Analisis Kemampuan Literasi Matematis Siswa Melalui Komik Matematika Berbasis Pembelajaran Berbasis Masalah

Novferma [1], Febbry Romundza [2], Indah Pristy Yenzi[3]
[1,2,3]Pendidikan Matematika, Universitas Jambi, Indonesia
E-mail: novferma@unja.ac.id[1] febbryromundza@unja.ac.id[2]
indahpristyyenzi13042002@gmail.com[3]

Abstrak

Kemampuan siswa Indonesia dalam literasi matematis tergolong dalam taraf rendah, ini ditunjukkan dari beberapa hasil survey PISA. Hal yang menyebabkan rendahnya kemampuan literasi matematis siswa di Indonesia adalah kurangnya penerapan model pembelajaran dan media yang mendukung kemampuan literasi matematis siswa. Tujuan dari penelitian ini adalah untuk menganalisis kemampuan literasi matematis siswa melalui penerapan komik matematika berbasis *problem-based learning*. Penelitian ini merupakan jenis penelitian kualitatif. Subjek penelitian ini melibatkan 25 siswa kelas VIII.1 pada salah satu sekolah di Batanghari yaitu SMPN 21 Batanghari. Teknik pengumpulan data pada penelitian berupa tes kemampuan literasi matematis berjumlah 5 butir soal essay. Analisis data dalam penelitian ini meliputi reduksi data, penyajian data, penarikan kesimpulan/verifikasi. Hasil penelitian yang diperoleh bahwa dari 25 siswa yang mengikuti tes kemampuan literasi matematis, sebanyak 11 siswa atau 44% siswa memiliki kemampuan literasi matematis tingkat tinggi, sebanyak 14 siswa atau 56% siswa memiliki kemampuan literasi matematis tingkat sedang dan tidak ada siswa yang memiliki kemampuan literasi matematis tingkat rendah. Dengan demikian disimpulkan bahwa kemampuan literasi matematis siswa setelah belajar dengan menggunakan komik matematika berbasis *problem-based learning* masuk dalam kategori kemampuan literasi matematis tingkat sedang yang dilihat dari perolehan nilai rata-rata tes kemampuan literasi matematis siswa yaitu sebesar 79,72.

Kata Kunci: kemampuan literasi matematis, komik matematika, *problem-based learning*

Analysis of Students' Mathematical Literacy Ability Through Mathematics Comics Based on Problem-Based Learning

Abstract

Indonesian students' ability in mathematical literacy is classified as low; this is shown in several PISA survey results. What causes students' low mathematical literacy abilities in Indonesia is the need for more application of learning models and media that support students' mathematical literacy abilities. This research analyzes students' mathematical literacy skills using problem-based learning-based mathematical comics. This research is a type of qualitative research. The subjects of this research involved 25 class VIII—1 students at one of the schools in Batanghari, namely SMPN 21 Batanghari. The data collection technique in the study was a mathematical literacy ability test consisting of 5 essay questions. Data analysis in this research includes data reduction, data presentation, and concluding/verification. The research results showed that of the 25 students who took the mathematical literacy ability test, as many as 11 students, or 44%, had high levels of mathematical literacy skills. As many as 14 students, or 56% of students, had moderate mathematical literacy skills. No students had average levels of mathematical literacy skills. Low-level mathematics. Thus, it is concluded that students' mathematical literacy abilities after learning using problem-based learning-based mathematical comics fall into the category of medium-level mathematical literacy abilities as seen from the average score obtained on the students' mathematical literacy ability test, which is 79,72.

Keywords: mathematical comics; mathematical literacy ability; problem-based learning

INTRODUCTION

Mathematics is a field of knowledge that every individual needs to have to solve various problems in everyday life. Mathematics can help someone hone their ability to think, reason, argue, discuss, and contribute to solving life problems. Mathematics is one of the fields of study that must be taught to students at school to form students with quality and critical thinking as a means for students to solve various problems in everyday life. When students study mathematics at school, they are required to be able to calculate and use their reasoning and analytical skills to connect mathematical ideas to the context of life. According to Ananda & Wandini (2022), mathematics is related to mathematical literacy, which is associated with the ability to understand and apply mathematics in several situations by using strategies, concepts, and facts to describe events.

According to OECD (2017), mathematical literacy is the ability to formulate, use, apply, and analyse mathematics in several situations by applying concepts, facts, procedures, and mathematical tools to explain an event. Mathematical literacy is an essential ability for every person because, through mathematical literacy skills, a person can choose various effective strategies to solve a problem and assess and analyse problems to conclude (Amaliya & Fathurohman, 2022). Someone can be said to be capable of solving mathematical problems if they can understand the problem, choose the suitable method, and apply mathematical concepts to solve it (Usman & Kristiawati, 2022).

However, the facts on the ground are inversely proportional to these theories. In natural conditions that occur when students are given problems that are problem-solving, students have difficulty understanding the meaning of the problem well, cannot understand the questions given in the problem, have difficulty changing word problems into mathematical models, and have trouble writing down known rights. Moreover, when asked about the questions, they could have been more optimal in using arithmetic operations and more able to provide conclusions from the problems in the questions. Students still need to understand the use of mathematical concepts in formulating mathematical situations or changing real conditions in mathematical form, and students need help understanding mathematical patterns (Lestari & Effendi, 2022). This is due to students' low mathematical literacy skills, which makes it challenging to solve mathematical problems.

The low mathematical literacy abilities of students are shown by several PISA (*Program for International Student Assessment*) survey results, namely PISA in 2012, Indonesia was in 64th position with a total of 65 test takers from participating countries with a score of 382 in the field of science, a score of 396 in the area of reading, and a score of 375 in mathematics with an average score on the international scale of 494, while the results of the PISA survey in 2015, Indonesia was in 69th position with the number of test takers being 76 participating countries with a score of 382 in the field of science, a score of 371 in the area of reading, and a score of 386 in the field of mathematics with an average score on the international scale of 403. As for the results of the 2018 PISA survey, Indonesia is in 73rd position, with the number of test takers being 78 participating countries with a score of 396 in the field of science, a score of 371 in the area of reading, and 379 in mathematics (Masfufah & Afriansyah, 2021). Based on several PISA survey results, Indonesian students must improve their mathematical literacy skills.

The main reason for the low mathematical literacy skills of students in Indonesia is that students are only used to working on problems that cannot hone their abilities to think critically and reason highly, causing students to be confused when working on issues that are a problem (Nasoha et al., 2022). Not only that, teachers also have not adapted learning models that support students' abilities in solving problems, and the use of media is not appropriate. Hence, the teacher's delivery of mathematical concepts could be more optimal. This needs to be a concern for teachers when teaching mathematics to hone students' analytical and critical thinking abilities in training students to work on problem-solving questions. Choosing appropriate learning models and media can encourage students to understand mathematical concepts that are considered complicated because learning models and learning media play a vital role in supporting the achievement of learning objectives and improving the quality of learning. The complexity of presenting material in learning media can cause students to be less interested in reading the material and will be considered difficult to understand. According to Syahwela (2020),

complex material requires a tool that can make it easier for teachers to convey material concepts well and can be understood by students.

One alternative that can be used to make complex material more accessible to understand is mathematics learning media in the form of comics. According to Gunadi & Aisah (2019), comics can also be used as a learning medium that can train students' mathematical literacy skills to become more developed. Comics are defined as a medium that presents simple stories that are easy to understand, the contents of which are accompanied by cute pictures so that they are liked by many people (Fikriani & Swetherly Nurva, 2020). Comics are used as learning media, and they can motivate students to understand material that is considered difficult to understand quickly and can lengthen students' memory so that they can support students' success in learning mathematics (Mujawal et al., 2018)

Based on research by Putra & Milenia (2021), learning media in the form of mathematics comics improves students' problem-solving ability. Meanwhile, study by Gunadi & Aisah (2019) states that mathematics comics help form students' understanding of learning material, and comics applied in mathematics learning can support teachers' teaching methods to create effective and efficient learning. Research by Mujawal et al. (2018) shows that comic media can motivate students to learn and maximize student learning outcomes, so comics can be used as an alternative to learning mathematics. Apart from that, mathematics comics also support students' mathematical literacy skills. This shows that through mathematics comics, students can continue reading the comic's storyline, which can develop students' mathematical literacy.

Comic media can be combined by relating the stages of a learning model that can facilitate students' mathematical literacy skills. A learning model that can support students' abilities to think critically and analytically when solving mathematical problems is problem-based learning. The problem-based learning model is a student-centered learning model that uses real-life problems as a context that makes students skilled in solving mathematical problems (Nurlaela & Imami, 2022). In line with Pamungkas & Franita (2019), problem-based learning allows students to apply their knowledge and skills to solve problems.

The application of mathematical comics based on problem-based learning makes it possible to help students understand abstract mathematical concepts, attract students' attention when studying a mathematical subject, help students solve problems, and support students' abilities in terms of mathematical literacy. Syifani & Siregar (2023) said that the problem-based learning model facilitates students' mathematical thinking abilities through investigation, problem solving, presentation, and problem evaluation activities to support the development of students' knowledge construction abilities.

METHOD

This type of qualitative research aims to analyze students' mathematical literacy skills through the application of problem-based learning-based mathematical comics. The subjects of this research involved 25 students in class VIII.1 at one of the schools in Batanghari, namely SMPN 21 Batanghari. This research data is descriptive qualitative data in words related to facts obtained through the data analysis process, which are described and studied briefly. The data collection technique in this research tests students' mathematical literacy skills with material on Systems of Linear Equations in Two Variables with 5 essay questions. Before the test questions were used in the research, the test question instruments had been validated by the validator, Mrs. Dr. Dra. Mujahidawati, M.Si., a lecturer in the mathematics education study program at Jambi University. Data analysis for this research uses the Miles and Huberman model in data reduction, data presentation, and drawing conclusions or verification. Qualitative data analysis is carried out after implementing learning using problem-based learning and mathematical comics. Activities carried out in data analysis include organizing data, breaking it down into units, carrying out synthesis, arranging it into patterns, and choosing which ones will be studied to reach conclusions.

At the data reduction stage, the researcher summarizes and focuses on the essential things. In this stage, when the researcher has finished checking the students' test work results, the researcher will classify the students' mathematical literacy abilities into three categories of levels of mathematical

literacy abilities: high, medium, and low. Then, at the data presentation stage, the researcher will present the reduced data, namely the classification of students' mathematical literacy abilities into high, medium, and low categories. The final stage is the conclusion drawing and verification stage, where the researcher will conclude from the results obtained based on the results of data analysis. The indicators of mathematical literacy abilities used in this research include 1) mathematical formulation of real problems, 2) mathematical concepts, procedures, facts, and tools, and 3) interpretation, application, and assessment of results.

RESULTS

Students' mathematical literacy abilities were observed from the results of students' mathematical literacy ability test scores after implementing learning using problem-based mathematics comics. Information on the results of students' mathematical literacy ability test scores after learning can be seen in Table 1.

Table 1. Results of Students' Mathematical Literacy Ability Test Scores

Number	Information	Students' Mathematical Literacy Ability Test Scores
1.	Highest Score	93
2.	Lowest Score	65
3.	Average Score	79,72

Based on Table 1, it can be seen that of the 25 students who took the mathematical literacy skills test, the highest score was 93, the lowest score was 65, and the average score obtained was 79.72. Furthermore, the level of students' mathematical literacy skills, which are grouped into low-level, medium-level, and high-level categories, can be seen in Table 2.

Table 2. Results of Students' Mathematical Literacy Ability Tests Based on Category

Number	Score Interval	The Number of Students	Percentage	Level
1.	$80 \leq$ score < 100	11	44%	High
2.	$60 \leq$ score < 80	14	56%	Medium
3.	$0 \leq$ score < 60	-	-	Low

Based on Table 2 above, it can be seen that of the 25 students who took the mathematical literacy ability test, the number of students who fell into the category of high-level mathematical literacy ability was 11, or 44% of students. In contrast, the number of students who had medium-level mathematical literacy ability was 14 people or 56%, and there were no students who had mathematical literacy skills at a low level. In this way, students' mathematical literacy skills are pretty good because they are at a high and medium level. The categories of completeness of students' mathematical literacy abilities after implementing learning using problem-based mathematics comics can be seen in Table 3.

Table 3. Level of Completeness of Students' Mathematical Literacy Ability

Number	Category	Mathematical Literacy Ability	
		The Number of Students	Percentage
1.	Complete	22	88%
2.	Incomplete	3	12%
	The Number of Students	25	100%

Based on Table 3, it is shown that of the 25 students who took the mathematical literacy ability test after implementing learning using problem-based learning-based mathematics comics, 22 students, or 88% of students, were declared complete, and 3 students, or 12% of students, were declared incomplete.

Then, students were grouped based on their level of mathematical literacy for analysis. The researcher analyzed students' mathematical literacy abilities and chose two representative students from each category. The category of students with moderate mathematical literacy skills is S5, while students with high mathematical literacy skills are S9. Researchers will analyze the mathematical literacy abilities

of the two selected students in solving mathematical literacy ability test questions. The following is an analysis of students' mathematical literacy abilities according to categories:

Students' Mathematical Literacy Ability in the High Category

High-level students' mathematical literacy abilities were analyzed on S9 students. This selection was based on the results of the S9 students' mathematical literacy ability test, which obtained the highest score, namely 93. S9 students were able to apply indicators of mathematical literacy abilities well. The stages in the problem-solving process by S9 students are by mathematical concepts and procedures, which in this case are by the concepts in the material on systems of linear equations in two variables. On several questions, S9 students have succeeded in solving the questions well and have met all the mathematical literacy indicators. However, there was one question that S9 students failed to solve, namely in question number 5. S9 students experienced a slight error in solving question number 5, resulting in S9 students getting the wrong results. Below are the results of answers to question number 5 by S9 students on the mathematical literacy ability test, which can be seen in Figure 1.

Figure 1. S9 Student Answer Sheet on Question Number 5

Based on the results of the S9 student answer sheet, it can be seen that in indicator 1, the S9 student was correct in changing the story problem into mathematical form, where the student used the information known from the problem by making an example to use in forming a mathematical model to obtain two equations called systems of linear equations in two variables. In indicator 2, students have also used appropriate mathematical concepts and procedures by solving systems of linear equations in two variables, namely the elimination and substitution methods. In the elimination method to obtain the value of variable x, S9 students have used concepts, facts, procedures, and mathematical tools correctly so that the results obtained by students for the value of variable x are correct. Meanwhile, when carrying out the substitution method to obtain the value of the variable y, student S9 used the concept and procedure of the substitution method correctly. However, student S9 experienced an error in writing the sign for the addition operation, where student S9 wrote $-2y = -3 + 9$; what should be true is $-2y = -3 - 9$. These errors occur because students are less skilled at compiling mathematical equations and use inappropriate symbols or mathematical notation. Apart from that, errors related to the calculation process are caused by students not being careful and appearing to be in a rush to complete it. In this way, the application of indicator 3 by S9 students was not correct, which was caused by an error that

had an impact when S9 students interpreted the values obtained from the calculation results. Because the calculations carried out by S9 students were wrong, the final results obtained by S9 students to answer the problem questions given in the questions were not correct.

Students' Mathematical Literacy Ability in the Medium Category

An analysis of medium-level students' mathematical literacy abilities was conducted on S5 students. This selection was based on the results of the mathematical literacy ability test of S5 students who obtained the lowest score, namely 65. S5 students were considered not optimal in applying indicators of mathematical literacy ability well. Below are the results of answers to question number 5 by S5 students on the mathematical literacy ability test, which can be seen in Figure 2.
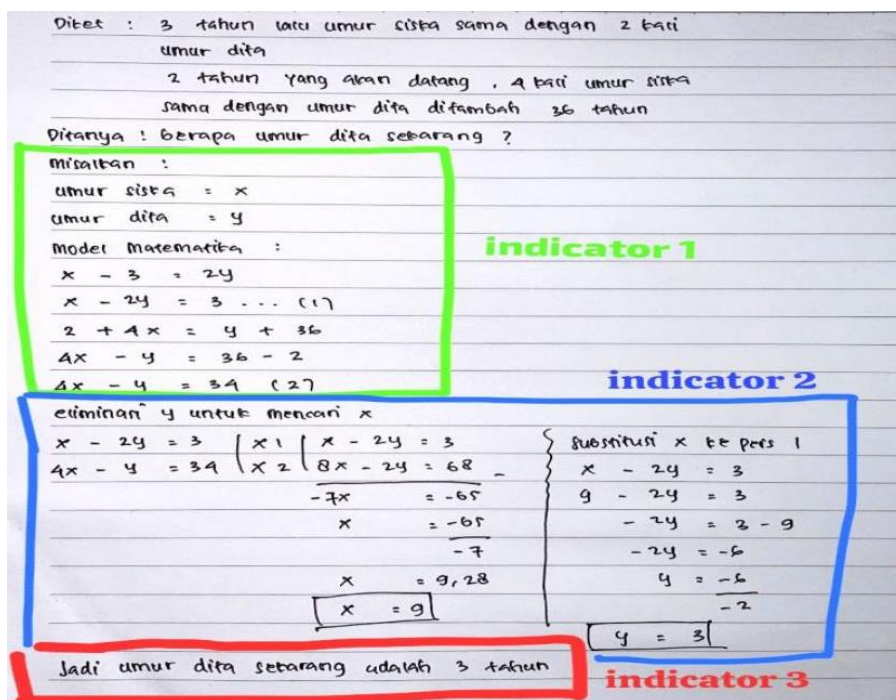

Figure 2. S5 Student Answer Sheet on Question Number 5

Based on the results sheet of S5 students' answers to question number 5, S5 students have been able to write down information from the questions regarding what is known and what is asked about in the questions. In indicator 1 as a whole, S5 students can formulate situations in mathematical form, where S5 students can make an example that is used in creating a mathematical model, and S5 students can change the situation given in the problem into mathematical form using the examples that have been made. However, S5 students were not correct in making the two mathematical model equations; where S5 students wrote down the mathematical model in equation 1, namely $x – 2y = 3$, but the correct one should be $x – 2y = -3$, and in equation 2, S5 students wrote $4x – y = 34$, but what should be correct is $4x – y = 30$, so the system of linear equations in two variables that is formed is not correct. This condition can be caused by students not being careful and not fully understanding the essence of the problem when interpreting the form of the problem presented in the mathematical model.

In indicator 2, S5, students can use appropriate mathematical concepts and procedures to solve systems of linear equations in two variables. S5 students can use the elimination method correctly to find the value of variable x, and S5 students can also use the substitution method correctly to find the value of variable y. S5 students have used concepts, facts, procedures, and mathematical tools correctly where the solution process carried out by S5 students is mathematically correct, namely identifying problems by making examples using appropriate variables, building mathematical equations, and carrying out calculation processes to find the final answer. Apart from that, in indicator 3, S5 students could interpret the results obtained according to the calculation results. However, the results obtained by S5 students were not correct in answering the problem questions from the problems given because

the mathematical model created by S5 students was incorrect, causing S5 students to obtain incorrect solution results even though the mathematical concepts and procedures carried out by S5 students were correct.

DISCUSSION

They are based on the analysis of students' mathematical literacy abilities, as shown by the results of the students' answers in completing the mathematical literacy ability test. Based on the results of the analysis of students who have high levels of mathematical literacy skills, namely S9 students, it is known that S9 students have used indicator 1, namely formulating problems in mathematical form, where S9 students can write down the information given in the problem by writing down everything they know and asked in the question. S9 students have also been able to change the problem in the word problem into a mathematical model correctly to obtain two equations that form a system of linear equations in two variables. This shows that the indicator of mathematical literacy ability in formulating problems in mathematical form has been fulfilled well by S9 students. Furthermore, in indicator 2 of mathematical literacy, namely using mathematical concepts, procedures, facts, and tools, S9 students used the correct concepts and procedures in using the SPLDV solving method in the form of elimination and substitution methods. However, S9 students needed to be corrected in writing the mathematical symbols needed to solve the problem; S9 students were wrong in writing signs in the addition operation in the solution process using substitution, resulting in S9 students making mistakes in calculating the final result. Then, in indicator 3, namely interpreting, applying, and assessing the results, S9 students can conclude the answers from the calculation results. It is just that because S9 students are not careful about using mathematical symbols properly, the answers given by S9 are not correct, even though S9 students used the correct concepts and procedures in the previous stage. In this way, it can be assessed that S9 students have mastered the concepts and procedures in the material on two-variable linear equation systems well and have fulfilled all indicators of mathematical literacy ability.

The results of the researcher's analysis of students with moderate-level mathematical literacy skills. Based on the analysis of S5 students, it was assessed that S5 students could have been more optimal in fulfilling indicator 1. Overall, S5 students could rewrite the information from the questions accurately and entirely and had written down the things that were asked and known in the questions. S5 students have also been able to change story problems into mathematical models; it is just that the equations formed by S5 students still need to be perfect. In this way, it can be assessed that S5 students still need to optimally apply one of the indicators of mathematical literacy skills, namely the indicator of formulating problems in mathematical form. In indicator 2, namely using concepts, procedures, facts, and mathematical tools, S5 students can use concepts from two-variable linear equation systems well in the elimination and substitution methods. S5 students can also use mathematical symbols well in mathematical calculations. This shows that S5 students have been able to fulfill indicators of mathematical literacy abilities by using mathematical concepts, mathematical procedures, facts, and mathematical tools. Then, for indicator 3, namely interpreting, applying, and assessing the results, S5 students could conclude that the calculation results obtained were by the problems in the questions. However, the answers obtained by S5 students were incorrect because, in formulating the problem, S5 students were not precise in making mathematical models. So, S5 students have fulfilled two indicators of mathematical literacy skills well: the indicators of applying mathematical concepts, facts, procedures, and tools and the indicators of interpreting, applying, and evaluating mathematical results well.

Based on the analysis above, using mathematical comics based on problem-based learning can support students' mathematical literacy skills because the material in mathematical comics is presented simply by choosing sentences that are easy to understand according to the student's understanding. Through the mathematical concepts presented in comics, which are explained in a simple and easy-to-understand way for students, it is hoped that they will influence students' acquisition of knowledge (Syahwela, 2020). According to Safitri & Wijayanti (2022), to improve students' mathematical abilities in learning mathematics, teachers are expected to be able to implement exciting learning activities so that students can understand the process of conveying mathematical concepts. Appropriate learning media that suit students' needs can support success in implementing learning and increase students'

enthusiasm for learning mathematics. Mathematics comics, in their presentation of material, contain sections adapted to the stages of problem-based learning. This helps students construct knowledge towards understanding mathematical concepts presented in comics. According to Khotimah & Aini (2022), learning using problem-based learning stages can direct students to solve problem-solving by providing examples of questions related to real contexts.

The research results showed that the students' mathematical literacy abilities after implementing problem-based learning-based mathematics comics were in the high and medium categories; there were no students with low mathematical literacy abilities. Apart from that, the completeness of students' mathematical literacy skills through problem-based learning-based mathematical comics is relatively high, namely 88%. So, problem-based learning-based mathematics comics can support students' mathematical literacy abilities. This is reinforced by research conducted by Fitriyani et al. (2021), which states that students who learn to use comic media in class can improve their mathematical literacy skills more than those who do not. Similar to the results of research by Rakasiwi (2019), which found that the effectiveness of comic media showed an increase in mathematical literacy skills, as seen from the increase in students' post-test results. Furthermore, research by Hidayat et al. (2021) states that learning tools using the problem-based learning model can facilitate students' mathematical literacy skills. This is because the problem-based learning model is very suitable for learning, making it easier for students to understand SPLDV material through appropriate education. Problem-oriented. This is the same as the results of research by Astuti (2018), who found that problem-based learning positively influences students' mathematical literacy abilities. Problem-based learning can train students to contribute actively to the learning process and make using mathematical knowledge to solve problems easier.

CONCLUSION

This research shows that mathematical comics based on problem-based learning can support students' mathematical literacy abilities. From the analysis of the results of students' mathematical literacy ability tests, it is assessed that students have met the three indicators of mathematical literacy. The first indicator of mathematical literacy is formulating real problems mathematically. Most students can change the issues in the story problems given into mathematical models by making the correct variables for mathematical equations. In the second indicator of mathematical literacy, namely using mathematical concepts, procedures, facts, and tools, it is assessed that students can solve a two-variable linear equation system correctly, using the elimination and substitution method to find a variable's value. Apart from that, students have also calculated mathematical operations well. Then, for the third indicator of mathematical literacy, namely interpreting, applying, and assessing the results, it is evaluated that students have been able to conclude from the calculation results obtained to answer the problems asked in the question. The results of tests on students' mathematical literacy abilities show that students with high-level mathematical literacy abilities have a percentage of 44%. Meanwhile, students' mathematical literacy abilities in the medium-level category are 56%. This shows that students' mathematical literacy abilities dominate in the medium-level category.

REFERENCES

Amaliya, I., & Fathurohman, I. (2022). Analisis Kemampuan Literasi Matematika Ditinjau dari Gaya Belajar Siswa Sekolah Dasar. *Jurnal Riset Pendidikan Dasar*, *5*(1), 45–46. https://doi.org/https://doi.org/10.26618/jrpd.v5i1.7294

Ananda, E. R., & Wandini, R. R. (2022). Analisis Kemampuan Literasi Matematika Siswa Ditinjau dari Self Efficacy Siswa. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *6*(5), 5113–5126. https://doi.org/10.31004/obsesi.v6i5.2659

Astuti, A. D. K. P. (2018). Pengaruh Problem Based Learning Terhadap Kemampuan Literasi Matematis Siswa Kelas VII Di SMP Negeri 1 Bobotsari. *AlphaMath : Journal of Mathematics Education*, *4*(2), 37. https://doi.org/10.30595/alphamath.v4i2.7359

Fikriani, T., & Swetherly Nurva, M. (2020). Pengembangan Bahan Ajar Matematika Berbentuk Komik untuk Meningkatkan Kemampuan Matematis Siswa Kelas VII SMP. *Jartika: Jurnal Riset Teknologi Dan Inovasi Pendidikan*, *3*(1), 11–24. https://doi.org/10.36765/jartika.v3i1.25

Fitriyani, Y., Eliyanti, M., & Lestari, M. A. (2021). The Application of Comic Media to Improve Literature Ability in Understanding Mathematics Story Problems in Elementary School. *Auladuna: Jurnal Pendidikan Dasar Islam*, *8*(2), 168–179. https://doi.org/10.24252/auladuna.v8i2a5.2021

Gunadi, F., & Aisah, L. S. (2019). Comic's Mathematics Learning (CML): Pembelajaran Matematika untuk Mengembangkan Kemampuan Literasi Matematis Siswa. *Mathline : Jurnal Matematika Dan Pendidikan Matematika*, *4*(2), 128–138. https://doi.org/10.31943/mathline.v4i2.113

Hidayat, R., Murni, A., & Roza, Y. (2021). Pengembangan Perangkat Pembelajaran Matematika Menggunakan Model Problem Based Learning untuk Memfasilitasi Kemampuan Literasi Matematis Peserta Didik. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(3), 3017–3027. https://doi.org/10.31004/cendekia.v5i3.373

Khotimah, K., & Aini, K. (2022). Pengembangan LKPD Berbasis Problem-Based Learning (PBL) untuk Memfasilitasi Kemampuan Literasi Matematis Siswa. *Indiktika : Jurnal Inovasi Pendidikan Matematika*, *5*(1), 90–99. https://doi.org/10.31851/indiktika.v5i1.9840

Lestari, R. D., & Effendi, K. N. S. (2022). Analisis Kemampuan Literasi Matematis Siswa SMP Pada Materi Bangun Datar. *Biormatika : Jurnal Ilmiah Fakultas Keguruan Dan Ilmu Pendidikan*, *8*(1), 63–73. https://doi.org/10.35569/biormatika.v8i1.1221

Masfufah, R., & Afriansyah, E. A. (2021). Analisis Kemampuan Literasi Matematis Siswa melalui Soal PISA. *Mosharafa: Jurnal Pendidikan Matematika*, *10*(2), 291–300. https://doi.org/10.31980/mosharafa.v10i2.825

Mujawal, W. A., Bani, A., & Nani, K. La. (2018). Penggunaan Media Komik dalam Pembelajaran Matematika untuk Meningkatakan Motivasi dan Hasil Belajar Siswa pada Materi SPLDV. *Jurnal Matematika Dan Pendidikan Matematika*, *7*(1), 1–14. https://doi.org/10.33387/dpi.v7i1.1221

Nasoha, S. R., Araiku, J., Pratiwi, W. D., & Yusup, M. (2022). Kemampuan Numerasi Siswa Melalui Implementasi Bahan Ajar Matematika Berbasis Problem Based Learning. *Indiktika : Jurnal Inovasi Pendidikan Matematika*, *4*(2), 49–61. https://doi.org/10.31851/indiktika.v4i2.7903

Nurlaela, E., & Imami, A. I. (2022). Peningkatan Kemampuan Literasi Matematika Siswa Melalui Penerapan Model Pembelajaran Problem Based Learning di Kelas VII SMPIT Insan Harapan. *Jurnal Ilmiah Dikdaya*, *12*(1), 33. https://doi.org/10.33087/dikdaya.v12i1.270

OECD. (2017). PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematic, Financial Literacy and Collaborative Problem Solving (Revised Edition). In *OECD Publishing*. www.oecd.org

Pamungkas, M. D., & Franita, Y. (2019). Keefektifan Problem Based Learning untuk Meningkatkan Kemampuan Literasi Matematis Siswa. *Jurnal Penelitian Pendidikan Dan Pengajaran Matematika*, *5*(2), 75–80. https://doi.org/10.37058/jp3m.v5i2.957

Putra, A., & Milenia, I. F. (2021). Systematic Literature Review: Media Komik dalam Pembelajaran Matematika. *Mathema: Jurnal Pendidikan Matematika*, *3*(1), 30. https://doi.org/10.33365/jm.v3i1.951

Rakasiwi, N. (2019). Pengembangan media komik dengan metode picture and picture untuk meningkatkan keterampilan literasi matematika kelas IV. *Aksioma : Jurnal Matematika Dan Pendidikan Matematika*, *10*(1), 60–70. https://doi.org/10.26877/aks.v10i1.3741

Safitri, I. A., & Wijayanti, R. (2022). Pengembangan Media Pembelajaran Pop-Up Book untuk Meningkatkan Kemampuan Literasi Matematika Siswa. *Laplace : Jurnal Pendidikan Matematika*, *5*(2), 401–409. https://doi.org/10.31537/laplace.v5i2.777

Syahwela, M. (2020). Pengembangan Media Komik Matematika SMP. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(2), 534–547. https://doi.org/10.31004/cendekia.v4i2.235

Syifani, M. A., & Siregar, T. J. (2023). Perbedaan Kemampuan Literasi Matematis Siswa SMP Negeri 3 Medan pada Soal Cerita yang diajarkan dengan Problem Based Learning dan Konvensional. *Euclid*, *10*(1), 76–87. https://doi.org/http://dx.doi.org/10.33603/e.v10i1.8526

Usman, M. R., & Kristiawati, K. (2022). Analisis Kemampuan Literasi Matematis Siswa Ditinjau dari Penguasaan Materi Prasyarat. *Jurnal Edukasi Dan Sains Matematika (JES-MAT)*, *8*(1), 79–94. https://doi.org/10.25134/jes-mat.v8i1.5463