Jurnal Theorems (*The Original Reasearch Of Mathematics*)
Volume 9, Nomor 1, Juli 2024
URL: http://ejournal.unma.ac.id/index.php/th

e-ISSN: 2528-102X
p-ISSN: 2541-4321

NUMERACY LITERACY SKILLS OF EIGHTH GRADE STUDENTS IN SOLVING HOTS QUESTIONS

Rismayani[1], Siska Firmasari[2], Mohammad Dadan Sundawan[3]
[1]UGJ Cirebon; rismayani14116@gmail.com
[2]UGJ Cirebon; siska.fs115@gmail.com
[3]UGJ Cirebon; mohammaddadansundawan@unswagati.ac.id

***Corresponding Author**:**
Rismayani
UGJ Cirebon
Rismayani14116@gmail.com
Contact Person: 0838-9356-2730

Article Info:
Received 2024-02-29
Revised 2024-07-04
Accepted 2024-07-11

How to Cite:
Rismayani., Firmasai, S., Sundawan, M. D. (2024). Numeracy Literacy Skills of Eighth Grade Students in Solving HOTS Questions. *Jurnal Theorems (The Original Research of Mathematics*, *9*(1), 74-84.

ABSTRACT

Numeracy literacy culture in Indonesia is still a very interesting issue because numeracy literacy is still low in Indonesia, based on the results of the PISA survey. Numeracy literacy is one of the essential skills that students must possess because it involves the ability to apply numerical concepts and arithmetic operations in everyday life. This research aims to identify the numeracy literacy abilities of class VIII students in solving HOTS questions. This research was conducted on 26 class VIII students, then the researchers selected 3 people as research samples. This research is a descriptive qualitative study to describe students' numeracy literacy abilities in solving HOTS questions. The results of this research are that the numeracy literacy abilities of class VIII students in solving HOTS questions are in the sufficient category.

Keywords: HOTS, Numeracy Literacy.

INTRODUCTION

Numeracy literacy culture in Indonesia is still a very interesting issue because numeracy literacy is still low in Indonesia. Based on the PISA survey, the numeracy literacy ranking of Indonesian students from 2009 to 2015 did not show a significant increase, there was also a decrease in PISA results in 2018 compared to 2015, where the reading ability category decreased from an average score of 397 to 371 and for mathematics ability decreased from 386 to 379 (Kristanti et al., 2023; OECD, 2021). Numeracy literacy is a fundamental skill in using various kinds of numbers and symbols related to basic mathematics with the ability to choose, analyze information critically and also be able to apply number concepts and arithmetic operation skills in everyday life (Ate & Lede, 2022; Fiangga et al., 2019; Han et al., 2017). The results of PISA research on students aged 15 years or for the educational stage in Indonesia, namely children at the Junior High School class VIII level, show that students experience difficulties in learning geometry, especially in understanding space and shape (Kusaeri, 2020; Perdana & Suswandari, 2021; Pereira et al., 2022; Suwaji, 2008).

e-ISSN: 2528-102X
p-ISSN: 2541-4321

The PISA questions in the process require the ability to setiawan analyze, evaluate, and create where this ability is the high-level thinking ability that we usually call *Higher Order Thinking Skills* (HOTS) (Setiawan & Dafik, 2014; Wardani et al., 2017). In PISA 2021, in order to develop students' numeracy literacy, they were required to engage in learning experiences involving the resolution of Higher Order Thinking Skills (HOTS) problems, which can sharpen students' reasoning abilities (Diva et al., 2022; Habibi & Suparman, 2020; Patriana et al., 2021).

HOTS can be interpreted as the ability to process complex thinking which includes breaking down material, criticizing and creating solutions to problem solving. Problem solving is not just done through the process of remembering or memorizing, but requires making connections and conclusions from problems (Mailani, 2018; Tiwery, 2021; Ulum, 2020). Many countries use HOTS questions in classroom learning because students' high-level thinking abilities can be trained or improved (Hanifah, 2019; Musrikah, 2018; Saraswati & Agustika, 2020). *Higher order thinking skills* are part of the revised Bloom's taxonomy in the form of operational verbs consisting of analyze (C4), *evaluate* (C5) and *create* (C6) which can be used in the compilation of questions (Effendi, 2017; Fanani, 2018; Listiani & Rachmawati, 2022).

Problem solving is something that is closely related to mathematics, so students must be accustomed to using their thinking patterns to be able to solve a problem (Ramadhani & Yahfizham, 2024; Rosita, 2014; Wahyudi & Anugraheni, 2017). Then NCTM (2000) stated that problem solving plays a dual role in the school curriculum. On the one hand, it is a basic means or tool for studying mathematics, on the other hand, it is the main goal in learning mathematics.

In solving HOTS questions, the steps taken are the same as solving math problems in general (Fanani, 2018; Khamidah, 2017). There are five stages of problem solving according to Krulik & Rudnick (1995), namely (1) reading and thinking, (2) plan, (3) choosing a strategy, (4) looking for answers , and (5) reflection or reviewing.

Numeracy literacy is closely related to solving mathematical problems, especially HOTS questions. The HOTS problem solving strategy is that students have to sort information, apply a method to solve the problem, connect several related concepts to get results (Ariandari, 2015; Suryapuspitarini et al., 2018). This is in line with numeracy literacy skills where in its application numeracy literacy applies basic mathematical operations which then interprets the results in various forms (diagrams, tables, graphs, etc.) and can be used to solve everyday problems. The relationship between indicators of numeracy literacy abilities and problem solving steps according to (Krulik & Rudnick, 1995) is:

e-ISSN: 2528-102X
p-ISSN: 2541-4321

Table 1. Numeracy Literacy Ability Indicator and Krulik and Rudnick's Problem Solving Steps

Troubleshooting Steps Krulik and Rudnick	Numeracy Literacy Ability Indicator
1st step: reading and thinking (*read and think*) Students can find out information from the data they already know and what they want to know.	Ability to analyze information from graphs, tables, and diagrams.
2nd step: planning (*plan*) Students can look for various methods or steps for the solution to be carried out.	Ability to use symbols in space and form.
3rd step: choosing a strategy (*select a strategy*) Students can determine the method or solution steps that will be carried out and the reasons.	Concept skills space and form, and measurement.
4th step: looking for answers (*find the answer*) Students can solve problems using existing methods or steps planned.	
5th step: reflection or revisiting (*reflect*) Students can check the correctness of the results obtained from each step taken in solving the problem.	

METHODS

This research uses a qualitative descriptive method approach with a case study research design which aims to obtain detailed data regarding the subject under study. The participants in this research were 3 students in class VIII of SMP Negeri 2 Cirebon. The reasoned for only selected 3 participants to allow for a more in-depth and focused analysis of each student's numeracy literacy abilities. The participants were chosen based on their varying levels of performance in previous mathematics assessments to ensure a diverse range of abilities and perspectives were represented in the study. The data collection technique is by looking at students' mathematics test scores, then conducting a written test and final interview. Analysis of numeracy literacy ability test data was carried out by grouping test results according to indicators and criteria for assessing numeracy literacy ability.

Jurnal Theorems (*The Original Reasearch Of Mathematics*)
Volume 9, Nomor 1, Juli 2024
URL: http://ejournal.unma.ac.id/index.php/th

e-ISSN: 2528-102X
p-ISSN: 2541-4321

FINDINGS

Analysis of S1 Answers

The following are the results of students' work on the questions.

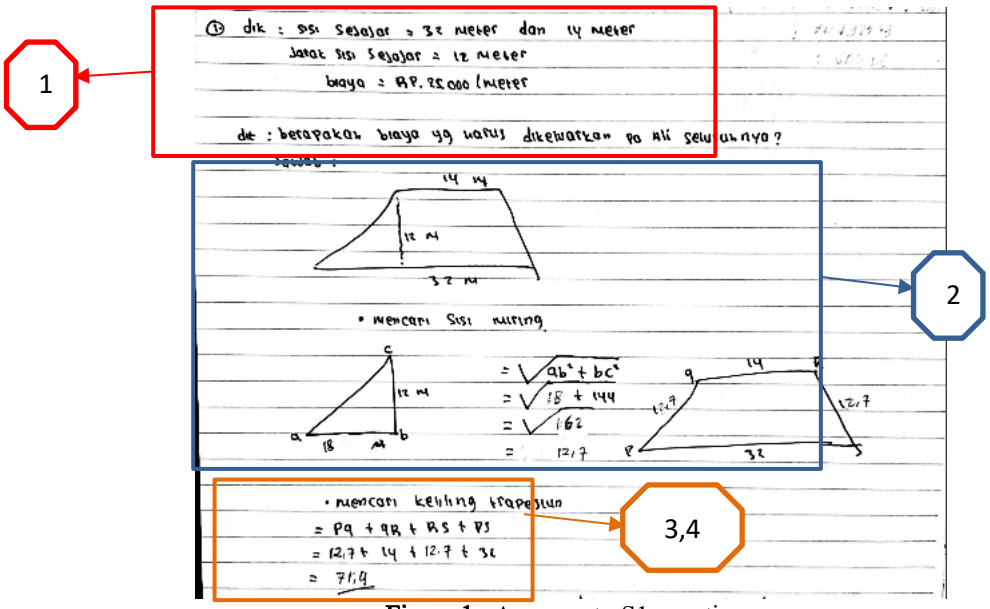

Figure 1. Answers to S1 questions

It can be seen in Figure 4.10 that S1 wrote down the known information and S1 also wrote down correctly the information asked for in the question, namely how much money Mr. Ali had to pay in total. S1 re-draws the flat trapezoid shape with a description of the symbol and length. S1 finds the sides of the trapezoid using the Pythagorean theorem formula and then finds the perimeter of the trapezoid. To clarify S1's written answer, an interview was conducted.

Based on the interview, it can be seen that at stage 1, S1 can state the information that is known from the question and can also state the information that he wants to know from the question correctly. In stage 2, S1 re-draws the trapezoidal figure with explanations of the symbols and lengths, S1 also draws the triangular figure. In stage 3, S1 mentioned that he used addition and division arithmetic operations. S1 also uses 7 symbols in solving problems. In stage 4, S1 looks for the answer by finding the length of the side of the trapezoid first, then finding the perimeter of the trapezoid. At stage 5, S1 concluded that he was confident in his answer.

Analysis of S2 Answers

The following are the results of students' work on the questions.

Jurnal Theorems (*The Original Reasearch Of Mathematics*)
Volume 9, Nomor 1, Juli 2024
URL: http://ejournal.unma.ac.id/index.php/th
e-ISSN: 2528-102X
p-ISSN: 2541-4321

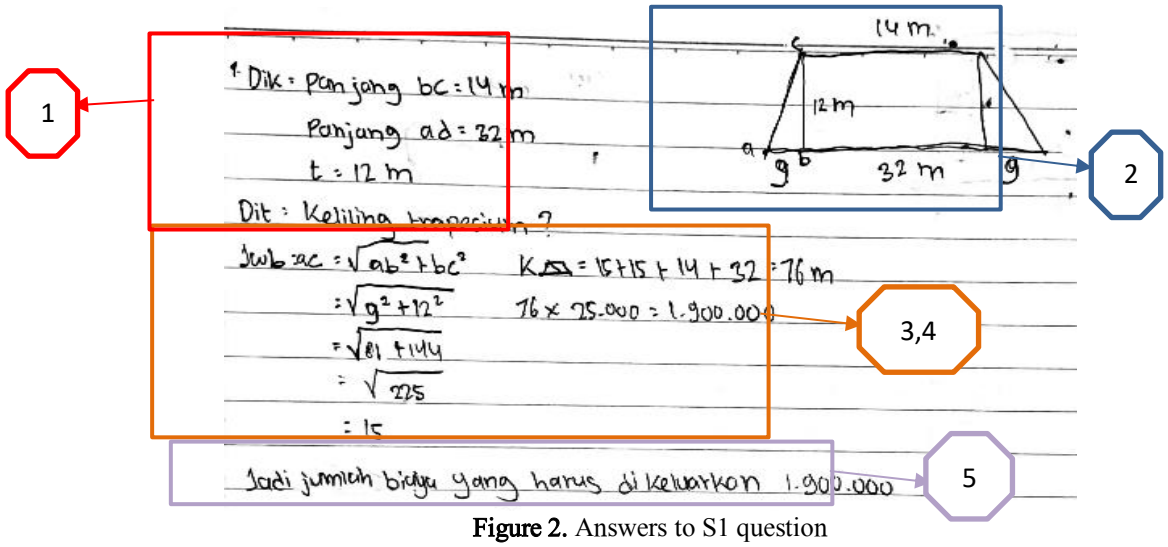

Figure 2. Answers to S1 question

It can be seen in Figure 4.13 that S2 wrote down the known information in the problem and wrote down the information asked for in the problem, namely the circumference of the trapezoid. S2 finds the sides of the trapezoid using the Pythagorean theorem formula and then finds the perimeter of the trapezoid. S2 wrote the conclusion of the solution results. To clarify S2's written answer, an interview was conducted.

Based on the interview, it can be seen that at stage 1, S2 was able to state what information was known from the questions and information that was not yet known in the questions. S2 stated that the information asked for in the question was the circumference of the trapezoid. In stage 2, S2 redraws the shape of the trapezoidal swimming pool by providing several symbols and also using several arithmetic operations. In stage 3, S2 stated that using the arithmetic operations of addition, multiplication, powers and roots. S2 also mentioned that it uses 3 symbols, namely a, b and c. In stage 4, S2 looked for the answer with a strategy of finding the length of the hypotenuse of the trapezoid first, then finding the circumference of the trapezoid and finally multiplying the circumference of the trapezoid by the price of the fence to get the result, namely that the cost incurred to make the fence was 1,900,000. at stage 5, S2 stated that he was sure of the answer and had nothing to correct.

Analysis of S3 Answers

The following are the results of students' work on the questions.

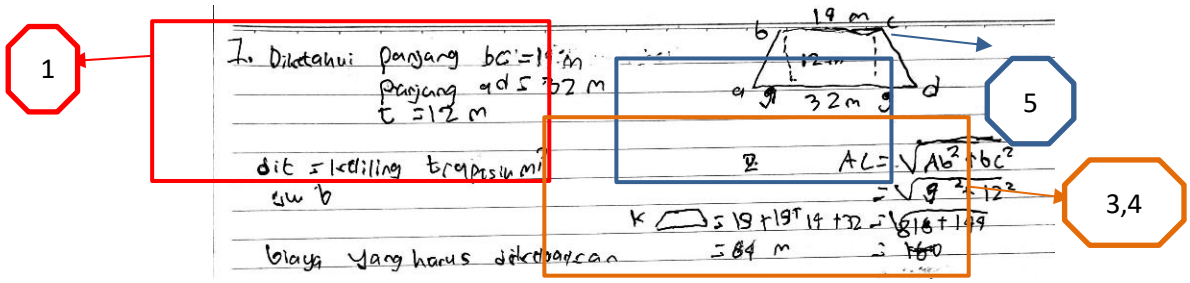

Figure 3. Answers to S3 question

e-ISSN: 2528-102X
p-ISSN: 2541-4321

It can be seen in Figure 4.16 that S3 writes down the information that is known and also writes down the information that you want to know, namely the circumference of the trapezoid. S3 does not write conclusions from the results of solving the problem. To clarify S3's written answer, an interview was conducted.

Based on the interview, it can be seen that at stage 1, S3 correctly stated the information he knew but was wrong in stating the information being asked. in stage 2, S3 redraws the flat trapezoid shape with several symbols and long descriptions. In stage 3, S3 stated that he only used the multiplication arithmetic operation unlike in the written answer, also S3 wrote down several symbols but during the interview S3 stated that he did not use symbols. In stage 4, S3 looks for the answer by finding the length of ac using the Pythagorean theorem which is not possible because the length of ac is the diagonal of the trapezoid. at stage 5, S3 stated that he was not sure about the answer.

DISCUSSION

Analysis of Numeracy Literacy Ability S1

Ability to analyze information from images, graphs, tables and diagrams

Look at the description above, namely the written answer figure 1 Regarding the ability to analyze information from pictures, it shows that S1 wrote all the information known in the question and S1 was able to correctly write the information asked for in the question. From this explanation it can be concluded that S1 is capable of mentioning information displayed in various forms (pictures, graphs, tables, etc.).

Ability to use symbols in space and form

Look at the description above, namely the written answer figure 1 regarding the ability to use symbols in space and shape material, shows that S1 in the question of writing 7 symbols was seen in the written answer and clarified at the interview stage. At the interview stage, S1 only mentioned some of the arithmetic operations used. Based on this analysis, it can be concluded that subject S1 is capable of using less than 3 types of symbols in solving problems of material space and form in the context of everyday life.

Space, shape and measurement concept skills

Look at the description above, namely the written answer figure 1 regarding the skills of the concept of space, shape and measurement, it shows that S1 in the problem redraws a flat trapezoid shape by giving symbols, then looks for the length of the unknown side first but there is an error because S1 only calculates 32 – 14 = 18 which should be divided by 2 first, In completing calculations using the Pythagorean theorem, S1 did not understand it. It can be seen that S1 immediately wrote $ab^2 = 18$, because at the initial stage there were errors so that the solution results were wrong. During the

e-ISSN: 2528-102X
p-ISSN: 2541-4321

interview, S1 stated that he was confident with his answer. Based on the analysis of question S1, it can explain the strategy used and which is not appropriate in solving the problem. From the explanation above it can be concluded that subject S1 is capable of interpreting some of the results of problem analysis to predict and make the right decisions.

Analysis of S2 Numeracy Literacy Ability

Ability to analyze information from images, graphs, tables and diagrams

Judging from the description above, namely the written answer in Figure 2 regarding the ability to analyze information from images, it shows that S2 only wrote down some of the known information in the question. It was also made clear that at the interview stage, S2 did not mention all the information known in the questions but only mentioned some information. Based on the analysis, S2 only wrote down some known information in the question, it can be concluded that S2 capable enough mentions information displayed in various forms (pictures, graphs, tables, etc.).

Ability to use symbols in space and form

Look at the description above, namely the written answer Figure 2 regarding the ability to use symbols in space and shape material, it shows that S2 in the problem only uses 3 symbols. Based on the analysis above, S2 only mentions three arithmetic operations, namely addition, roots and multiplication. From the explanation above it can be concluded that subject S2 is unable to use symbols in solving problems of material space and form in the context of everyday life.

Space, shape and measurement concept skills

Look at the description above, namely the written answer Figure 2 regarding the skills of the concept of space, shape and measurement, shows that S2 in the problem of redrawing a flat trapezoid shape using given symbols, then finding the hypotenuse of the trapezoid using the Pythagorean theorem, finding the perimeter of the trapezoid, finally looking for the costs incurred by Mr. Ali. This was also clarified at the interview stage . The S2 solves the problem precisely. Based on the analysis of the questions above, S2 is lacking in explaining the strategy to be used and also at the stage of searching for answers. From the explanation above it can be concluded that subject S2 is capable enough to interpret the results of problem analysis to predict and make the right decisions.

Analysis of Numeracy Literacy Ability S3

Ability to analyze information from images, graphs, tables and diagrams

Look at the description above, namely the written answer figure 3 regarding the ability to analyze information from images, it shows that S3 did not write down all the known information in the

e-ISSN: 2528-102X
p-ISSN: 2541-4321

questions. It was also made clear that at the interview stage, S3 did not mention all the information but only mentioned some information that was known from the questions. From the explanation above it can be concluded that S3 just mentions some information displayed in various forms (pictures, graphs, tables, etc.).

Ability to use symbols in space and form

Look at the description above, namely the written answer figure 3 regarding the ability to use symbols in space and shape material, it shows that S3 in the question used less than 3 symbols seen in the written answer but stated verbally at the interview stage that he did not use symbols.

Based on the analysis above, S3 mentioned four arithmetic operations, namely addition, division, roots and multiplication and S3 could write symbols but could not mention any symbols at the interview stage. From the explanation above it can be concluded that the subject S3able to use less of 3 types of symbols in solving problems of material space and form in the context of everyday life.

Space, shape and measurement concept skills

Looking at the description above, namely in the written answer written in Figure 3 regarding skills in the concept of space, shape and measurement, it shows that S3 in the question redraws the flat shape of the trapezoid with given symbols, but there is an error in S3's answer, namely finding the length of AC which is the diagonal of the trapezoid. using the Pythagorean theorem, it was made clear during the interview that S3 said he was not sure about his answer. Based on the analysis of the question above, S3 cannot explain the strategy that will be used at the stage of searching for answers. From the explanation above it can be concluded that subject S3 unable interpret the results of problem analysis to predict and make the right decisions.

Table 2. Numeracy Literacy Ability S1, S2, S3

Level of Problem Solving	Numeracy Literacy Ability Indicator	S1	S2	S3
read and think	Ability to analyze information from images, graphs, tables and diagrams.	Capable	Enough	Enough
plan	Ability to use symbols in space and form.	Enough	Unable	Enough
choose a strategy		Enough	Enough	Unable

e-ISSN: 2528-102X
p-ISSN: 2541-4321

Looking for
answers

CONCLUSION AND SUGGESTION

Based on the analysis of the three subjects, namely S1, S2, and S3, it is known that students are able to state some known information in the questions, both in writing and orally. Students who are also able to use several symbols when solving test questions are able to verbally mention the symbols used in preparing a solution plan and are able to explain the reasons for using symbols. In addition, students can develop plans or strategies for solving problems but cannot carry out problem-solving correctly.

The conclusion from the discussion results was that students were quite capable in three indicators of numeracy literacy skills, namely, quite capable of analyzing information from pictures, graphs, tables, and diagrams; quite capable of using symbols in terms of space and form; and quite capable in the skills of space concepts, shapes, and measurements.

REFERENCE

Ariandari, W. P. (2015). Mengintegrasikan higher order thinking dalam pembelajaran creative problem solving. *Seminar Nasional Matematika Dan Pendidikan Matematika UNY*, 489–496.

Ate, D., & Lede, Y. K. (2022). Analisis kemampuan siswa kelas VIII dalam menyelesaikan soal literasi numerasi. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *6*(1), 472–483.

Diva, S. A., Khafidin, D., & Ulya, H. (2022). Pengaplikasian PMRI dengan soal HOTS guna meningkatkan kompetensi literasi numerasi dalam asesmen kompetensi minimum. *Prosiding Seminar Nasional Pendidikan Matematika (SNAPMAT)*, 138–148.

Effendi, R. (2017). Konsep revisi taksonomi Bloom dan implementasinya pada pelajaran matematika SMP. *JIPMat*, *2*(1).

Fanani, M. Z. (2018). Strategi pengembangan soal hots pada kurikulum 2013. *Edudeena: Journal of Islamic Religious Education*, *2*(1).

Fiangga, S., Amin, S. M., Khabibah, S., Ekawati, R., & Prihartiwi, N. R. (2019). Penulisan Soal Literasi Numerasi bagi Guru SD di Kabupaten Ponorogo. *Jurnal Anugerah*, *1*(1), 9–18.

Habibi, H., & Suparman, S. (2020). Literasi Matematika dalam Menyambut PISA 2021 Berdasarkan Kecakapan Abad 21. *JKPM (Jurnal Kajian Pendidikan Matematika)*, *6*(1), 57–64.

Han, W., Susanto, D., Dewayani, S., Pandora, P., Hanifah, N., Miftahussururi, M., Nento, M. N., & Akbari, Q. S. (2017). *Materi pendukung literasi numerasi*. Direktorat Jenderal Pendidikan Dasar dan Menengah.

Hanifah, N. (2019). Pengembangan instrumen penilaian Higher Order Thinking Skill (HOTS) di

e-ISSN: 2528-102X
p-ISSN: 2541-4321

sekolah dasar. *Current Research in Education: Conference Series Journal*, *1*(1), 1–8.

Khamidah, L. (2017). Pemahaman konseptual dan pengetahuan prosedural siswa kelas VIII dalam penyelesaian soal matematika pada materi sistem persamaan linier dua variabel. *Prosiding SI MaNIs (Seminar Nasional Integrasi Matematika Dan Nilai-Nilai Islami)*, *1*(1), 611–616.

Kristanti, R., Gulo, D., & Sulistyani, N. (2023). Pengembangan Soal Literasi Numerasi pada Materi Aritmatika Sosial di Kelas VII A SMP Negeri 4 Kaliwiro Wonosobo. *Mathematical Proceedings of The Widya Mandira Catholic University*, *1*(1), 77–85.

Krulik, S., & Rudnick, J. A. (1995). *The New Sourcebook for Teaching Reasoning and Problem Solving in Elementary School. A Longwood Professional Book.* ERIC.

Kusaeri, K. (2020). *Reorientasi penilaian pembelajaran Matematika: Dulu, kini, dan mendatang*.

Listiani, W., & Rachmawati, R. (2022). Transformasi Taksonomi Bloom dalam Evaluasi Pembelajaran Berbasis HOTS. *Jurnal Jendela Pendidikan*, *2*(03), 397–402.

Mailani, E. (2018). Potret Implementasi Pembelajaran Berbasis High Order Thinking Skills (HOTS) di Sekolah Dasar Kota Medan. *Jurnal Pembangunan Perkotaan*, *6*(2), 102–111.

Musrikah, M. (2018). Higher Order Thingking Skill (Hots) Untuk Anak Sekolah Dasar Dalam Pembelajaran Matematika. *Martabat*, *2*(2), 339–360.

NCTM, P. (2000). *standards for school mathematics. Reston, VA: The National Council of Teachers of Mathematics*. Inc.

OECD. (2021). *The final version will reflect the new name of the cycle "PISA 2022."* https://www.oecd.org/pisa/sitedocument/PISA-2021-mathematics-framework.pdf

Patriana, W. D., Sutama, S., & Wulandari, M. D. (2021). Pembudayaan literasi numerasi untuk asesmen kompetensi minimum dalam kegiatan kurikuler pada sekolah dasar muhammadiyah. *Jurnal Basicedu*, *5*(5), 3413–3430.

Perdana, R., & Suswandari, M. (2021). Literasi numerasi dalam pembelajaran tematik siswa kelas atas sekolah dasar. *Absis: Mathematics Education Journal*, *3*(1), 9–15.

Pereira, J., Aulingga, A., Ning, Y., & Vilela, A. (2022). Kesalahan siswa smp dalam menyelesaikan soal pisa konten space and shape berdasarkan teori newman. *JPMI (Jurnal Pembelajaran Matematika Inovatif)*, *5*(2), 317–326.

Ramadhani, S. H., & Yahfizham, Y. (2024). Systematic Literature Review: Analisis Pemecahan Masalah Matematika Mahasiswa dan Siswa dengan Berpikir Komputasional. *Pendekar: Jurnal Pendidikan Berkarakter*, *2*(3), 75–81.

Rosita, C. D. (2014). Kemampuan penalaran dan komunikasi matematis: Apa, mengapa, dan bagaimana ditingkatkan pada mahasiswa. *Euclid*, *1*(1).

Saraswati, P. M. S., & Agustika, G. N. S. (2020). Kemampuan berpikir tingkat tinggi dalam menyelesaikan soal HOTS mata pelajaran matematika. *Jurnal Ilmiah Sekolah Dasar*, *4*(2), 257–

e-ISSN: 2528-102X
p-ISSN: 2541-4321

269.

Setiawan, H., & Dafik, N. (2014). Soal matematika dalam PISA kaitannya dengan literasi matematika dan keterampilan berpikir tingkat tinggi. *Prosiding Seminar Nasional Matematika, Universitas Jember*.

Suryapuspitarini, B. K., Wardono, W., & Kartono, K. (2018). Analisis soal-soal matematika tipe Higher Order Thinking Skill (HOTS) pada kurikulum 2013 untuk mendukung kemampuan literasi siswa. *PRISMA, Prosiding Seminar Nasional Matematika*, *1*, 876–884.

Suwaji, U. T. (2008). Permasalahan pembelajaran geometri ruang SMP dan alternatif pemecahannya. *Yogyakarta: PPPPTK Matematika*.

Tiwery, B. (2021). *Kekuatan dan Kelemahan Metode Pembelajaran Dalam Penerapan Pembelajaran HOTS: Higher Order Thinking Skills*. Media Nusa Creative (MNC Publishing).

Ulum, A. R. (2020). *Pengembangan Assesment HOTS (Higher Order Thinking Skills) Berbasis Pemecahan Masalah Pada Tema 6 Kelas V SD/MI*. UIN Raden Intan Lampung.

Wahyudi, W., & Anugraheni, I. (2017). Strategi pemecahan masalah matematika. *Salatiga: Satya Wacana University Press Universitas Kristen Satya Wacana Jl. Diponegoro*, 52–60.

Wardani, A. K., Zulkardi, Z., & Hartono, Y. (2017). Pengembangan Soal Matematika Model PISA Level 5 untuk Program Pengayaan SMP. *Jurnal Pendidikan Matematika RAFA*, *3*(1), 1–18.