Analysis of Mathematics Problem Solving Ability Students Based on Mathematical Resilience and Gender

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The ability to solve mathematical problems is an important thing that must be possessed by students. The fact is that students' mathematical problem-solving abilities are still low, one of the reasons for this is low mathematic resistance. This research is a qualitative research that aims to describe students' mathematical problem solving abilities in terms of mathematical resilience and gender. This study used a purposive sampling technique with 6 research subjects in class VIII SMP Negeri 5 Tanjung Jabung Timur based on 3 categories of mathematical resilience and gender. The instrument used is a mathematical resilience questionnaire, problem solving ability test questions and a list of interviews. The results of the research analysis showed that RMTP subjects had good abilities in solving the problems given.

Keywords: Mathematical problem solving ability; mathematical resilience; gender.

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1. INTRODUCTION

Education is a conscious effort that is systematically planned to create a learning environment where students play an active role in improving the abilities that are within them (RI Law No. 20 2003). Education is able to change people's mindsets to make innovations or innovations in thinking which in turn make innovations in solving problems. One sign of the success of a country in educating students can be seen from the ability to solve problems [1-3].

One of the requirements in education in the 21st century is problem solving skills which are considered a necessity [4-7]. Based on the PISA (Program for International Student Assessment) ranking which was named by the Organization for Economic Co-operation and Development (OECD) in 2018 consisting of 76 countries, it has an average score of 489, Indonesia's score is 379 which is in 71st place. (Nurfitri and Jusra 2021). This fact indicates that Indonesia is low in problem solving, so this requires more attention to fix it.

Problem Solving is a tool for students to digest problems, plan strategies and solve problems with systematic strategies and methods. Mathematics learning in secondary schools is directed so that students are able to solve problems [8-11].

Based on NCTM data (National Council of Teachers of Mathematics, 1980) recommends problem solving as the focus of school mathematics. It is even said that problem solving is the "heart" of mathematics.

Problem solving abilities emphasize the selection of methods (strategies) and the use of procedures that can be proven systematically which are used as a means for students to digest problems, plan strategies, and solve problems systematically [12-16]. Researchers analyzed using the Polya framework with 4 steps to solving the problem, namely understanding the problem, making a plan, carrying out the plan, and looking back (Polya, 1985).

Problem solving ability is one of the important skills in life, one's success in solving the problems one has in life, cannot be separated from the ability of how one understands the problem.(Cognitive Psychology, Sternberg 2011).

The results of an interview with one of the mathematics teachers said that there were still many students who were not used to it and had difficulty working on non-routine questions. This was reinforced by the results of the initial test for students' mathematical problem-solving abilities which were conducted on Friday, September 9, 2022, which showed that students' abilities were still relatively low. in solving math problem solving problems.

There are several factors resulting from the low ability of solving mathematical problems, such as students not liking mathematics [17,18]. Mathematics is often seen as a subject that is less desirable or if it can be avoided, this is because mathematics is an exact science, which is always associated with numbers that are considered complicated to solve. (Syaiful et al., 2018).

Negative attitudes often appear among students due to the difficulties and obstacles experienced by students during the mathematics learning process so as to give students a bad experience (Hutauruk & Priatna, 2017).

The results of other studies indicate that there are positive attitudes towards mathematics that must be developed in students, the attitudes in question include self-regulation, self-confidence, self-efficacy and a sense of perseverance and toughness (mathematics resilience).) in dealing with mathematical difficulties or mathematics resilience(Rahmawati and Zhanty, 2019).

In addition to the factors that cause low mathematical problem solving abilities, there are also factors that can help students in solving problemsstudents, includesfactormotivation from within the student, student confidence and student strength or persistence in solving problems.One of the steps to overcome these negative attitudes, students must have an attitude of never giving up, high self-confidence and perseverance in dealing with mathematics is called mathematical resilience.

Resilience Mathematics is an important concept in education, because many students still experience difficulties and failures in learning mathematics. Students who have mathematical resilience have the ability to grow their self-confidence (Wilder and Lee, 2013).

According to Grotberg (1995) suggests that resilience has a close relationship with problem solving abilities, in his book entitled A Guide to Promoting Resiliences in Children explains that

resilience factors can be identified based on different sources.

Mathematical resilience is the attitude of students in dealing with difficulties when learning mathematics such as being diligent, willing to work hard, and persistent(Rizqa Rahmmatiya and Asih Miatun 2020). There are 4 correlated indicators of mathematical resilience, namely value, struggle, development and resilience (Megan et al., 2013).

Kooken (2015) added that the relationship between mathematical resilience and mathematical problem solving ability can be measured by looking at several dimensions, students who have mathematical resilience if they meet the indicators of mathematical resilience 1) have the belief that mathematics is something that is valuable, meaningful, and useful to learn; 2) learn from mistakes and give a positive response in learning mathematics; 3) have the confidence that he can learn and master mathematics; 4) have a strong character and do not give up easily to solve math problems.

Wilder and Lee (2013) also explained that there are factors that correlate with mathematical resilience, namely:

1. *Value*: Confidence that math is a subject valuable and worth studying;
2. *Struggle*: The recognition that struggles with mathematics are universal even with people of high levels of mathematical ability;
3. *growth*: Beliefs that everyone can develop math skills and mistrust that some people are born with or without the ability to learn, and
4. *Resilience*: Orientation to negative situations or difficulties in learning mathematics that generate positive responses.

The results of research conducted by Rizqy Ayu Nurfitri and Hella Jusra (2021) show that students in the good category in mathematical problem solving ability have high mathematical resilience, do not give up easily when experiencing difficulties and are able to fulfill the four Polya indicators but women are better than men male, while students in the moderate category were only able to fulfill three Polya indicators, students were less able to carry out plans and were less thorough in solving

problems, but male subjects were better than women.

The results of research conducted by Rahmatiya and Miatun (2020), show that students in the good category in problem solving abilities have high resilience, and students in the less able category have moderate mathematical resilience. However, Miatun's research was carried out in a limited manner, problem solving abilities were viewed from the category of high and medium mathematical resilience without the presence of low mathematical resilience subjects.

Based on the results of several studies above, research is needed that provides an overview of mathematical problem solving abilities in terms of 3 categories of mathematical resilience, namely high, medium and low mathematical resilience categories and based on gender.

2. METHODS

This research is a qualitative research with a descriptive approach which is a type of research that is used with the aim of explaining the subject's ability to solve mathematical problems by paying attention to mathematical resilience and gender.

The selection of subjects used a purposive sampling technique and used video recordings of students (think aloud). Think Aloud is a way to get information from research subjects in working on math problem solving ability tests, from this activity you can see the subject's behavior audio and visually in solving math problem solving problems.

In selecting research subjects, there were 6 subjects who met the research criteria consisting of 2 subjects with high mathematical resilience (women and men), 2 subjects with moderate mathematical resilience (women and men) and 2 subjects with low mathematical resilience (woman and man)

In determining the categories of high, medium and low mathematical resilience, the analysis technique uses the average score of the mathematical resilience questionnaire, with the following criteria:

Furthermore, the results of the problem-solving ability tests that have been done by the subject, then these results are analyzed according to the indicators of mathematical problem-solving ability according to Polya.

Table 1. Mathematical resilience category criteria

Interval	Category
$X \geq 83$	Height
$73 < X < 83$	Currently
$X \leq 73$	low

To obtain valid data on the selected subject, interviews were conducted with 6 selected subjects, the subject had to provide an explanation regarding the answers obtained based on the mathematical problem solving stage.

The mathematical resilience questionnaire instrument used consisted of 25 statements by adopting instruments from the Development and Validation of the Mathematical Resilience Scale (Kooken et al., 2013), the instrument used uses a Likert scale for each statement item which consists of 4 scale choices. While the test instruments used are 2 items with Polya indicators: (1) understanding the problem, (2) making plans, (3) implementing plans, (4) looking back (Polya, 1985).

Structured interview techniques are used in research but the questions can change according to the answers from students. The triangulation used in this study uses source triangulation which aims to collect data from six research subjects in solving mathematical problems, then reduces data by selecting and sorting sentences that are not needed from research subjects in expressing the process of solving problems during subsequent interviews followed by presentation data and finally conclusions are drawn.

3. RESULTS AND DISCUSSION

The mathematical resilience questionnaire was given to class VIII students. Then, the questionnaire data was processed and analyzed. The analysis used to determine the category of mathematical resilience uses an average score analysis. The mathematical resilience data shows that there were 28 students who had filled out the mathematical resilience questionnaire consisting of 13 female students and 15 male students.

Based on the categorization criteria the resilience questionnaire made, it was obtained 4 students

with high mathematical resilience consisting of 3 female students and 1 male student, 19 students with moderate resilience consisting of 8 female students 11 and male students, and 5 students with low resilience consisting of 3 female students and 2 male students.

Table 2. Mathematical resilience data

No	Student code	Gender	Score
1	AZ	P	87
2	EA	P	85
3	AM	P	73
4	DMP	P	84
5	CA	P	82
6	UII	P	76
7	AS	L	83
8	AR	L	83
9	AP	L	77
10	HKL	L	82
11	CSB	P	79
12	MZ	L	81
13	MH	L	77
14	IG	P	79
15	RAS	L	76
16	TBP	L	76
17	DN	P	79
18	AL	L	74
19	GA	L	77
20	YO	L	74
21	RMFP	L	88
22	FIP	L	70
23	JMR	P	82
24	LN	P	73
25	ASN	P	79
26	ZA	P	80
27	RHN	P	70
28	MKS	L	71

After the description data, from 28 respondents the recording results were seen one by one the respondents in solving the questions given. The results of the work of the respondents above were chosen by 6 students based on research criteria and used as research subjects.

Subjects who could meet the research criteria were students with the code AZ (female students with high mathematical resilience), CA (female students with low resilience), AM (female students with low resilience), RMFP (male students with high mathematical resilience), FIP (male students with moderate mathematical resilience) and HKL (male students with low mathematical resilience).

Then the 6 subjects were coded as research subjects with codesRMTP as a subject of high female mathematical resilience, RMSP is a subject with moderate mathematical resilience, RMRP is a subject of low female mathematical resilience, RMTL is a subject with high male mathematical resilience, RMSL is a subject of moderate mathematical resilience male and RMRL is a subject with low mathematical resilience of men.

The following are the results of the answers to the test of the subject's mathematical problem solving abilities selected from the 3 categories of mathematical resilience in number 1.

3.1 High Category Mathematical Resilience

3.1.1 Understanding problems

In Figs. 1 and 2 below it is known that the RMTP subject The RMTP subject wrote down what was known and what was asked in full and in detail while the RMTL understood the problem well, but the RMTL subject was wrong in writing down what was known from the question. Both RMTP and RMTL subjects have a good perception of mathematics, that mathematics is important to learn (value).

3.1.2 Make plans

Based on the results of the tests given, it shows that RMTP and RMTL are able to make plans as the value of the second mathematical resilience indicator, namely struggle, being able to control their thought processes and actions to solve difficulties, the two subjects are able to make strategies by writing the correct formula, then create an equation that is oriented to the purpose of the problem.

3.1.3 Carry out the plan

From the picture above it is known that RMTP and RMTL subjects have been able to carry out plans, are able to develop strategies and have confidence in facing difficulties, RMTP and RMTL use the same method in developing strategies (growth). After that, the two subjects with high mathematical resilience were able to make equations and substitute the value of the first term and the value of the difference. The two subjects then looked for the tribe in question using the formula that had been made in the previous process.

Fig. 1. RMTP work results

Fig. 2. RMTL work results

3.1.4 Looking back

The RMTP subject did this step well, both subjects had re-checked the answers obtained and concluded the answers correctly, but the RMTL subject made a mistake in rewriting the answer which obtained a value of 1,017,000 written as 117,000.

The following are the results of interviews with RMTP subjects:

Q : How do you respond to learning mathematics
RMTP: Excited sir, if we understand the teacher's explanation.
Q : What is your opinion about the questions given?
RMTP: It's not that difficult sir, I've studied this material before.
Q : What information is known?
RMTP: 4th month profit or S4 = 30,000, and S8 = 172,000
Q : Then, what is asked?
RMTP: what is asking is the profit of month 18 or S18
Q : What strategy do you use?
RMTP: I use formula$Sn = n/2(2a + (n − 1))b$
Q : Are there any problems in solving this problem.
RMTP : no sir
Q : How do you conclude this matter?
RMTP: The 18th month profit is 1,017,000
Q Did you do the examination and believe the answers you made?
RMTP: Yes, sir, I'm sure and double-checked the answers I got.

Following are the results of interviews with RMTL subjects

Q : What do you think about math lessons?
RMTL: It's quite difficult, sir, especially if we don't understand and there's no effort to learn (value).
Q : What is your opinion about this matter?
RMTL: Difficult sir.
Q : What information can be found?
RMTL: The fourth term is 30,000, and the eighth term is 172,000
Q : Then, what is asked?
RMTL: which asked the 18th term or S18
Q : What steps did you use to solve this problem?
RMTL: In solving this problem, I use the formula , I make an equation to get the value a and the difference between the problem. (struggle)$Sn = n/2(2a + (n − 1))b$
Q : Did you draw any conclusions from the problems you worked on?
RMTL: Yes, sir, after substituting and eliminating and obtaining the value, I can conclude that the profit for 18 months is 1,017,000 (growth)
Q : Are you sure and double-check the answers you get?
RMTL: Yes, sir, we are sure, but I was in a hurry, so I wrote it wrong sir, it should have been 1,017,000, which I wrote was 117,000 (resilience)

Based on the explanation and findings above, it shows that students with high mathematical resilience have good mathematical problem solving abilities, have good perceptions of mathematics, are able to control thought processes and goal-oriented actions and are able to develop strategies and not easily give up in the face of difficulty. In line with the results of Hafiz's research, (2017) students with high or strong mathematical resilience have mastered mathematical concepts well, mastery of concepts in mathematics is in line with strong mathematical resilience, so problems can be solved. Then, the higher the level of students' mathematical resilience, the higher their ability to solve mathematical problems (Dilla, et al. 2018)

3.2 Medium Category Mathematical Resilience

3.2.1 Understanding the problem

Based on the picture above, it shows that the RMSP and RMSL subjects are able to understand the problems given, the RMSP subjects are detailed in writing important things at this stage and the results of the interviews show that the RMSP subjects have good perceptions of mathematics, while the RMSL subjects have views and perceptions. who are not good at math.

3.2.2 Make plans

The RMSP subject was able to make a plan to be used, was able to use the information obtained and make an equation, in terms of the mathematical resilience of the steps taken by the RMSP was a struggle. RMSP subjects have the ability to control their thought processes and actions in dealing with problems while RMLS subjects only write plans in the form of formulas used, without making equations, RMLS subjects are unable to control their thought processes and actions to determine the right strategy.

3.2.3 Carry out the plan

The RMSP subject can carry out the plan with the strategy that has been made, starting at the stage of making the equation first to get the value of the first term and the value of the difference, after obtaining the value correctly RMSP enters the value obtained into the initial strategy. While RMSL subjects cannot carry out any plans, because RMSL subjects only fulfill up to the stage of understanding the problem and do not have strong resilience in the face of difficulties and are unable to develop the formulas that are made.

Fig. 3. RMSP work results

Fig. 4. RMSL work results

3.2.4 Looking back

RMSP subjects were able to re-check their answers by looking back at what was asked and the calculations that had been made, while RMLS subjects did not draw conclusions and had low self-confidence in facing mathematical difficulties.

The following are the results of interviews with RMSP subjects:

Q :   What is your opinion about learning mathematics?
RMSP: If we try to understand, math is easy sir. (value)
Q :   What is your opinion about this matter?
RMSP: This question is difficult, sir, the value of the first term and difference is unknown, so you have to use the previous material concept.
Q :   What information can you find out?
RMSP: the 4th month or S4 30,000, S8 equals 172,000
Q :   Then, what is asked in the question?
RMSP: which is asked about the profit of the 18th or S18th month.
Q :   What strategy is used to solve this problem?
RMSP: First I determine what formula to use, the formula used is an arithmetic series, after that I make an equation from known information (struggle)$Sn = n/2(2a + (n-1))b$
Q :   Furthermore, are there any obstacles after determining the strategy?
RMSP: No sir, I entered the values obtained into the formula that I made. (Growth)
Q :   Have you come to a conclusion?
RMSP: Yes, the conclusion is that the profit until the 18th month is 1,017,000
Q :   Are you sure and double check the answers you get?
RMSP: Yes I'm sure, and I look back at the answers I got, afraid to miscalculate (resilience)

Following are the results of interviews with RMSL subjects:

Q :   How do you feel about math lessons?
RMSL: Maths is difficult, sir.
Q :   What is your opinion about the questions given?
RMSL: It's difficult, sir, I can't finish it. (value)
Q :   What information is known?

RMSL: 4 month profit, S4 30,000, S8 172,000,
Q : Then, what is asked?
RMSL: What is being asked is profit up to month 18, or written with S18
Q : Why after writing the formula, do not continue the next process?
RMSL: I don't know how anymore (struggle)
Q : What do you do next?
RMSL: I just read the questions over and over and wait for the time to complete the questions.

Based on the explanation above, it shows that the ability of students to solve math problems with moderate mathematical resilience, women are better at solving mathematical problems, female students have a good perception of mathematics and do not easily give up in the face of difficulties. This is in line with the results of the study (Chusna et al., 2019)said that female students had better self-control in mathematics and made it possible to have good cognitive abilities. Further research Rizqa Rahmmatiya et al., (2020) male students who have moderate mathematical resilience, still lack the ability to solve mathematical problems, are less thorough and tend to give up when faced with difficult questions.

Fig. 5. RMRP work results

This is in line with the results of the study (Sitohang et al., 2020)stated that female students had a little difficulty in understanding contextual questions, were more able to translate questions into mathematical forms completely and correctly.

3.3 Low Category Mathematical Resilience

3.3.1 Understanding the problem

Based on the picture above it is known that the RMRP subject is able to understand the problem in full and detail, this statement is reinforced by the results of interviews conducted, RMRP can select and sort important information in the problem to be solved, RMRP has a poor perception of mathematics. The RMLR subject understands the problem but writes down the important things in the problem, the RMLR lacks detail in writing it, the RMLR subject also has a poor perception of mathematics, believing that mathematics is learned only for those who have high abilities in mathematics.

3.3.2 Make plans

The RMRP and RMLR subjects had not been able to use the information obtained correctly, these two subjects wrote formulas and tried to make equations but did not get the results, so at this stage the two subjects decided to stop working on the problem. RMRP and RMRL subjects cannot determine strategies and control thought processes and actions that are correct in determining goal-oriented steps.

3.3.3 Carry out the plan

Based on the picture above, it shows that the RMRP and RMRL subjects cannot carry out plans and cannot develop the strategies obtained, the reason is that these two subjects are unable to use the information obtained to be used as a strategy that leads to an unknown value, namely the first term and the difference value.

3.3.4 Looking back

The RMRP and RMRL subjects did not come to any conclusions at this stage, because the two subjects did not complete the questions given, these two subjects also lacked self-reliance in facing difficulties and gave up too quickly.

The following are the results of interviews with RMRP subjects:

Q : What is your opinion about learning mathematics?
RMRP: Mathematics is the most difficult subject sir.

Q :   Are the questions given difficult?
RMRP: Yes sir, very difficult.
Q :   What information can you find out?
RMRP: What I can find out is that the fourth month's profit is 30,000, the eighth month's profit is 172,000,
Q :   Then, what is asked in the question?
RMRP: What is asked about the profit of the 18th month.
Q :   What steps will you use?
RMRP: I'm using the arithmetic series formula sir.
Q :   After determining the formula, what are the next steps?
RMRP: I immediately entered the values I knew into the arithmetic series formula.
Q :   Do you get results this way?
RMRP: I can't, sir, I'm confused, sir, how else can I do it.
Q :   Then what do you do next?
RMRP: I don't know anymore sir.

Following are the results of interviews with RMLR subjects:

Q :   How do you feel about math lessons?
RMLL: Difficult sir, difficult subject sir.
Q :   What is your opinion about this matter?
RMLL: It's difficult sir, I can't finish it
Q :   What information can you find out?
RMLL: Known information is the fourth month profit 30,000, the eighth month profit 172,000,
Q :   Next, what to ask?
RMLL: What is asked is the profit of month 18 or S18.
Q :   What's the next step?
RMLL: I wrote the formula Sn equals n/2 (2a+(n-1) times b.
Q :   Then after writing the formula, what's the next step?
RMLL: I don't know the next step anymore, it's too difficult sir, the questions given.
Q :   what do you do next?
RMLL: I stopped not working on it until it was finished.

Based on the explanation above, it shows that subjects with low mathematical resilience have poor mathematical problem solving abilities and tend to have negative attitudes or negative perceptions of mathematics, and easily give up in the face of mathematical difficulties. In line with the results of the study (Nurfitri & Jusra, 2021) said that students with low mathematical

resilience have low ability to solve mathematical problems and easily give up when faced with problems or are faced with difficult questions.

Fig. 6. RMRL work results

4. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the analysis of the subject dataRMTP has very good mathematical problem solving abilities, it fulfills all indicators of mathematical problem solving, the stages of understanding a problem, devising a plan, carrying out the plan, and looking back. Furthermore, if viewed from the mathematical resilience of the RMTP subject in solving mathematical problems, they have positive perceptions and beliefs about mathematics (value), are able to control their thought processes and actions to determine goal-oriented strategies (struggle), are able to develop strategies properly and without constraints (growth) as well as having strong beliefs and not giving up easily in the face of adversity (resilience).

RMTL subjecthas good ability in solving mathematical problems, but at the stage of understanding the problem the RMTL subject is incomplete in writing down important information at the stage of understanding the problem (understanding problem), at the next stage the RMTL subject is able to make a plan (devising a plan), carry out the plan (carrying out the plan) and at the looking back stage the RMTL subject made a mistake in rewriting the conclusions obtained, the RMTL subject had a good perception of mathematics, mathematics could be learned easily if there was an effort to understand mathematics (value), then the

subject RMTL is also able to control thought and action processes to determine strategies that lead to problem solutions (struggles),then be able to develop strategies that are used correctly without constraints (growth) and have a strong character and do not give up easily in the face of difficulties (resilience) even though they make mistakes in concluding answers.

RMSP subjecthas good mathematical problem solving abilities, he fulfills all indicators of mathematical problem solving, at the stage of understanding a problem, and making a plan (devising a plan) the RMSP subject does not find any problems, but at the stage of carrying out the plan (carrying out the plan)) faced problems and was able to be corrected by the RMSP subject, looking back was correct in concluding it. Furthermore, if viewed from the mathematical resilience of the RMTP subject in solving mathematical problems, they have positive perceptions and beliefs about mathematics, mathematics will be easy if they really understand it (value), are able to control their thought processes and actions to determine goal-oriented strategies (struggle).

RMSL subjecthave poor mathematical problem-solving skills, RMSL subjects are only able to fulfill the indicators of solving mathematical problems, the stages of understanding a problem and making a plan (devising a plan) RMSL subjects cannot complete the questions given so that the two stages of problem solving cannot done. Furthermore, if viewed from the mathematical resilience of RMSL subjects in solving mathematical problems, they have poor perceptions and beliefs about mathematics, mathematics is a difficult subject (value), unable to control their thought processes and actions to determine goal-oriented strategies (struggle), RMSL subjects do not have strong beliefs and easily give up in the face of mathematical difficulties.

RMRP subjects have poor problem-solving abilities and do not meet the indicators of mathematical problem solving, RMRP subjects have poor perceptions of mathematics, have not been able to control their thought processes to find strategies and develop them, do not have strong beliefs and easily give up in the face of difficulties.

The RMRL subject has poor problem solving abilities, marked by problem solving indicators obtained, the RMRL subject only fulfills two indicators, he is unable to find a goal-oriented strategy, has a less strong character in mathematics and gives up easily in the face of difficulties.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Hutauruk JB. Mathematics Resilience of Mathematics Education Students. International Conference on Mathematics and Science Education (ICMScE) Conf. Series 895 Journals; 2017
2. Sternberg R. Investigation cognitive psychology. JEFF Mo. University of California Panoma: Wadsworth. ← Book; 2012.
3. Kooken J, Wales Megan E, Mc D Betsy, Sue Clare. Measurement Mathematical Resiliences: Construction Applications Mathematical Study: Annual Meeting AERA 2013 Conferences; 2013.
4. Rijali A. Qualitative data analysis. UIN Antasari Banjarmasin. Journal Al-Hadharah. 2019;17(33).
5. Syaiful H, Nizlel, Mukminin A. Communication skills and mathematical problem solving ability among junior high schools students through problem-based learning. International Journal of Scientific and Technology. 2019;(11).
6. Wilder J Sue, Lee. Development and Validation of the Mathematical Resilience. University of Warwich. BERA Conferences, 1 – 4 September 2010 Conferences; 2010
7. Creswell J. Education research. Qualitative, Quantitative, and Mixed Methods Approaches: Fourth edition. Learning Libraries; 2016
8. Megan EW, Wilder J. Development and validation of the mathematical resilience scale: Measurement and Evaluation in Counseling and Development 1–26. Journals; 2015.
9. Nurfitri RA, Jusra H. Analysis of mathematical problem solving abilities based on mathematical resilience. Scholar's Journal: Journal Math Education. 2021;05(2):1943–1954.
10. National Library of Indonesia Law No.20. National Education System Act. Jakarta, Indonesian Book; 2003.
11. Rahmmatiya R, Asih M. Analysis of mathematical problem solving abilities of

Junior High School students (A study at Math in 160 Junior High School Jakarta). Journal Theorem. 2020;6(2):187–202.

12. Chusna CA, Rochmad, Prasetyo APB. Mathematical Resilience of Students in Team Assisted Individualization Learning in an Effort to Improve Mathematical Reasoning Ability. Postgraduate National Seminar, 2019:157–62.

13. Johnston-wilder S, Warwick U, Lee C. The Open University. Developing a Mathematical Resilience Instrument. Go to Online Research; 2010.

14. Kooken J, Welsh M, McCoach DB. Development of Instrument Mathematical Resiliences. Open Online Research; 2013.

15. Maharani S, Bernard M. Analysis of the relationship between mathematical resilience and students' problem solving abilities in circle material. 2018;1(5):819–826.

16. Nurfitri RA, Jusra H. Analysis of Students' Mathematical Problem Solving Ability in View of Mathematical Resilience and Gender. 2021;05(02):1943–1954.

17. Sitohang A, Catholic U, Thomas S. Analysis of mathematical problem solving abilities on cube and block material in the form of contextual questions in terms of student gender. 2020;3(1):1–23.

18. Zanthy LS (nd). The Contribution of Mathematical Resilience to Students' Academic Ability in Statistics Courses. Musharafa Journal; 7:85–94.

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