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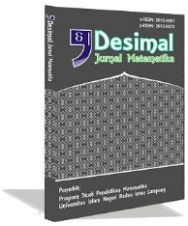

Analysis of the mathematical literacy skills of high school students in solving PISA questions content change and relationship viewed from self-esteem

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ABSTRACT

Mathematical literacy is a person's ability to use mathematical science that includes aspects of understanding, application, reasoning, and communication in everyday life. This study aims to analyze and describe students' mathematical literacy in solving questions about changes in PISA content and the relationship that students' self-esteem checks. This research uses qualitative descriptive research methods. The subjects of the study consisted of three Class IX.2 students at Negeri 3 Secondary School Surakarta. Data collection techniques consisted of PISA self-esteem improvement, content change and relationship tests, and interviews. Data analysis techniques consist of data presentation, data reduction, and conclusions. The results of the study show that students with high self-esteem can meet the six indicators of mathematical literacy in both subjects.

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INTRODUCTION

Mathematics has a very important role in life, so that it becomes a must for every individual to master mathematics so that he can compete in the future (Lestari et al., 2018). In addition, mathematics plays an important role because mathematics is a broad science in all aspects of life (E. K. Hasibuan's, 2018). Mathematics is not only famous for the ability to calculate but also for implementing problem solving in everyday life. Learning mathematics aims to equip students to think logically, critically, and practically, as well as be positive and creative in solving problems in their daily lives (Marlina & Sanjaya, 2017). According to (Dina & Siregar, 2022), there are many students who face difficulties in completing math assignments. Concepts in mathematics are abstract, so there are many students who consider mathematics as learning that is difficult to understand, according to (Dini & Maarif, 2022).

The importance of mathematical literacy in everyday life is evident in various activities related to mathematics, which require understanding to deal with problems that arise (Santika & Khotimah, 2023). Mathematical literacy is a person's ability to use mathematical science that includes aspects of understanding, application, reasoning, and communication in everyday life. Mathematical literacy is a person's ability to formulate, use, and interpret mathematics in various aspects (OECD, 2017). Mathematical literacy supports an individual in understanding the function or use of mathematics in everyday life, making the right decision or agreement as a dignified individual, and thinking logically. Mathematical literacy is defined as a person's ability to formulate, use, and interpret mathematics in various contexts to effectively solve everyday life problems (Hera & Sari, 2015).

PISA (Programme for International Student Assessment) is an international scale assessment program for 15-year-old children that was first organized in 2000 by the Organization for Economic Co-operation and Development (OECD) every three years. (OECD, 2013). PISA content is grouped into four categories: change and relationships, space and form, quantity and uncertainty (Khairuddin, 2017). Change in content and relationships is an event in diverse settings such as the growth of organisms, music, seasonal cycles, weather patterns, and economic conditions (Jurnaidi & Zulkardi, 2014). According to Hasibuan et al. (2020) this category deals with aspects of algebra, such as algebraic forms, equations and inequalities, and how to present information in tables and graphs, and is important in explaining, modeling and describing changes in phenomena. Based on PISA 2003 data, Indonesian students find it difficult to understand the content of change and relationships compared to quantity, space, form, and uncertainty (Stacey & Turner, 2015).

The latest PISA results in 2018 also show that Indonesia's math literacy score is still far from the international ranking of 379 out of 489 (OECD, 2019), so this may be because students have difficulty solving PISA issues. The assumption is supported by research (Murtiyasa & Perwita, 2020) which says that the results of the PISA study are still below standard because students are not trained in solving PISA questions. One of them is the change of content and relationship. This content is related to the subject of algebra, which is one of the subjects that has been studied at the secondary school level. In PISA 2003, content and relationship changes were the most difficult subjects for Indonesian students (Stacey, 2011).

Self-esteem is the dynamic of a person's self-evaluation, so it is called self-esteem or self-image (Santrock, 2021). According to Lutan (2022), self-esteem is self-acceptance, meaning that we are worthy, valuable, capable, and useful no matter what is, is, or will happen. In mathematics, a student's self-esteem can be understood as the student's view of himself in mathematics. Relevant to the statement (Hendriana, Rohaeti, & Sumarmo, 2022) that when the needs of self-esteem or self-respect are not met, then one of them will cause a feeling of despair.

Self-esteem skills are increasingly important, but some studies show that students' self-esteem levels are in the low category. The research conducted (Fitriah & Aripin, 2019) shows that the average ability of mathematics self-esteem on the eight indicators is only around 38%. (Hendriana, Rohaeti, & Sumarmo, 2022) mentioned that one of the indicators of mathematical self-esteem is showing the belief that a person is capable of solving mathematical problems. In addition, according to Tresnawati, Hidayat, and Rohaeti (2017), confidence will affect

student motivation and student achievement related to problem solving. Experts' opinions show that math self-esteem can be developed well through learning that trains students in solving math problems until there is a belief that he is capable of solving math problems. Based on the description above, the purpose of this research is to analyze and describe students' mathematical literacy in solving the question of changes in PISA content and revision of relationships among students' identity.

METHOD

The type of research used is descriptive qualitative research. Qualitative descriptive research is research that emphasizes the determination of facts through a network of observation activities based on the point of view of the subject being studied (Hardani,dkk, 2022). This research was carried out at SMA Muhammadiyah 3 Surakarta in the academic year 2023-2024. The subjects used in the research are three subjects in class IX.2 The main instrument is the researcher and the supporting instrument that includes self-esteem improvement, about PISA's description of change and relationship content, and interviews. The flow chart study design is shown in the following figure.

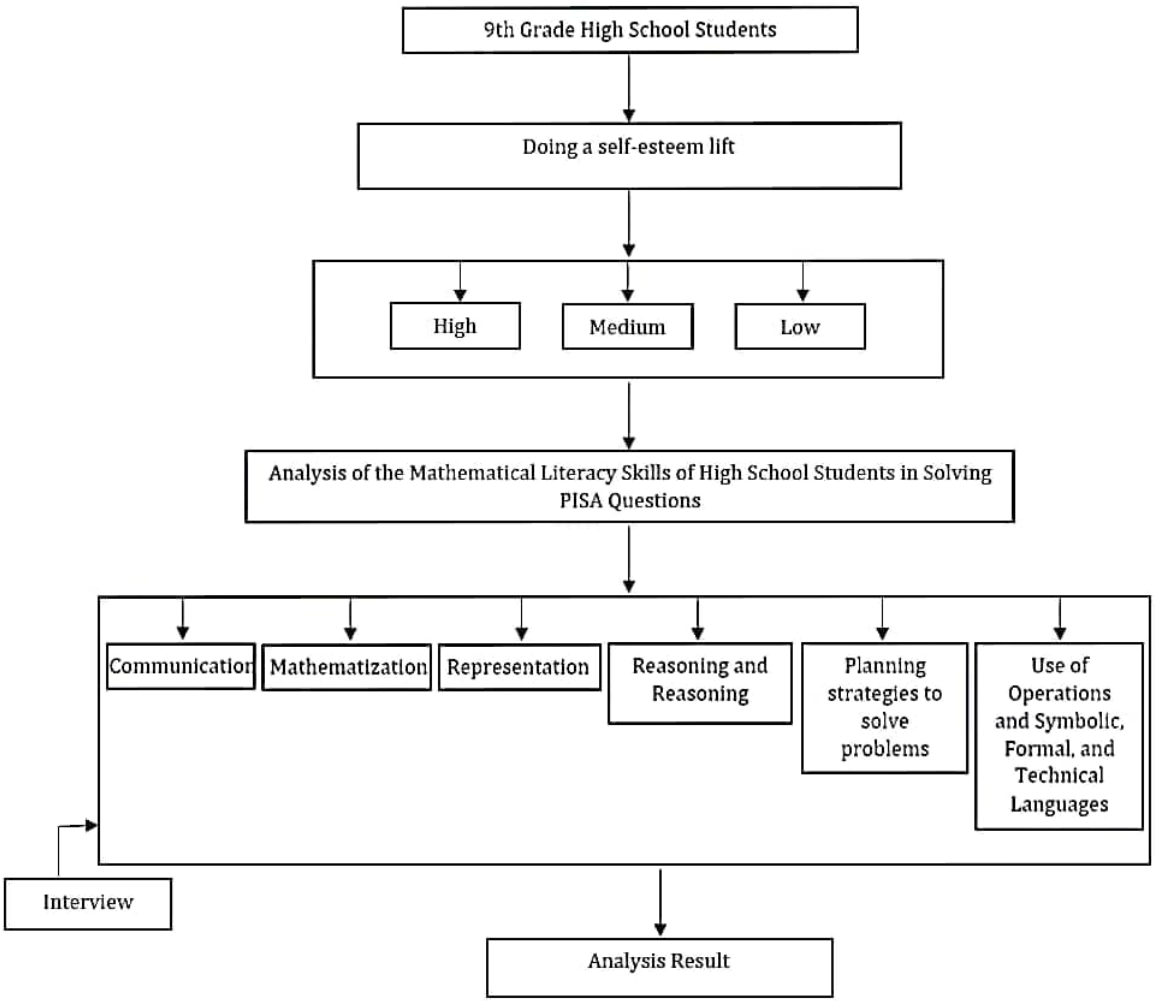

Figure 1. Flowchart Research Design

This research uses the triangulation technique with written tests and interviews to test the validity of the data. The data analysis technique used in this study is the model analysis technique (Miles and Huberman, 1992), which consists of data reduction, data presentation, and drawing conclusions. To determine the level of student self-esteem, indicators are needed to measure it. This self-esteem scale research is divided into four categories of Coopersmith's self-esteem sequence based on various correlated research (Irani et al., 2021). Here are the four categories and indicators of self-esteem.

Table 1. Mathematical Literacy Indicators (OECD, 2019).

No.	Category	Indicator
1.	Power	1. Be able to regulate or control behavior 2. Have advantages that others do not have
2.	Significance	1. Have a sense of recognition and acceptance by others 2. Have an interest in others
3.	Virtue	1. Have a spirit of observance of norms, values, and ethics withinthe community and its surroundings
4.	Competence	1. Have the ability to succeed

In the research instrument used, each statement has an evaluation scale between 1 and 5. Determination of evaluation categories with high, medium, and low criteria based on the reference of Arikunto (2018). The rating categories are shown in the Table 2.

Table 2. Assessment categories

Interval	Criteria
3,67 – 5,00	High
2,44 – 3,66	Medium
1,00 – 2,33	Low

Mathematical literacy indicators are used to measure students' mathematical literacy.

Table 3. Mathematical Literacy Indicators (OECD, 2019)

No.	Mathematical Literacy Skills	Mathematical Literacy Indicator
1.	Communication	1. Students are able to understand what information is known about the subject 2. Students can write what information was asked in the subject
2.	Mathematization	1. Students are able to write mathematical models according to the subject
3.	Representation	1. Students are able to understand the form of representation to solve problems on the subject
4.	Reasoning and Reasoning	1. Students are able to draw conclusions and write the reasons for the outcome of problem solving
5.	Planning strategies to solve problems	1. Students are able to determine what strategies are used to solve problems on the topics 2. Students can write and explain the steps in solving problems in topics
6.	Use of Operations and Symbolic, Formal, and Technical Languages	1. Students are able to use counting operations and use mathematical languange correctly

When the subject completes two PISA content and relationship change questions, then as an assessment based on six indicators of mathematical literacy, namely communication, mathematization, representation, problem-solving strategies, operational use and symbolic, formal and technical language, as well as reasoning and reasoning, then the three the subject worked on changing the PISA

questions and the content of the relationship, which consisted of two questions for assessment and included all six indicators of mathematical literacy.

HELEN THE CYCLIST

Helen baru saja mendapat sepeda baru. Dia mempunyai spedometer yang terletak di stang spedometernya dapat memberi tahu Helen jarak yang ditempuh dan kecepatan rata-ratanya dalam suatu perjalanan. Jika Helen mengendarai sepedanya dari rumah menuju sungai yang berjarak 4 km dan membutuhkan waktu 9 menit. Helen pulang menggunakan rute yang lebih pendek sejauh 3 km dan hanya membutuhkan waktu 6 menit. Berapa kecepatan rata-rata Helen dalam km/jam, untuk perjalanan ke sungai dan pulang pergi?

(Sumber dari PISA 2012 released item (OECD 2012))

Figure 2. Question number 1

CLIMBING MOUNT FUJI

Gunung Fuji adalah gunung berapi aktif yang terkenal di Jepang.

Jalur pekalan kaki Gotemba menuju Gunung Fuji panjangnya sekitar 9 kilometer (km). Pejalan kaki harus kembali dari jalan kaki sejauh 18 km pada jam 8 malam. Toshi memperkirakan dia bisa mendaki gunung dengan kecepatan rata-rata 1,5 km/jam, dan turun dengan kecepatan dua kali lipat. Kecepatan ini memperhitungkan istirahat, makan dan waktu istirahat. Dengan menggunkan perkiraan kecepatan Toshi, kapan terakhir kali dia dapat mulai berjalan sehingga dia dapat kembali pada jam 8 malam?

(Sumber dari PISA 2012 released item (OECD, 2012))

Figure 3. Question number 2

RESULTS AND DISCUSSION

Based on the results of self-esteem improvement and PISA content change and relationship tests, researchers used three subjects with high, medium and low self-esteem categories.

Subject Data Analysis S1

Subjects (S1) who have a high sense of self are able to meet the six indicators of mathematical literacy in both subjects. The results of S1's answer to question number one are shown in the following picture.

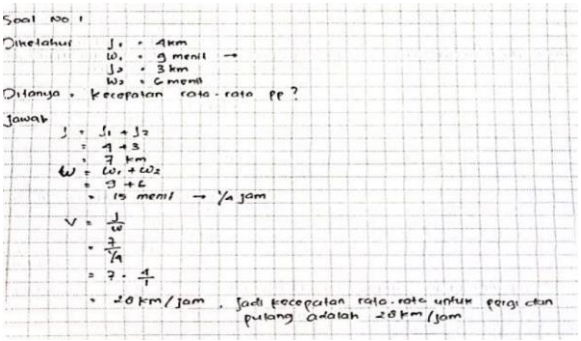

Figure 4. S1's answer to Question One

Subject S1 was able to accurately write the information known about it, namely the distance of the house to the river 4 km in 9 minutes and the distance of the house 3 km in 6 minutes. Then it writes down the information asked in the question, which is to find the average speed for the round trip to the river. In other words, Subject S1 is able to meet the indicators of communication mathematics literacy.

Subject S1 writes a mathematical model by writing distance with the symbol j and time with the symbol w and writes a mathematical model that is to find the average speed denoted by v. With that, S1 subjects can meet the indicators of mathematical literacy.

Subject S1 can understand the form of representation to solve the problem of finding the total travel distance and the total travel time to and from the river. S1 subjects can meet representative mathematical literacy indicators.

Subject S1 can identify, write, and explain what strategy is used to solve the problem on the subject, which is to add up the distance and time to travel to the river and back. In other words, the S1 Subject is able to meet the indicators of mathematical literacy, which is strategy planning to solve problems.

S1 subjects are able to use and write summaries and divisions correctly. So the S1 subject can meet the mathematical literacy indicators of the use of operations and symbolic language, both formal and technical. Subject S1 was able to write the answer to the question correctly, reasoning or concluding the final result that the average round trip speed is 28 km/h. Thus, the S1 Subject is able to meet the indicators of mathematical literacy, namely reasoning and reasoning.

It seems that S1 subjects can fulfil six indicators of mathematical literacy: 1) communication; 2) mathematization; 3) representation; 4) problem solving strategies; 5) operational use and symbolic, formal and technical language; 6) reasoning and reasoning.

Subject Data Analysis S2

S2 subjects in the self-esteem category were able to meet five mathematical literacy indicators on question one, while on question two, only met four indicators. Subject S2's answers to questions 1 and 2 are shown in the following picture.

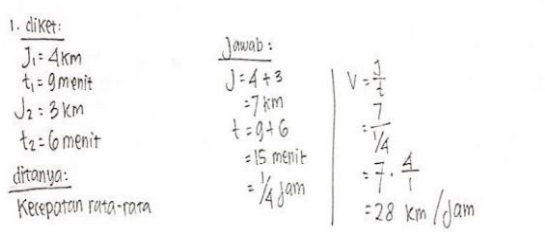

Figure 5. S2's answer to Question One

Subject S2 was able to accurately write the information known about it which is the distance from the house to the river as far as 4 km in 9 minutes and the distance back 3 km in 6 minutes. He also wrote the information asked about the question of finding the average speed for a round trip to the river. In other words, S2 subjects are able to meet the indicators of communication mathematics literacy. Subject S2 correctly writes a mathematical model, where distance is denoted by j and time is denoted by t. Therefore, S2 subjects are able to meet the indicators of literacy and mathematics.

S2 subjects can understand the representation form to solve the problem of finding the total travel distance and the total travel time to and from the river. Thus, S2 subjects can meet representative mathematical literacy indicators.

Subject S2 can determine, write, and explain what strategy is used to solve the subject's problem, which is to calculate the distance and time to go to the river back and forth and find the average speed. In other words, S2 subjects have been able to meet the mathematical literacy guidelines to plan strategies to solve problems.

S2 subjects can use and write operations and symbolic language, formally and technically, correctly, namely aggregation, multiplication and division operations. Then distance is denoted by j, time is denoted by t, and the average speed formula is v = j/t. So, the S2 subject can meet the indicators of mathematical literacy of the use of operations, symbolic, formal, and technical language.

Subject S2 did not conclude from the final result that the average speed to go and return was 28 km/h. Thus, S2 Subjects cannot meet the indicators of mathematical literacy, namely reasoning and reasoning.

It seems that the S2 subject at number 1 could not meet the mathematical literacy reasoning cues. Subject S2 could not draw conclusions from the final answers to questions 1 and 2. But in question 1, subject S2 wrote a mathematical model correctly, where distance is denoted by j and time is denoted by t, so that subject S2 is able to meet the indicator of mathematical ability.

This statement is reinforced by the following interview.

Q: " How do you write information about issue number one into mathematical sentences or mathematical models?''

S2: "Knowing the distance is j and the time is t."

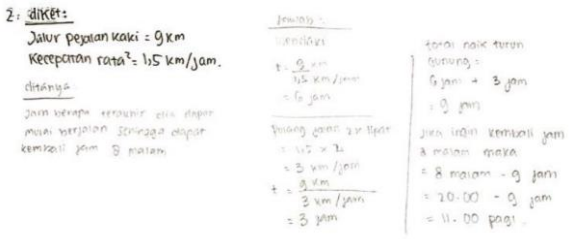

Figure 6. S2's answer to Question Two

Subject S2 was able to write the known information about exactly 9 km of pedestrian track at an average speed of 1.5 km/h and could also write what information was requested from issue number one, which was the last time he could start walking like that. that he can come back at 8:00 p.m. In other words, S2 subjects are able to meet the indicators of communication mathematics literacy.

Subject S2 could not write information about the subject into the mathematical model, only to write the problem according to question number 2. So, subject S2 could not meet the indicators of mathematical and mathematical literacy.

S2 subjects can understand the representation form to solve the problem of finding time for pedestrians to climb and return until 8:00 pm. Thus, S2 subjects can meet the mathematical literacy indicator that is representation.

S2 subjects can determine, write, and explain what strategy is used to solve the problem of finding the amount of time to climb a mountain, and then the result is reduced by the time back at 8 p.m. In other words, S2 subjects have been able to meet the mathematical literacy guidelines to plan strategies to solve problems.

S2 subjects can use and write division, addition, and subtraction correctly and write various mathematical symbols, namely t (time) and km/h. Therefore, S2 subjects can meet the mathematical literacy guidelines, which is the use of operations and symbolic language, both formal and technical.

Subject S2 did not draw conclusions from the final decision about how many hours the pedestrian could walk so that he could return home at 8:00 p.m. Therefore, S2 subjects could not meet the mathematical literacy indicators of reasoning.

Apparently, the S2 subject could not write the information about the subject into the mathematical model. This statement is reinforced by the results of interviews with the following S2 subjects:

Q: " How do you write information about issue number two into mathematical sentences or mathematical models?"

S2: " I wrote the information according to the sentence to your brother."

Subject Data Analysis S3

S3 subjects who have low self-esteem are only able to meet one mathematical literacy indicator in both subjects. Q3's answer to question number one is shown in the following picture.

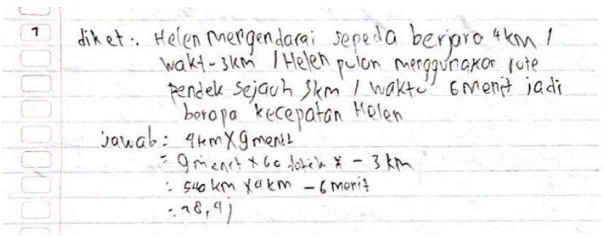

Figure 7. S3's answer to Question One

It seems that the S3 subject at number 1 cannot meet the five indicators of mathematical literacy. Subject S3 only wrote down the known information accurately about Helen cycling 4 km in 9 minutes and Helen returning on a short 3 km route in 6 minutes. This statement is reinforced by the interview with the following S3 subject.

Q: " Please read back issue number one. What is question number one?"
S3: " What is Helen's average speed in km/h to go to the river and back home?"
Q: " And what information do you know about number one?
S3: " Knowing that Helen rode a bicycle for four kilometres, nine minutes, sorry sister, on the answer sheet I wrote 9 minutes wrongly, then Helen went home using a short route of three kilometres, six minutes."

According to the results of the study above, S1 subjects with a high self-esteem category meet the six indicators of mathematical literacy for both arguments. Indications: 1) communication; 2) mathematization; 3) representation; 4) problem solving strategies; 5) operational use and symbolic, formal and technical language; 6) reasoning and reasoning. Students who have a high level of self-esteem in solving problems do not experience difficulties and better understand mathematical concepts, according to Kurniasari and Sritresna (2022). Students who have high self-efficacy in presenting problems into mathematical models using appropriate symbols and tools, thus arranging steps to solve mathematical literacy problems quickly (Setiani et al., 2018).

S2 subjects in the self-esteem category met the five indicators of mathematical literacy for both submissions. Indications: 1) communication; 2) mathematization; 3) representation; 4) problem solving strategies; 5) the use of operational and symbolic language, both formal and technical. Subject S2 could not meet the sixth indication, which is to draw conclusions from the problem-solving results for both issues. According to Siregar (2023), the subject only requires students to think using existing information, so the subject can be classified as a moderate level of difficulty. Students who have mathematical literacy at level 3 include high school students who are able to solve things at medium and low difficulty levels but still have difficulty solving problems at the highest level. (Septiadi, 2022).

S3 subjects with low self-esteem only met 1 indicator of mathematical literacy for both subjects, which is the communication indicator. S3 subjects are unable to meet the indicators of mathematization, representation, problem-solving strategies, use of operations and symbolic language, formal and technical reasoning, and reasoning. In research (Adiastuty et al., 2023), students experience difficulties in solving problems involving mathematical literacy indicator skills such as communication, representation, mathematization, problem solving strategy design, and reasoning and opinion skills. According to Sari and Khotimah (2023), female students can meet the five indicators of mathematical literacy that have been tested, while male students only meet four indicators of mathematical literacy.

The results of the study show that there is a difference in mathematical literacy among students who have a preference for visual, auditorium, and kinesthetic learning (Trisnaningtyas & Khotimah, 2022). There is a significant mean difference and learning approach to self-esteem in math problem solving skills (Kesumawati & Hera, 2022). Therefore, we recommend that the primary school curriculum include self-esteem-oriented topics and activities (Cudjoe & Sarfo,

2019). The results of the meta-analysis show that there is a positive and moderate correlation between students' mathematical literacy and mathematical achievement seen through the PISA test (Polat & Turhan, 2022).

Based on the results of the study data, the ability of mathematical literacy in solving the changes in PISA content and the relationship surveyed from self-esteem can be seen in the following table.

Table 4. Recapitulation of Mathematical Literacy Indicators Subjects

Subject Code	Question Number	Mathematical Literacy Indicators					
		I_1	I_2	I_3	I_4	I_5	I_6
S1	1	√	√	√	√	√	√
	2	√	√	√	√	√	√
S2	1	√	√	√	√	√	-
	2	√	-	√	√	√	-
S3	1	√	-	-	-	-	-
	2	√	-	-	-	-	-

CONCLUSIONS AND SUGGESTIONS

Based on the results of the research presented, it is suggested that the S1 subject belongs to students who have a high level of self-esteem who can meet the six indicators of mathematical literacy skills: communication, mathematics, representation, problem solving strategies, use. operations and symbolic, formal and technical language, and reasoning and explanation when completing PISA content changes and relationships. The S2 subject belongs to students who have a level of self-esteem that is able to meet the five indicators of mathematical literacy skills in topic number one: communication, mathematics, representation, problem-solving strategies, operational use and symbolic, formal and technical language. . In Topic 2, S2 Subjects are able to meet four indicators: mathematical literacy ability, communication, representation, problem solving strategies, and the operation and use of symbolic, formal and technical language.

In this study, only a few identified students' mathematical literacy ability in solving questions, changes in PISA content, and revision of students' self-esteem relationships. For further research, an effort can be made to improve students' mathematical literacy skills in various other subjects.

REFERENCES

Cudjoe, J., & Sarfo, J. O. (2019). Improving self-esteem levels among Ghanaian Junior high students using designed activities. *European Journal of Contemporary Education*, *8*(3), 483–488. https://doi.org/10.13187/ejced.2019.3.483

Dina, N. R., & Siregar, T. J. (2022). Group investigation and rotation trio exchange learning model: The impact on students' mathematical problem-solving abilities. *Desimal: Jurnal Matematika*, *5*(1), 79–90. https://doi.org/10.24042/djm.v5i1.12050

Dini, D. F. R., & Maarif, S. (2022). Students' problem-solving ability: An analytical practice viewed from the aspect of sociomathematical norm. *Desimal: Jurnal Matematika*, *V*(1), 31–102. http://dx.doi.org/10.24042/djm.v5i1.11491

Fitriah, A., & Aripin, U. (2019). Analisis kemampuan koneksi matematis dan self esteem siswa SMA di Kabupaten Bandung Barat. *JPMI (Jurnal Pembelajaran …*, *2*(4), 197–208. https://www.journal.ikipsiliwangi.ac.id/index.php/jpmi/article/view/2852

Ginanjar, I., & Fitriah, A. (2022). Penguatan Self-Esteem dalam Pembelajaran. *Jurnal Pembelajaran Matematika Inovatif,,* *5*(2), 385–394. https://doi.org/10.22460/jpmi.v5i2.8185

Hardani, D. (2022). Konsep dasar penelitian kualitatif dalam penelitian pendidikan. *Al-Fathonah : Jurnal Pendidikan Dan Keislaman*, *1*(5), 578–596.

Hasibuan, E. K. (2018). Analisis kesulitan belajar matematika siswa pada pokok bahasan bangun ruang sisi datar di Smp Negeri 12 Bandung. *AXIOM : Jurnal Pendidikan Dan Matematika*, *7*(1), 18–30. https://doi.org/10.30821/axiom.v7i1.1766

Hasibuan, S. A., Fauzi, K. M. S. M. A., & Mukhtar. (2020). Development of pisa mathematical problem model on the content of change and relationship to measure students mathematical problem-solving ability. *International Electronic Journal of Mathematics Education*, *15*(2). https://doi.org/10.29333/iejme/6274

Irani, L. C., Maghfiroh, N. R., Dewanti, B., & Irhami, A. R. (2021). Pengembangan skala self esteem berbasis aplikasi digital komputer untuk sekolah menengah. *Jurnal Penelitian Bimbingan Dan Konseling*, *6*(1), 44–55. http://dx.doi.org/10.30870/jpbk.v6i1.12081

Jurnaidi, J., & Zulkardi, Z. (2014). Pengembangan soal model pisa pada konten change and relationship untuk mengetahui kemampuan penalaran matematis siswa sekolah menengah pertama. *Jurnal Pendidikan Matematika*, *8*(1). https://doi.org/10.22342/jpm.8.1.1860.25-42

Kesumawati, N., & Hera, T. (2022). Pengaruh pendekatan pendidikan matematika realistik Indonesia (PMRI) terhadap kemampuan pemecahan masalah matematis berdasarkan sel. *Journal on Teacher Education*, *4*(1), 237–249. https://doi.org/10.31004/jote.v4i1.5550

Khairuddin. (2017). Analisis literasi matematika siswa dalam memecahkan soal matematika PISA konten change and relationship. *Analisis Literasi Matematika Siswa Dalam Memecahkan Soal Matematika PISA Konten Change and Relationship*, *3*(2), 127–131. https://doi.org/10.31764/jtam.v3i2.1035

Kurniasari, D., & Sritresna, T. (2022). Kesulitan pemecahan masalah matematis siswa berdasarkan self-esteem pada materi statistika. *Jurnal Inovasi Pembelajaran Matematika: PowerMathEdu*, *1*(1), 47–56. https://doi.org/10.31980/powermathedu.v1i1.1915

Lestari, N. D. S., Juniati, D., & Suwarsono, S. (2018). Exploring the knowledge of content and teaching (KCT) of prospective math teacher in planning mathematical literacy teaching. *Journal of Physics: Conference Series*, *1097*(1). https://doi.org/10.1088/1742-6596/1097/1/012150

Marlina, M., & Sanjaya, T. M. (2017). Perbandingan keefektifan model pembelajaran kooperatif tipe students team achievemant division dan numbered head together ditinjau dari prestasi dan sikap siswa. *Jurnal Penelitian Dan Pembelajaran Matematika*, *10*(1). https://doi.org/10.30870/jppm.v10i1.1202

Murtiyasa, B., & Perwita, W. R. G. (2020). Analysis of mathematics literation ability of students in completing PISA-oriented mathematics problems with changes and relationships content. *Universal Journal of Educational Research*, *8*(7), 3160–3172. https://doi.org/10.13189/ujer.2020.080745

OECD. (2013). Autistic states in children. in *PISA 2012 Assessment and Analytical Framework*. https://doi.org/10.4324/9781003090366

OECD. (2017). *PISA 2015 assessment and analytical framework: science, reading, mathematic, financial literacy and collaborative problem solving*. OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264281820-en

OECD. (2019). 3. PISA 2018 Mathematics framework. *PISA 2018 Assessment and Analytical Framework*, 73–95. https://doi.org/10.1787/b25efab8-en

Polat, M., & Turhan, N. S. (2022). a Meta-Analysis study on the relationship between mathematical literacy and mathematics. *International Online Journal of Education and Teaching (IOJET)*, *9*(2), 661–676. https://hdl.handle.net/11352/4163

Santika, A., & Khotimah, R. P. (2023). Analisis kemampuan literasi matematika siswa SMP dalam menyelesaikan soal PISA konten quantity ditinjau dari self-regulation. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(2), 1103–1117. https://doi.org/10.31004/cendekia.v7i2.2359

Saputro, E. P., & Arikunto, S. (2018). Keefektifan manajemen program pembelajaran BIPA (Bahasa Indonesia bagi Penutur Asing) di Kota Yogyakarta. *Jurnal Akuntabilitas Manajemen Pendidikan*, *6*(1), 122. https://doi.org/10.21831/amp.v6i1.8066

Sari, R. M., & Khotimah, R. P. (2023). Analysis of mathematic literacy ability in solving problems in arithmetic sequences and series based on gender view. *Prisma Sains : Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *11*(2), 296. https://doi.org/10.33394/j-ps.v11i2.7336

Septiadi, D. D. (2022). *Kemampuan literasi matematika siswa tingkat 3 dalam memecahkan masalah bersifat pisa pada program kelas matematika MAN 1 Jember*.. Skripsi. UIN KHAS Jember. http://digilib.uinkhas.ac.id/id/eprint/13103

Setiani, C., Waluya, S. B., & Wardono. (2018). Analysis of mathematical literacy ability based on self-efficacy in model eliciting activities using metaphorical thinking approach. *Journal of Physics: Conference Series*, *983*(1). https://doi.org/10.1088/1742-6596/983/1/012139

Siregar, R. S. (2023). Analisis kemampuan literasi matematika dalam menyelesaikan soal matematika pisa pada kelas VIII MTsN 2 Medan. *Jurnal Pembelajaran Dan Matematika Sigma (Jpms)*, *9*(2), 144–153. https://doi.org/10.36987/jpms.v9i2.4699

Stacey, K. (2011). The PISA view of mathematical literacy in Indonesia. *Journal on Mathematics Education*, *2*(2), 95–126. https://doi.org/10.22342/jme.2.2.746.95-126

Stacey, K., & Turner, R. (2012). *The foundations of PISA mathematics introduction to part I*. Cham: Springer International Publishing.

Sumarni, S., Adiastuty, N., Riyadi, M., Nisa, D. K., Restu, A. M., & Lestari, I. T. (2023). Analisis kemampuan literasi matematika siswa smp dalam mengerjakan soal PISA uncertainty and data content. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *12*(1), 725. https://doi.org/10.24127/ajpm.v12i1.6426

Tresnawati, T., Hidayat, W., & Rohaeti, E. E. (2017). Kemampuan berpikir kritis matematis dan kepercayaan diri

siswa SMA. *Symmetry: Pasundan Journal of Research in Mathematics Learning and Education*, *2*, 116–122. https://doi.org/10.23969/symmetry.v2i2.616

Trisnaningtyas, N. O., & Khotimah, R. P. (2022). Analisis kemampuan literasi matematis dalam menyelesaikan soal akm ditinjau dari gaya belajar. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *11*(4), 2714. https://doi.org/10.24127/ajpm.v11i4.5662

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