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# Analysis of Students' Errors in Solving Concept Understanding Problems On Integral Matter

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## Abstract

The ability to understand students' concepts is very important to be applied to learning mathematics. When students cannot understand the concept well, students cannot solve the problem correctly. This is the reason the researcher conducted this research. The purpose of this research is to describe the percentage of students' errors in solving the problem of understanding the concept of integral matter. The subjects in this study were class XII students, totaling 8 students. Data collection techniques used were observation and tests to see student errors in answering questions of understanding the concept. This study uses a quantitative approach with a descriptive type of research. The data analysis technique used the percentage of students' ability assessment in solving problems. The results obtained in this study are the indicator of error reading about the questions gets a percentage of 62.5%, then the percentage of errors in understanding the questions gets a value of 50%, the percentage of transformation errors gets a value of 75%, then on the percentage of error processing skills gets a score of 62.5% and the percentage of errors in writing the final answer also obtained the same results as the percentage of process skills errors, which was 62.5%. This is because most students do not understand the integral concept so they do not understand in determining the formula and applying it. the percentage of transformation errors gets a value of 75%, then the percentage of process skills errors gets a value of 62.5%, and the percentage of errors in writing the final answer also gets the same result as the percentage of process skills errors that is 62.5%. This is because most students do not understand the integral concept so they do not understand in determining the formula and applying it. the percentage of transformation errors gets a value of 75%, then the percentage of process skills errors gets a value of 62.5%, and the percentage of errors in writing the final answer also gets the same result as the percentage of process skills errors that is 62.5%. This is because most students do not understand the integral concept so they do not understand in determining the formula and applying it.

**Keywords:** Student Errors, Concept Understanding

## INTRODUCTION

Mathematics is a basic science that has an important role in the development of science and technology. Mathematics is also a science that is identical to formulas and calculations (Manalu et al., 2019) so it is always used to solve problems in everyday life that we always encounter (Sholihah & Mahmudi, 2015). Not only that, but mathematics can also develop students' thinking patterns (Surat, 2016). Therefore, mathematics lessons are very important to learn

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(Wiliawanto et al., 2019). Learning mathematics is an exact science that requires more understanding than memorization (Suswigi & Zanthy, 2019). One of the mathematical sciences that requires understanding is integral. Integral is the concept of continuous addition in mathematics with its inverse differential, that's why to be able to understand the integral concept, students have to understand the derivative concept (Hartono & Noto, 2017). In its application, integrals are often found in the fields of physics and engineering as well as other fields (Ghozi & Hilmansyah, 2018).

Mathematics is always synonymous with concepts and students will always be required to understand concepts in mathematics (Andriani et al., 2017). Understanding the concept means explaining the relationship between concepts and applying concepts flexibly, accurately, efficiently, and precisely in a problem (Maharani et al., 2013). Instilling mathematical concepts to students can be done by providing various activities such as watching videos, discussing, conducting question and answer activities, and Mastery of concepts in mathematics can be used to solve real problems. When solving problems in mathematics, skills such as interpreting problems into mathematical models, arithmetic skills, concept mastery skills, and others so that students do not make mistakes in doing math problems (Rachman & Saripudin, 2020). This is the reason the understanding of the concept is closely related to student errors in solving problems. If the student is wrong in solving the problem, it indicates that the student is not good at understanding mathematical concepts. This is in line with the statement (Yuliani et al., 2018) that one of the problems that often arise in learning mathematics is the low ability of students to solve mathematical problems in the form of questions that emphasize understanding concepts in a particular subject. (Damayanti et al., 2017).

However, achieving an understanding of concepts in mathematics is not an easy thing because the ability to understand mathematical concepts of each student is different, one of which is in the integral matter. Therefore, to determine the right method in solving integral problems, the problem must be identified first (Saparwadi, 2015) then determine the most appropriate procedure or method to be used in identifying the solution to the problem to be worked on (Kesumawati, 2008). In reality on the ground, in solving integral questions students cannot yet understand concepts well (Ario & Asra, 2018). This statement is reinforced by (Fitriani & Yuliani, 2016) that the cause of the problem of students' lack of understanding of mathematical concepts is that students do not think about the concepts that have been studied so that the concepts learned do not last long, and students are reluctant to understand the practice questions first in doing the questions and assume that the problem is difficult to do. So there are many mistakes in solving math problems. The statement above is by the results of observations at SMK N 4 Batam where the majority of students still make many mistakes in solving math problems related to understanding concepts, this data is obtained from the results of students' daily tests in mathematics. This is the reason the researchers researched this school.

This study refers to Newman's analysis which divides errors into several factors, namely (1) reading errors, (2) comprehension errors, (3) transformation errors, (4) transformation errors. process skills (process skills error), and (5) writing error of the final answer (encoding error) (Karnasih, 2015). (Jha, 2012; Singh et al.,

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2010) describe several indicators that cause students to make mistakes in solving problems in the form of descriptions based on the Newman procedure which is described in Table 1 below:

**Table 1 Factors and Indicators that Cause Student Errors**

| Factors Causing Student Errors | Indicator |
|---|---|
| *Reading error* | • Students are not able to interpret the meaning of each word, term, or symbol in the problem |
| *Comprehension error* | • Students do not understand what information is known in the problem completely |
| *Transformation error* | • Students are not able to make mathematical models from the information obtained<br>• Students do not know the formula used to solve the problem |
| *Process skills error* | • Students do not know the procedures or steps used to solve the problem correctly |
| *Encoding error* | • Students are not able to find the final result of the problem based on the procedures or steps that have been used<br>• Students cannot show the final answer of solving the problem correctly |

According to (Juliana & Zanthy, 2020) a student who already has an understanding of the concept has several indicators, namely: 1) defining the concept in writing; 2) defining and identifying examples and non-examples; 3) classifying certain objects based on certain properties according to the concept; 4) presenting concepts in various forms of mathematical representation; 5) use, utilize and choose certain procedures or operations.

Previous research on student errors in solving math problems was conducted by (Agnesti & Amelia, 2020; Aulia & Kartini, 2021; Manalu & Zanthy, 2020; Septiahani et al., 2020) Meanwhile, other research related to concept understanding was carried out by (Kurniadi et al., 2020; Munasiah, 2021; Radiusman, 2020; Wijaya et al., 2018) Meanwhile, research on student errors in understanding mathematical concepts was carried out by (Az Zahra, 2019; Halawa & Oktaviani, 2021). The difference with this research is in the data analysis technique used, besides that there are also differences in the material, place, and subject under study. The purpose of this study is to describe the percentage of students' errors in solving the problem of understanding concepts in the integral matter.

## RESEARCH METHOD

This study uses a quantitative approach with a descriptive type of research that aims to describe the percentage of students' errors in solving problems of understanding mathematical concepts on integral matter. This research was conducted at SMK N 4 Batam. The subjects in this study were students in class XII with a total of 8 students. The determination of research subjects using the purposive sampling technique by selecting subjects based on data from daily tests

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on the previous material that meets predetermined criteria based on the teacher's considerations, namely students who have problems in understanding mathematical concepts. Data collection techniques using tests and observations. The test is carried out by giving students a question of understanding the concept. While the observations were made based on the teacher's explanation of the conditions of learning mathematics in the classroom and based on the data on the daily test scores of students' mathematics given by the teacher. The test research instrument consists of 5 questions in the form of a description of integral matter which refers to the test questions for the ability to understand mathematical concepts. As for this research, it refers to the concept of understanding indicators by (Juliana & Zanthy, 2020) which are described in Table 2 below.

**Table 2 Questions and Indicators of Concept Understanding Ability in Integral Matter**

| No About | Question Points | Indicators of Ability to Understand Mathematical Concepts |
|---|---|---|
| 1 | Result of $\int ax^n dx$ is … | Define the concept in writing |
| 2 | If $f'(x) = 4x + 1$ then specify! $F(x)$ | Give examples and non-examples of a concept |
| 3 | Determine the result of the following integral function $\int (3x - 8) dx$ | Classify certain objects based on certain properties according to the concept |
| 4 | Determine the result of the integral function $\int \frac{2}{t^3} dt$ | Presenting concepts in various forms of mathematical representation |
| 5 | Determine the result of the following integral function using the substitution integral technique $\int (2x + 3)^4 dx$ | Using, utilizing, and selecting certain procedures or operations |

After obtaining student answers, the student's errors were analyzed quantitatively and student errors were determined based on the scoring criteria that moved from 4 to 1, which is described in Table 3 below.

**Table 3 Scoring Criteria for Concept Understanding Indicators**

| Category | Score |
|---|---|
| Appropriate | 4 |
| Less precise | 3 |
| Incorrect | 2 |
| No answer | 1 |

After determining the score on each student's answer, then look for the percentage of assessment of the results of student answers. The percentage of assessment is as follows:

$$P = \frac{n}{M} \times 100\%$$

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Description:
$P$: the percentage of students' ability to solve problems based on indicators
$n$ : student answers on each of the assessment criteria
$M$: the number of students.

## RESULTS AND DISCUSSION

In general, students' ability to understand mathematical concepts is low. This can be seen from the table of the percentage of student answers based on the indicators of the ability to understand the concepts below.

**Table 4 Student Answer Results Based on Concept Understanding Indicators**

| No Question | Concept Understanding Indicator | Assessment Criteria (%) | | | |
|---|---|---|---|---|---|
| | | 4 | 3 | 2 | 1 |
| 1 | Define the concept in writing | 12.5 | 25 | 62.5 | 0 |
| 2 | Give examples and non-examples of a concept | 0 | 12.5 | 62.5 | 25 |
| 3 | Classify certain objects based on certain properties according to the concept | 12.5 | 25 | 50 | 12.5 |
| 4 | Presenting concepts in various forms of mathematical representation | 0 | 12.5 | 75 | 12.5 |
| 5 | Using, utilizing and selecting certain procedures or operations | 0 | 12.5 | 62.5 | 25 |

Based on the results shown in Table 4, the students' conceptual understanding ability in solving integral problems for all indicators is still low. The highest percentage was obtained from assessment criteria 2 by obtaining a score of 50% and above on each question, which means that more than half the number of incorrect students (wrong) in solving the problem of understanding the concept. Meanwhile, students who are right in answering the question of understanding the concept get the least percentage on each question.

The analysis of student errors shown in the concept understanding indicator with assessment criteria 2, namely the student is not right (wrong) in solving the problem is illustrated by the pie chart in Figure 1 below.

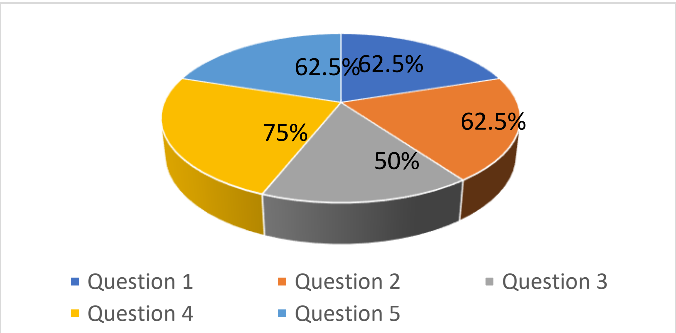


**Figure 1 Percentage of Student Errors in Each Question**

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Meanwhile, in the test of student work descriptions using the Newman procedure, various types of errors were made by students on the problem of understanding the concepts given, namely as follows:

**Reading Error**

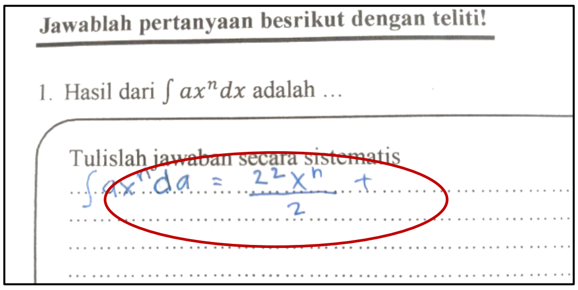


**Figure 2 Example of Reading Error**

Figure 2 is the student's answer to question number 1 which is an indicator of understanding the concept, namely defining the concept in writing with the percentage obtained which is 62.5%. In this question, students were asked to write down the concept of integral, but the student's answer showed that the student did not write the concept correctly, the student did not add $+C$ when writing the integral formula, besides that the way of writing was also wrong. This explanation is in line with (Rahimah, 2012) that one of the dominant mistakes made by students in solving integral problems is not adding a constant $C$ to the results of indeterminate integration. This shows that students are not able to interpret the meaning of each word, term, or symbol in the problem. According to (Halawa & Oktaviani, 2021) reading errors can take the form of a student's inability to write symbols, notations, or numbers that are known in the questions. (Amalia et al., 2018) added that reading errors could be seen from students who did not write down the meaning of the questions asked and could not explain in writing.

**Comprehension Error**

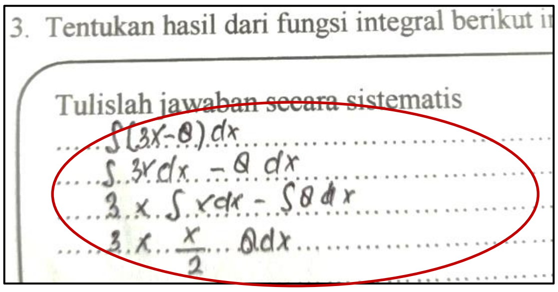


**Figure 3 Example of Comprehension Error**

Figure 3 shows the student's error in understanding what information is known in the problem completely. The problem being worked on is question number 3 with an indicator of concept understanding, namely classifying certain objects based on certain properties according to the concept and obtaining a percentage of 50%. In these questions, students do not understand the information

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contained in the questions, students do not use integral concepts in answering questions so that the results of students' answers with the commands in the questions do not match. This shows that students' errors in answering questions occur because the process of interpreting the information given into mathematical expressions is not appropriate (Delisda & Sofyan, 2014; C. Rahmawati & Zhanty, 2019). Students are considered to have misunderstood the question if they are not able to understand what is being asked (Widodo, 2013).

**Transformation Error**

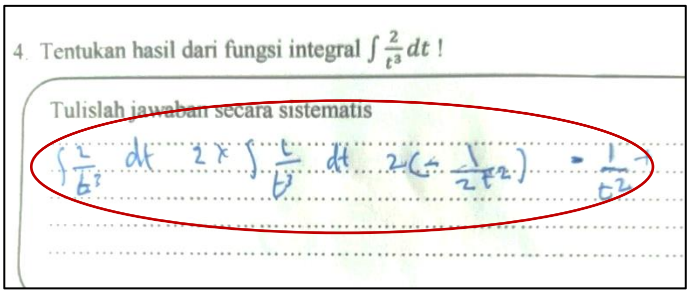


**Figure 4 Example of Transformation Error**

Figure 4 shows the student's error in stating the formula in question number 4 with an indicator of concept understanding, namely presenting concepts in various forms of mathematical representations that get a percentage of 75%. In this question, it shows that students do not change their shape $\frac{2}{t^3}$ into the form Students directly integrate the function, but the formula $2.t^{-3}$ used incorrectly. Students make mistakes in transforming the information they know in the problem into the correct mathematical model (D. Rahmawati & Permata, 2018). So from this, it can be concluded that students do not know the right formula to be applied to the problem. This is by research conducted by (Hutajulu et al., 2019) that students write answers that do not match the formulas that have been studied. Students have not been able to analyze the questions in the questions, and this has an impact on student answers that are made modest (Nadz & Haq, 2013).

**Process Skill Error**

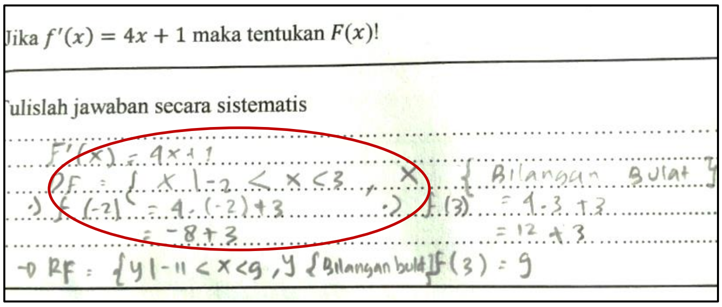


**Figure 5 Example of Process Skill Error**

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Figure 5 is a student error who does not know the steps that will be used to solve the problem correctly. This error is taken from question number 2 with an indicator of concept understanding, namely providing examples and not examples of a concept with a percentage of 62.5%. Where in this problem students are not able to find the value of F($x$) from the function $f'(x)$ by using the integral method. Students are not able to do the steps exactly according to the request on the question. According to (Juliana & Zanthy, 2020) process skill errors can be seen from students who make computational errors, namely students doing wrong calculations in solving problems. This is in line with the statement of (Aulia & Kartini, 2021) that the process error made by students is that students have not been able to manipulate problems into the form of mathematical models and students are wrong in calculations. (Arifani et al., 2016) added that processing errors lie in the fourth largest order which indicates that students have not been able to apply the correct rules in solving mathematical problems.

**Encoding Error**

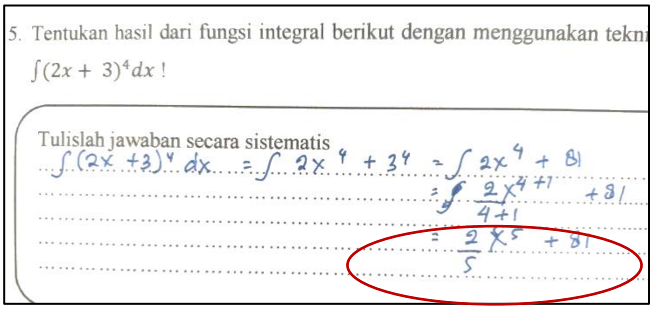


**Figure 6 Example of Encoding Error**

Figure 6 is a student error who cannot show the final answer to solving the problem correctly. This error is taken from question number 5 with indicators of concept understanding, namely using, utilizing, and choosing certain procedures or operations with a percentage of 62.5%. Where in the question students are asked to integrate a function by way of substitution, but based on the student's answer, the final result is wrong because the student immediately squares the function and integrates it without first substituting the question. This shows that students do not understand the concept of integral substitution. According to (Wijaya et al., 2018) the error in writing the final answer is the inability of students to interpret and validate mathematical solutions. (Septiahani et al., 2020) added one form of writing error in the final answer, namely students could not show the final answer to solving the problem correctly and by the conclusion. This statement is reinforced by (Lestari et al., 2016) who say that errors in writing the final answer are one of the types of errors that often occur in students when solving problems.

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## CONCLUSION

Based on the results of research and discussion regarding the analysis of student errors in solving concept understanding problems on the integral matter, the indicator for reading errors in the questions obtained a percentage of 62.5%, then the percentage of errors in understanding questions obtained a value of 50%, the percentage of transformation errors obtained a value of 75%, then the percentage of process skill errors gets a value of 62.5%, and the percentage of errors in writing the final answer also gets the same result as the percentage of process skills errors that is 62.5%. So it can be concluded that the most mistakes made by students are the transformation errors with a percentage of 75%. This is because most students do not understand the integral concept so they do not understand in determining the formula and applying it. Students are also in a hurry to solve problems without thinking about concepts and formulas correctly so students are wrong in solving problems. Therefore, teachers play an important role in providing a conceptual understanding of integral matter and also other materials in learning mathematics to students. Teachers can not only see the final results of student answers in completing the material but the process of answering questions must also be considered by the teacher so that teachers can understand the extent to which students' conceptual understanding abilities are. Not only that, but teachers can also apply several approaches and appropriate learning methods in learning mathematics in instilling concept understanding in students.

## REFERENCES

Agnesti, Y., & Amelia, R. (2020). Analisis Kesalahan Siswa Kesalahan VIII SMP Di Kabupaten Bandung Barat Dalam Menyelesaikan Soal Cerita Pada Materi Perbandingan Ditinjau Dari Gender. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(1), 151–162. https://doi.org/10.31004/cendekia.v4i1.186

Amalia, R., Aufin, M., & Khusniah, R. (2018). Analisis Kesalahan dalam Menyelesaikan Soal Cerita pada Pokok Bahasan Persamaan Linier Berdasarkan Newman Kelas X-MIA di SMA Bayt Al-Hikmah Kota Pasuruan. *Prosiding Seminar Nasional Matematika Dan Pendidikan Matematika (SNMPM)*, *2*(1), 346–359. http://www.fkip-unswagati.ac.id/ejournal/index.php/snmpm/article/view/408/342[06 Oktober 2021]

Andriani, T., Suastika, I. K., & Sesanti, N. R. (2017). Analisis Kesalahan Konsep Matematika Siswa dalam Menyelesaikan Soal Trigonometri Kelas X TKJ SMKN 1 Gempol Tahun Pelajaran 2016/2017. *Pi: Mathematics Education Journal*, *1*(1), 34–39. https://doi.org/10.21067/pmej.v1i1.1998

Arifani, N. H., As'ari, A. R., & Abadyo. (2016). Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Matematika TIMSS Menurut Teori Newman : Studi Kasus Pada Siswa Kelas VIII SMP Negeri 1 Tanjungbumi Bangkalan. *Seminar Nasional Matematika Dan Pendidikan Matematika UNY*, *1*(3), 443–448. http://seminar.uny.ac.id/semnasmatematika

Ario, M., & Asra, A. (2018). Pengaruh Pembelajaran Flipped Classroom terhadap Hasil Belajar Kalkulus Integral Mahasiswa Pendidikan Matematika. *ANARGYA: Jurnal Ilmiah Pendidikan Matematika*, *1*(2), 82–88.

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

https://doi.org/10.24176/anargya.v1i2.2477

Aulia, J., & Kartini. (2021). Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Cerita Pada Materi Himpunan Bagi Siswa Kelas VII SMP/MTs. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(1), 484. https://doi.org/10.31764/pendekar.v1i1.280

Az Zahra, S. J. (2019). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Cerita SPLTV Berdasarkan Tahapan Newman. *Jurnal Pembelajaran Matematika Inovatif*, *2*(2010), 364–373.

Damayanti, N. W., Mayangsari, S. N., & Mahardika, L. T. (2017). Analisis Kesalahan Siswa Dalam Pemahaman Konsep Operasi Hitung Pada Pecahan. *Edutic - Scientific Journal of Informatics Education*, *4*(1), 1–7. https://doi.org/10.21107/edutic.v4i1.3389

Delisda, D., & Sofyan, D. (2014). Perbandingan Prestasi Belajar Siswa Antara Yang Mendapatkan Model Pembelajaran Snowball Throwing Dan Pembelajaran Konvensional. *Mosharafa: Jurnal Pendidikan Matematika*, *3*(2), 75–84.

Fitriani, N., & Yuliani, A. (2016). Analisis Penerapan Pembelajaran Matematika Berbasis PMRI Pada Sekolah Dasar Di Kota Bandung. *Jurnal Ilmiah P2M STKIP Siliwangi*, *3*(2), 25–32.

Ghozi, S., & Hilmansyah, H. (2018). Visualisasi Geometris Aplikasi Integral: Studi Penggunaan Software Autograph Dalam Pembelajaran Matematika Teknik. *JNPM (Jurnal Nasional Pendidikan Matematika)*, *2*(1), 73. https://doi.org/10.33603/jnpm.v2i1.896

Halawa, J. S., & Oktaviani, M. R. R. D. H. (2021). Analisis Kesalahan Siswa Menyelesaikan Soal Pemahaman Konsep Pada Materi Relasi Dan Fungsi. *Jurnal PRIMATIKA*, *10*, 11–18.

Hartono, W., & Noto, M. S. (2017). Pengembangan Modul Berbasis Penemuan Terbimbing untuk Meningkatkan Kemampuan Matematis pada Perkuliahan Kalkulus Integral. *JNPM (Jurnal Nasional Pendidikan Matematika)*, *1*(2), 320. https://doi.org/10.33603/jnpm.v1i2.616

Hutajulu, M., Senjayawati, E., & Minarti, E. D. (2019). Analisis Kesalahan Siswa SMK Dalam Menyelesaikan Soal Kecakapan Matematis Pada Materi Bangun Ruang. *Mosharafa: Jurnal Pendidikan Matematika*, *8*(3), 365–376. https://doi.org/10.31980/mosharafa.v8i3.505

Jha, S. K. (2012). Mathematics Performance of Primary School Students in Assam (India): An Analysis Using Newman Procedure. *International Journal of Computer Applications in Engineering Sciences*, *2*(I), 17–21.

Juliana, H. S., & Zanthy, L. S. (2020). Analisis Kesalahan Siswa MTS Kelas IX Di Bandung Barat Dalam Menyelesaikan Soal Materi Statistika. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *04*(01), 183–192.

Karnasih, I. (2015). Analisis Kesalahan Newman Pada Soal Cerita Matematis. *Jurnal PARADIKMA*, *8*(1), 37–51.

Kesumawati, N. (2008). Pemahaman Konsep Matematik Dalam Pembelajaran Matematika. *Prosiding SeminarNasional Matematika Dan Pendidikan Matematika, Jurusan Pendidikan Matematika Fakultas Matematika Dan Ilmu Pengetahuan Alam Universitas Negeri Yogyakarta*, 229–235.

Kurniadi, E., Darmowijoyo, D., & Pratiwi, W. D. (2020). Analisis Kemampuan

ISSN : 2579-5724
ISSN : 2579-5260 (Online)
http://ejournal.umm.ac.id/index.php/MEJ

Pemahaman Konsep Dasar Mahasiswa dalam Mengidentifikasi Karakteristik dan Menyelesaikan Soal Pemodelan Matematika. *Jurnal Gantang*, *5*(1), 9–18. https://doi.org/10.31629/jg.v5i1.299

Lestari, A. P., Hasbi, M., & Lefrida, R. (2016). Analisis Kesalahan Siswa Kelas IX Dalam Menyelesaikan Soal Cerita Keliling Dan Luas Lingkaran Di SMP Al-Azhar Palu. *Elektronik Pendidikan Matematika Tadulako*, *3*(4), 373–385.

Maharani, L., Hartono, Y., & Hiltrimarti, C. (2013). Kemampuan Pemahaman Konsep Siswa Pada Pembelajaran Matematika Menggunakan Model Generative Learning Di Kelas VIII SMP Negeri 6 Palembang. *Jurnal Pendidikan Matematika*, *7*(2), 1–17. https://ejournal.unsri.ac.id/index.php/jpm/article/view/4650

Manalu, A., Jumiati, Y., & Setiawan, W. (2019). Analisis Minat Belajar Matematika Siswa SMP Kelas VIII Pada Materi Persamaan Garis Lurus Berbantu Aplikasi Geogebra. *Jurnal On Education*, *02*(01), 63–69.

Manalu, A., & Zanthy, L. S. (2020). Analisis Kesulitan Siswa SMP Kelas IX dalam Menyelesaikan Soal Materi Lingkaran. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(1), 104–112. https://doi.org/10.31004/cendekia.v4i1.179

Munasiah. (2021). Analisis Pemahaman Konsep Matematika Pada Materi Aljabar. *Jurnal Jendela Pendidikan*, *1*(3), 73–79.

Nadz, T. F., & Haq, C. N. (2013). Perbandingan Peningkatan Kemampuan Penalaran Matematis Siswa Yang Memperoleh Pembelajaran Melalui Metode Problem Based Instruction (PBI) Dengan Metode Konvensional. *Mosharafa: Jurnal Pendidikan Matematika*, *2*(3), 191–202. https://journal.institutpendidikan.ac.id/index.php/mosharafa/article/view/mv2n3_5/212

Rachman, A. F., & Saripudin. (2020). Analisis Kesalahan Siswa SMK Kelas XI Pada Materi Logika Matematika. *Jurnal Sigma*, *5*(2), 37. https://doi.org/10.36513/sigma.v5i2.692

Radiusman. (2020). Studi Literasi: Pemahaman Konsep Siswa Pada Pembelajaran Matematika. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, *6*(1), 1–8.

Rahimah, D. (2012). Identifikasi Kesalahan Mahasiswa Dalam Menyelesaikan Soal-Soal Pokok Bahasan Integral Pada Mata Kuliah Kalkulus Integral. *Jurnal Exacta*, *10*(1), 89–97.

Rahmawati, C., & Zhanty, L. S. (2019). Analisis Kemamampuan Komunikasi Siswa Menengah Terhadap Resiliensi Matematis. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, *2*(3), 147–154. https://doi.org/10.22460/jpmi.v2i3.p147-154

Rahmawati, D., & Permata, L. D. (2018). Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Cerita Program Linear Dengan Prosedur Newman. *Jurnal Elektronik Pembelajaran Matematika*, *5*(2), 173–185.

Saparwadi, L. (2015). Peningkatan Kualitas Pembelajaran Kalkulus Integral Melalui Kegiatan Lesson Sudy Di Program Studi Pendidikan Matematika. *Jurnal Pendidikan Matematika*, *9*(1), 35–48.

Septiahani, A., Melisari, M., & Zanthy, L. S. (2020). Analisis Kesalahan Siswa SMK dalam Menyelesaikan Soal Materi Barisan dan Deret. *Mosharafa: Jurnal Pendidikan Matematika*, *9*(2), 311–322.

*ISSN : 2579-5724*
*ISSN : 2579-5260 (Online)*
http://ejournal.umm.ac.id/index.php/MEJ

https://doi.org/10.31980/mosharafa.v9i2.644

Sholihah, D. A., & Mahmudi, A. (2015). Keefektifan Experiential Learning Pembelajaran Matematika MTs Materi Bangun Ruang Sisi Datar. *Jurnal Riset Pendidikan Matematika*, *2*(2), 175–185. https://doi.org/10.21831/jrpm.v2i2.7332

Singh, P., Rahman, A. A., & Hoon, T. S. (2010). The Newman Procedure for Analyzing Primary Four Pupils Errors on Written Mathematical Tasks: A Malaysian Perspective. *Procedia - Social and Behavioral Sciences*, *8*(5), 264–271. https://doi.org/10.1016/j.sbspro.2010.12.036

Surat, I. M. (2016). Pembentukan Karakter Dan Kemampuan Berpikir Logis Siswa Melalui Pembelajaran Matematika Berbasis Saintifik. *Jurnal EMASAINS*, *V*(6), 14–16.

Suswigi, & Zanthy, L. S. (2019). Kemampuan Pemahaman Matematik Siswa MTs di Cimahi Pada Materi Persamaan Garis Lurus. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *3*(1), 40–46. https://doi.org/10.31004/cendekia.v3i1.77

Widodo, S. A. (2013). Analisis Kesalahan Dalam Pemecahan Masalah Divergensi Tipe Membuktikan Pada Mahasiswa Matematika. *Jurnal Pendidikan Dan Pengajaran*, *2*(2), 106–113. https://doi.org/10.12928/admathedu.v4i1.4810

Wijaya, T. U. U., Destiniar, & Mulbasari, A. S. (2018). Kemampuan Pemahaman Konsep Matematis Siswa Dengan Menggunakan Model Pembelajaran Auditory Intellectually Repetition (Air). *Prosiding Seminar Nasional 21 Universitas PGRI Palembang*, *53*(9), 431–435.

Wiliawanto, W., Bernard, M., Akbar, P., & Sugandi, A. I. (2019). Penerapan Strategi Pembelajaran Aktif Question Student Have Untuk Meningkatkan Kemampuan Berpikir Kritis Matematik Siswa SMK. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *3*(1), 139–148. https://doi.org/10.31004/cendekia.v3i1.86

Yuliani, E. N., Zulfah, & Zulhendri. (2018). Kemampuan Pemahaman Konsep Matematis Siswa Kelas Viii SMP N 1 Kuok Melalui Model Pembelajaran. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *2*(2), 91–100.