiomadika) 2021, ISSN : 2722-6379

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