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ANALYSIS OF STUDENTS MATHEMATICAL COMMUNICATION ABILITY REVIEWED FROM ADVERSITY QUOTIENT DURING THE COVID-19 PANDEMIC

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Abstract
Mathematical communication skills are an ability that students need to have in the 21st century. This research aims to analyze mathematical communication skills in terms of the adversity quotient. The method used in this research was descriptive qualitative with six research informants in class Data validity using triangulation techniques. The results of the research concluded that: 1) Students with adversity quotient climbers do not always have high mathematical communication skills, but this can also happen to students who have moderate mathematical communication skills. Students' mathematical communication abilities in general with the adversity quotient climber are categorized as high; 2) Students with an adversity quotient camper tend to have the same mathematical communication skills, namely moderate. The mathematical communication skills of students with an adversity quotient camper are categorized as moderate; and 3) Students with an adversity quotient quitter do not always have low mathematical communication skills, but there are also students who have moderate mathematical communication skills. Students' mathematical communication abilities in general with the adversity quotient quitter are categorized as low-medium.
Keywords: Mathematical communication skills, adversity quotient, covid-19

1. Introduction

Considering the increasingly competitive development of the times, mathematics as one of the basic sciences for the development of knowledge and technology is very important for every human being to have. Mathematics is one of the subjects that must be taught and studied by students in schools from elementary to tertiary education (Mafulah & Amin, 2020). Moreover, communication and information are developing increasingly rapidly in this era of globalization. So, in order to create a superior generation that is able to answer all the world's challenges, students are required to have problem-solving skills, think critically and creatively, and have good communication skills. Learning mathematics aims to ensure that students not only build their mathematical knowledge, but also hone their skills in reasoning, communicating, applying, solving problems, and others (Permendikbud No. 21 of 2016 concerning Content Standards for Primary and Secondary Education, 2016). In line with this, The National Council of Teachers of Mathematics (2000) explains that the mathematics learning process standards that students must achieve include problem-solving skills, reasoning and proof, communication, connection, and representation.

Mathematical communication is students' ability to explain mathematical ideas, situations and relationships, in writing with pictures, reading written mathematical presentations and composing relevant questions and constructing arguments (Niasih et al., 2019). Students who study mathematics will of course actively think about ideas, opinions and solutions both orally and in writing with other students (Nurmala et al., 2018). Baroody revealed that apart from being a means of social activity in exchanging thoughts and opinions and being able to sharpen ideas in convincing someone, mathematical communication skills are capital in completing, exploring and investigating mathematics (Hendriana & Kadarisma, 2019). Developing mathematical communication skills is needed so that students do not only interpret mathematics as meaningless symbols, but as a useful language to help make it easier to solve problems in everyday life (Setiaji & Suherman, 2019). So by mastering mathematical communication skills, students are expected to be able to understand the meaning of the problem well and be able to solve it. There are several aspects that must be considered in mathematical communication skills. Baroody said that oral communication skills can be done by paying attention to aspects of listening, reading, discussion and writing. Meanwhile, mathematical communication skills in writing can be done by paying attention to the representation aspect, namely expressing mathematical ideas in the form of graphs/images, symbols, tables, and so on (Ansari, 2018).

Mathematical communication skills can be measured based on existing indicators. Sumarmo (2006) mentions indicators that can be used to measure mathematical communication skills, namely: 1) connecting real objects, pictures and diagrams into mathematical ideas; 2) explain mathematical ideas, situations and relationships, in writing; 3) express everyday events in language or mathematical symbols; 4) listen, discuss, and write about mathematics; and 5) make conjectures, organize arguments, formulate definitions and generalizations. Apart from that, NCTM states that there are 3 indicators of mathematical communication ability, namely: 1) expressing mathematical ideas through oral, written and demonstration and describing them in visual form; 2) understand, interpret, and assess mathematical ideas presented in oral, written, or other visual forms; and 3) using language, notation and mathematical structures to express ideas, describe relationships and create models (Ansari, 2018).

Research conducted by Achir et al., (2017) shows that the results of observations and interviews with mathematics teachers in class VIII of junior high schools in Surakarta regarding students' mathematical communication abilities obtained results that were generally still relatively low. Then, Wijaya & Afrilianto (2018) revealed that the ability of students at one of the Vocational Schools in Cimahi to explain mathematical ideas, situations and relationships orally and in writing with real objects, pictures, graphs and algebra was relatively low. Furthermore, research conducted by Tiffany et al., (2017) shows that the mathematical communication skills of class IX-1 junior high school students are still low. Only one indicator was achieved well, namely connecting pictures, diagrams, graphs into mathematical ideas as much as 70%. Meanwhile, 13.33% explained mathematical ideas in writing with pictures, diagrams, tables or algebra and 26.76% expressed events in everyday language or mathematical symbols. Furthermore, research by Saptika et al., (2018) shows that the mistakes made by junior high school students lie in several factors such as errors in understanding simple concepts, not understanding the meaning of the questions, not being able to complete mathematical sentences and also not being careful in calculating. Based on the results of interviews with mathematics teachers at one of the high schools located in Bekasi, general information was obtained that the mathematical communication skills of class XII students were not at the expected condition.

Each student has differences in affective abilities, one of which is Adversity Quotient (AQ). Research by Kurniawan & Karneli (2020) revealed that a person's level of career achievement is not only influenced by one variable, but is also influenced by aversity quotient, self-awareness, gender and socio-economic status. If it is related to the problem of mathematical communication skills, the type of intelligence that can be used is the adversity quotient (Pratiwi & Murtianto, 2021). Adversity Quotient (AQ) is an individual's intelligence in overcoming every difficulty that arises or is often identified as fighting power to fight every difficulty (Merianah, 2019). Stoltz (2000) groups AQ types into three, namely: climbers, campers, and quitters. Someone with the quitter type easily gives up when facing a problem, the camper is the type of person who is only comfortable with the situation he is facing and tends to give up easily, very rarely takes risks in facing a problem and the climber is the type of person who always wants the best in everything, and dare to face challenges (Chabibah et al., 2019). Based on the results of research conducted by Hidayat & Husnussalam (2019), the higher a person's AQ, the higher their mathematical understanding ability. Apart from that, research by Pratiwi and Murtianto (2021) shows the results that each individual in communicating the problems obtained is in accordance with their AQ.

The Coronavirus Disease 2019 (Covid-19) outbreak that hit various countries including Indonesia has changed the order of life, especially the world of education. The Indonesian Ministry of Education and Culture issued a learning from home policy to break the chain of distribution of all schools being closed and online learning being carried out as a substitute for Teaching and Learning Activities (KBM) in the classroom. Apart from the positive impact of being more familiar with technology, there are many negative impacts on learning due to the Covid-19 outbreak. Teachers are expected to be able to achieve competency targets through online learning, but there are still many obstacles to achieving these targets (Etika & Susilaningsih, 2020).

Based on this explanation, researchers are interested in analyzing students' mathematical communication skills in terms of the adversity quotient during the Covid-19 pandemic.

2. Methods

The research approach used in this research is descriptive qualitative. So, the results of this research will be analyzed using descriptive text. This research aims to describe students' mathematical communication skills in terms of the adversity quotient during the Covid-19 pandemic. This research was conducted at SMA Negeri 18 Bekasi City in the even semester of the 2020/2021 academic year. Research subjects were selected using purposive sampling according to the Adversity Response Profile (ARP) questionnaire score. The research subjects consisted of six students from class X Science 2, consisting of 2 subjects with high AQ, 2 subjects with medium AQ, and 2 subjects with low AQ.

Data was collected by administering the Adversity Response Profile (ARP) questionnaire which was adopted from Paul G. Stoltz's book and the Mathematical Communication Ability Test to obtain research subjects. The questionnaire instrument is first validated by an expert, while the test instrument is validated by an expert for language and tested on students for validity and reliability analysis. There are 30 items with each item consisting of 2 sub-statements and 7 description questions. The data analysis used in this research refers to the Miles and Huberman model which consists of 3 stages, namely data reduction, data presentation, and conclusions

(Sugiyono, 2015). Checking the validity of the data was carried out using technical triangulation, namely by comparing data obtained based on test results, semi-structured interviews and observations.

3. Result and Discussion

The results of the ARP questionnaire carried out by class Then, based on the results of the mathematical communication skills test, there were 2 students with high TKKM scores, 21 students with medium TKKM scores, and 5 students with low TKKM scores. After that, 6 research subjects were selected using purposive sampling using the following AQ and TKKM questionnaire categories.

Table 1: TKKM Scores

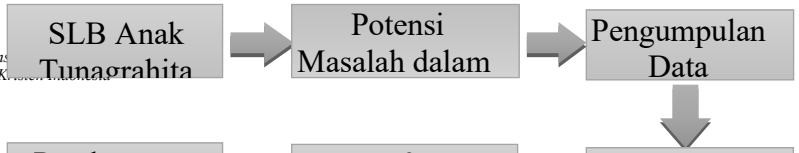
KODE SUBJEK	KATEGORI ARP	KATEGORI TKKM
JKDS	*Climber*	Tinggi
MND	*Climber*	Sedang
CNP	*Camper*	Sedang
AMZ	*Camper*	Sedang
NAN	*Quitter*	Sedang
NH	*Quitter*	Rendah

The results of the mathematical communication ability test from the seven subjects will then be analyzed based on the 3 indicators of mathematical communication ability used in this research, namely: 1) making written mathematical models in algebraic form and pictures of a problem, 2) reflecting on real objects, pictures and diagrams into mathematical ideas or models, and 3) expressing mathematical concepts by expressing everyday events in mathematical language and symbols (Hendriana et al., 2018). Indicator 1 is found in question numbers 1, 2, and 3. Indicator 2 is found in question number 4 and indicator 3 is found in question numbers 5, 6, and 7.

The aspect measured in indicator 1 in question number 3 is making written mathematical models in algebraic and pictorial form, namely the ability to illustrate mathematical models in the form of situations in pictorial form, write down the results of one's thoughts and carry out algebraic calculations correctly in writing. The aspect measured in indicator 2 in question number 4 reflects real objects, pictures and diagrams into mathematical ideas or models, namely the ability to write down known and asked information in one's own language, determine the mathematical model or idea used in accordance with the picture, and do calculations. The aspect measured in indicator 3 in question number 6 expresses mathematical concepts by stating everyday events in language or symbols, namely the ability to make examples using language or symbols, write formula concepts related to existing problems, and carry out calculations correctly. The following are the results and discussion:

Description of Mathematical Communication Ability of JKDS Subjects with AQ Climber and High TKKM Score

Below are presented the results of the mathematical communication ability test for JKDS subject indicators 1, 2 and 3.



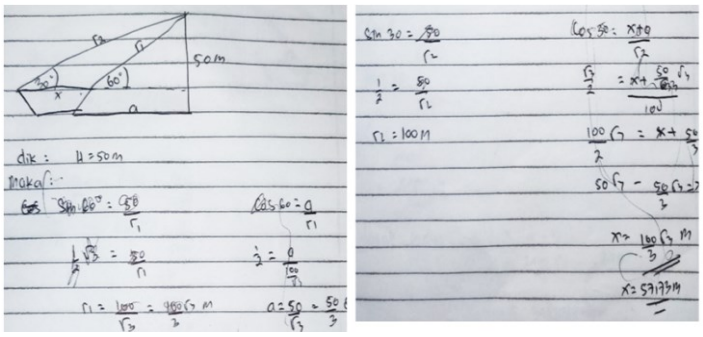
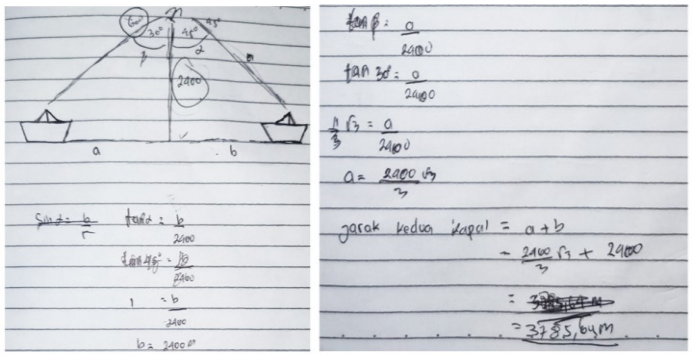
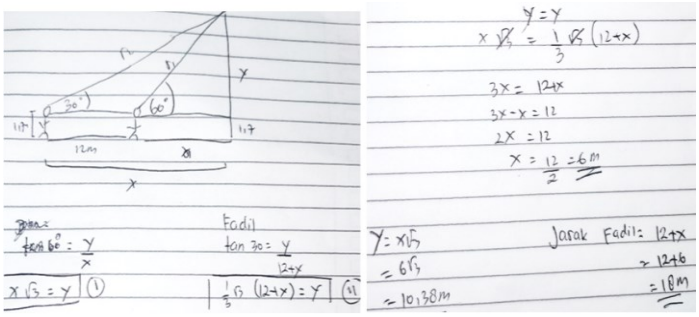


Figure 1 TKKM Subject JKDS Indicator 1



Gambar 2 TKKM Subject JKDS Indicator 2



Gambar 3 TKKM Subject JKDS Indicator 3

In the mathematical communication ability test indicator 1, the JKDS subject was able to explain the written test results fluently and correctly even though the illustrations made were not completely complete, because they misunderstood the angle referred to in the question and did not use an arc when drawing the angle. In addition, JKDS subjects can explain algebraic operations that are carried out smoothly and completely. The JKDS subject was doubtful about the picture he had made, but still tried to explain the picture he had made. In indicator 2, JKDS subjects are able to explain the information they know and ask in their own language. Apart from that, JKDS subjects can explain the relationship related to the mathematical model used with images and can explain calculations fluently and confidently even though they are not optimal. In indicator 3, JKDS subjects are able to explain the symbols used and carry out calculations

completely and correctly. In explaining the test results, in general the JKDS subjects never gave up and did not hesitate even though they were still lacking in language skills.

Based on this explanation, it can be seen that the data obtained from the results of mathematical communication ability tests, interviews, and observation notes reached the same conclusion, namely that the JKDS subject was in the high category. It can be said that JKDS subjects are able to fulfill the three indicators of mathematical communication skills even though they are not completely complete.

Description of MND Subject's Mathematical Communication Ability with AQ Climber and Medium TKKM Score

Below are presented the results of the MND subject's mathematical communication ability test regarding indicators 1, 2 and 3.

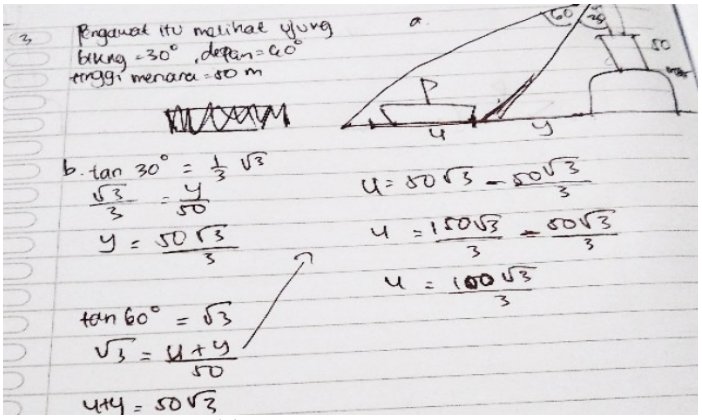


Figure 4 TKKM Subject MND Indicator 1

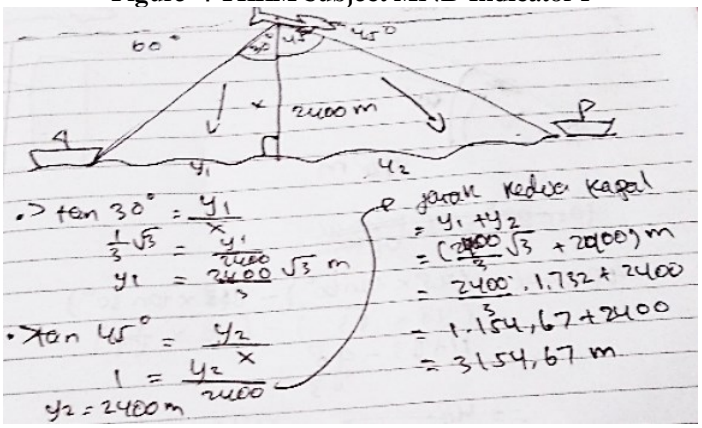


Figure 5 TKKM Subject MND Indicator 2

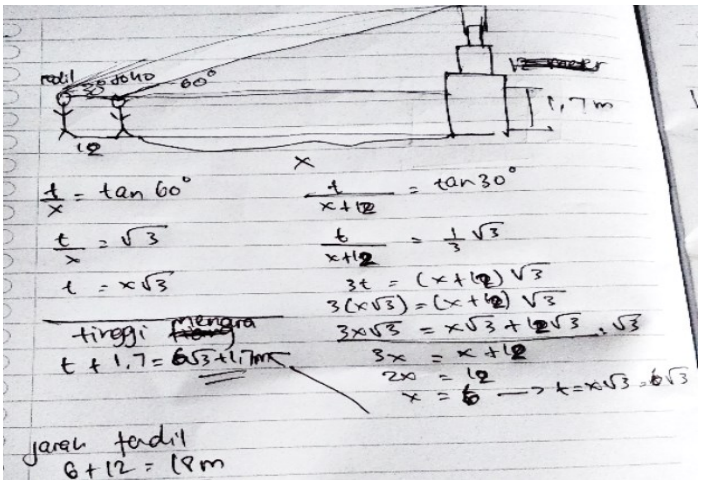


Figure *6* TKKM Subject MND Indicator 3

In the mathematical communication ability test indicator 1, the MND subject was able to explain the test results that had been written fluently and correctly even though the illustration made was not completely complete, because there was a slight error in the location of the angle drawn and did not use an arc when describing the angle. In addition, MND subjects can explain calculations fluently and are aware of not writing units in the final results. In indicator 2, MND subjects are able to explain the information they know and ask in their own language. Apart from that, MND subjects can explain the relationship between the mathematical model used and the image and can explain calculations fluently and confidently even though they are not optimal. The MND subject felt there was an error in his calculation results, so he had time to recalculate the final results and quickly realized his error. In indicator 3, the MND subject is able to explain the symbols used and can explain the calculation steps completely and correctly. In explaining the test results, in general MND subjects are still lacking in language, even explanations regarding the formulas used, simply because subjects often work on questions like this without knowing the clear reasons.

Based on this explanation, it can be seen that in general the data obtained from the results of mathematical communication ability tests, interviews, and observation notes obtained the same conclusion, namely that the MND subject was in the high category. It can be said that the MND subject is able to fulfill the three indicators of mathematical communication ability even though they are not completely complete and are less thorough in each written final result.

Description of CNP Subject Mathematical Communication Ability with AQ Camper and Medium TKKM Score

Below are presented the results of the CNP subject's mathematical communication ability test regarding indicators 1, 2 and 3.

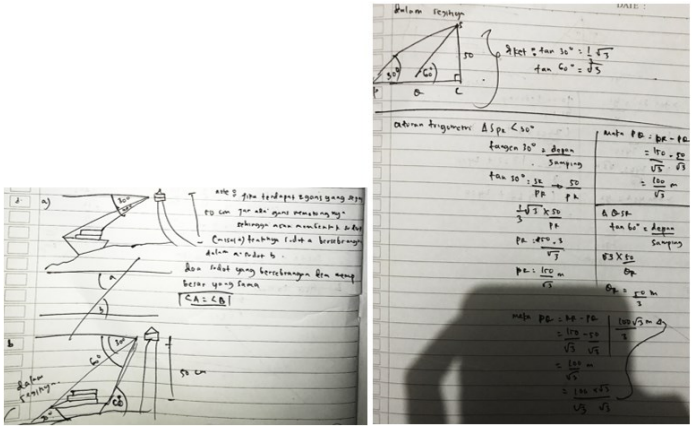


Figure 7 TKKM Subject CNP Indicator 1

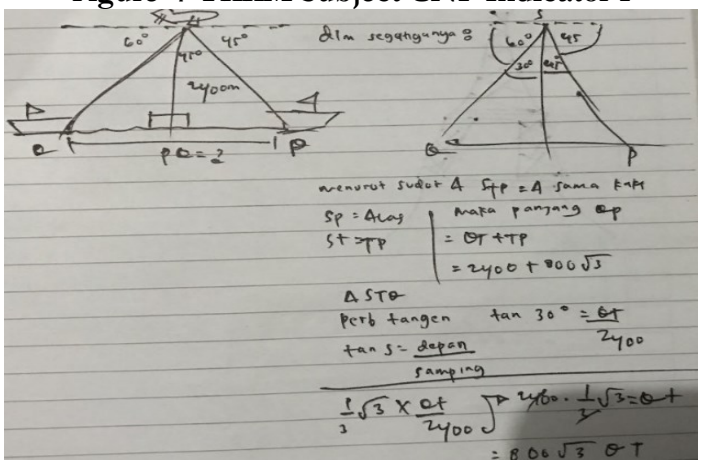


Figure 8 TKKM Subject CNP Indicator 2

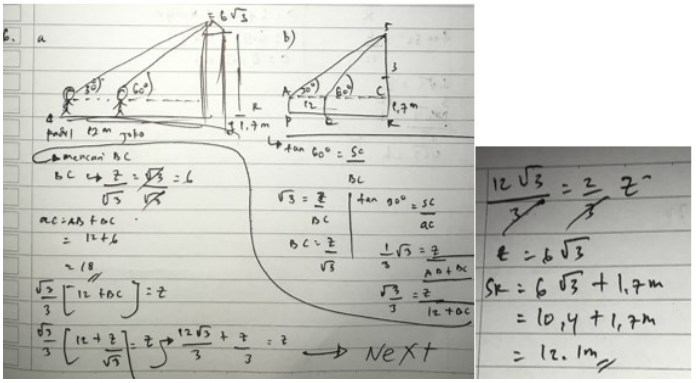


Figure 9 TKKM Subject CNP Indicator 3

In the mathematical communication ability test indicator 1, the CNP subject was quite able to explain the illustrations made even though they were less complete than what was depicted. This is because CNP subjects are less consistent in writing and explaining pictures. Apart from that, the CNP subjects were quite able to explain the algebraic operations carried out even though they were not optimal in language. This is because the CNP subject made mistakes in writing, but was correct in explaining. In indicator 2, CNP subjects are able to explain the information they know and ask in their own language. However, CNP subjects were less able to explain the relationship

related to the mathematical model used with the image. CNP subjects are quite capable of explaining calculations correctly, but are less fluent. In indicator 3, the CNP subject is quite capable of explaining the symbols used and explaining calculations, even though the test results do not write units enough. In explaining the test results, the CNP subject was not fluent but was quite confident and still tried to explain what he wrote.

Based on this explanation, it can be seen that in general the data obtained from the results of mathematical communication ability tests, interviews, and observation notes obtained the same conclusion, namely that the CNP subject was in the medium-high category.

Description of AMZ Subject's Mathematical Communication Ability with AQ Camper and Medium TKKM score

Below are presented the results of the AMZ subject's mathematical communication ability test regarding indicators 1, 2 and 3.

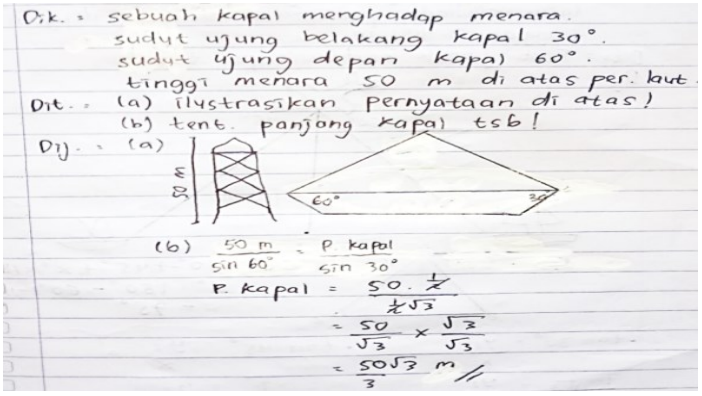


Figure 10 TKKM Subject AMZ Indicator 1

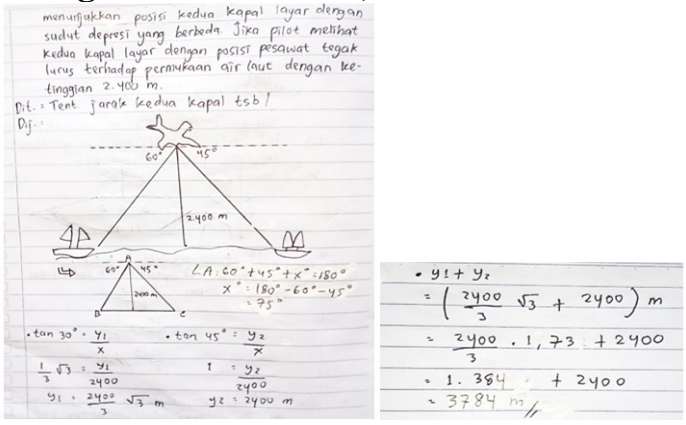


Figure 11 TKKM Subject AMZ Indicator 2

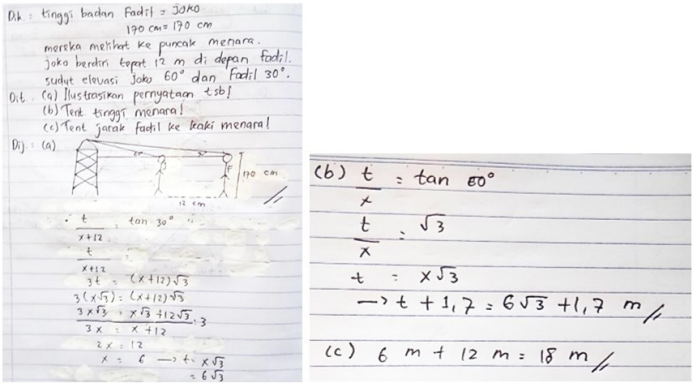


Figure 12 TKKM Subject AMZ Indicator 3

In the mathematical communication ability test indicator 1, subject AMZ was quite able to explain the illustrations made even though they were not quite complete according to what was depicted, and quite able to explain the algebraic operations carried out even though they were not very precise in determining the formula. However, subject AMZ realized that he had determined the formula incorrectly due to lack of focus. In indicator 2, Subject AMZ is able to explain the information known and asked about in the image in his own language as written, but is less able to explain the relationships related to the mathematical model that matches the image. AMZ subjects were able to explain the calculation steps correctly as written even though they were not optimal in language. In indicator 3, AMZ subjects are able to explain everyday events using language or symbols correctly as written and are able to explain calculations as written even though they are not optimal in language. In general, in explaining test results AMZ subjects were quite confident and thorough.

Based on this explanation, it can be seen that in general the data obtained from the results of mathematical communication ability tests, interviews, and observation notes obtained the same conclusion, namely that the AMZ subject was in the medium category. It can be said that subject AMZ is quite capable of fulfilling the three indicators of mathematical communication ability, even though there are errors in indicator 1, but he realized his mistakes during the interview.

Description of NAN Subject's Mathematical Communication Ability with AQ Quitter and Medium TKKM score

Below are presented the results of the NAN subject's mathematical communication ability test regarding indicators 1, 2 and 3.

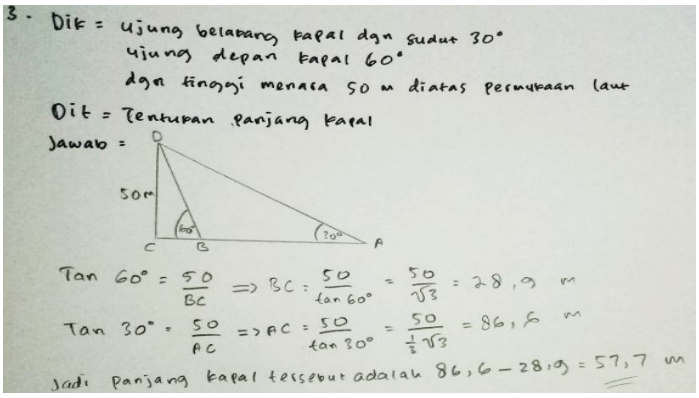


Figure 13 TKKM Subject NAN Indicator 1

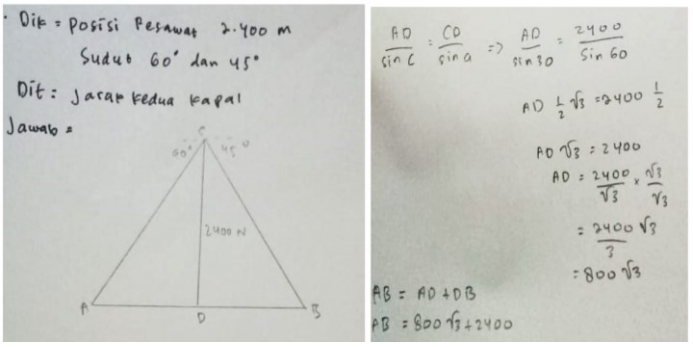


Figure 14 TKKM Subject NAN Indicator 2

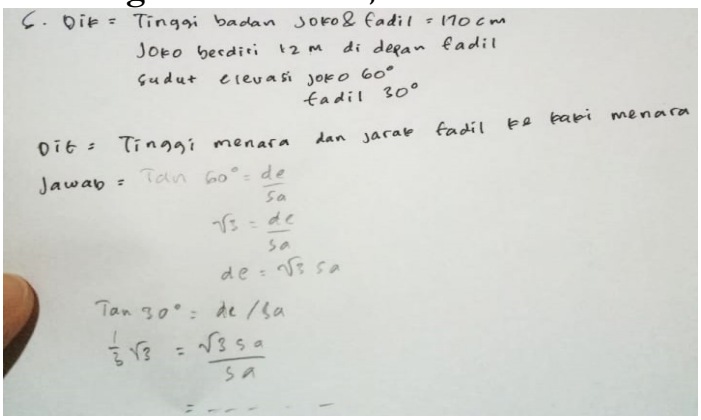


Figure 15 TKKM Subject NAN Indicator 3

In the mathematical communication ability test indicator 1, subject NAN was quite able to explain the illustrations made even though they were less complete than what was depicted, and quite able to explain the algebraic operations carried out even though they were less than optimal in language. In indicator 2, they are quite able to explain the information they know and ask about in the picture in their own language. NAN subjects were less able to explain the relationships related to mathematical models and the formulas used were not appropriate even though the final results of the calculations were correct. In indicator 3, NAN subjects are quite able to explain everyday events using language or symbols correctly and are less able to explain calculations, because they fail to do the calculations. The NAN subject admitted that he did not understand the question, so he could not carry out the next stage of calculation until he got the

final result. In explaining the test results, NAN subjects were not fluent, lacked self-confidence, and tended to give up hope in solving problems. However, it is still enough to understand the questions given.

Based on this explanation, it can be seen that in general the data obtained from the results of mathematical communication ability tests, interviews, and observation notes obtained the same conclusion, namely that the NAN subject was in the low-medium category. It can be said that the NAN subject is less able to fulfill the three indicators of mathematical communication ability.

Description of the Mathematical Communication Ability of NH Subjects with Quitter AQ and Low TKKM scores

Below are presented the results of the NH subject's mathematical communication ability test regarding indicators 1, 2 and 3.

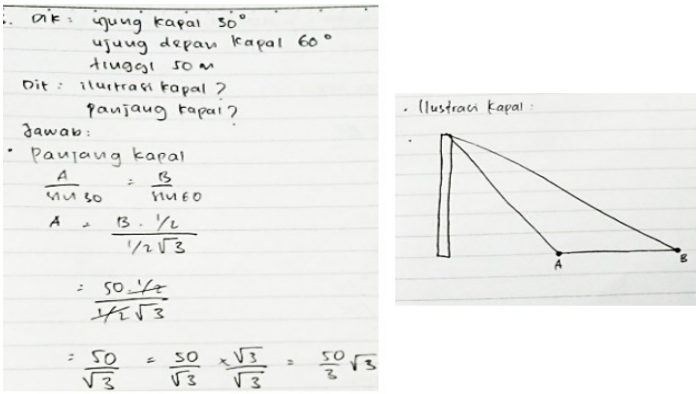


Figure 16 TKKM Subject NH Indicator 1

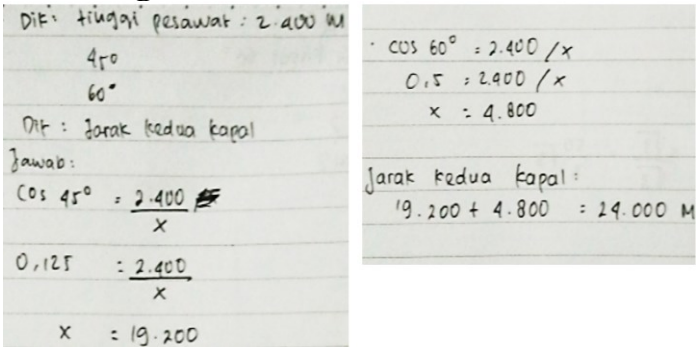


Figure 17 TKKM Subject NH Indicator 2

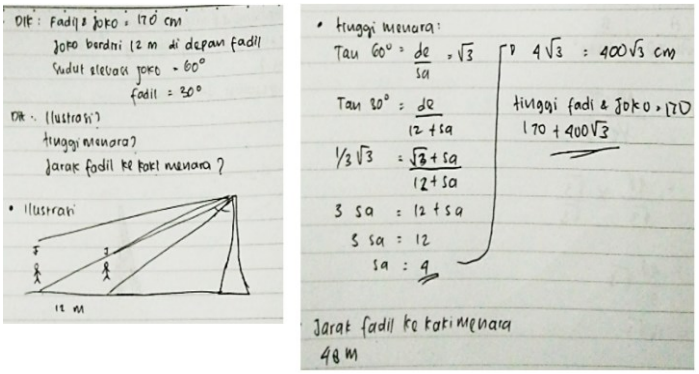


Figure 18 TKKM Subject NH Indicator 3

In the mathematical communication ability test indicator 1, subject NH was less able to explain the illustrations made according to what was depicted and less able to explain the algebraic operations carried out, because he failed to determine the appropriate formula. In indicator 2, they are quite able to explain the information they know and are asked about in the picture in their own language, they are less able to explain the relationships related to the mathematical model that matches the picture, and they are less able to explain the calculations carried out, because they failed to determine the appropriate formula. In indicator 3, NH subjects are less able to explain everyday events using language or symbols correctly and less able to explain calculations. Subject NH admitted that he did not understand all the questions given, so he was confused about determining the formula to use. In explaining the test results, NH subjects were not fluent, lacked self-confidence, and were easily discouraged in solving problems.

Based on this explanation, it can be seen that in general the data obtained from the results of mathematical communication ability tests, interviews, and observation notes obtained the same conclusion, namely that the NH subject was in the low category. It can be said that NH subjects are less able to fulfill the three indicators of mathematical communication abilities.

The results of students' mathematical communication abilities in terms of the adversity quotient climber and camper can be said to be that the conclusions obtained are in accordance with the results of research by Pratiwi & Murtianto (2021) which states that teacher candidates with AQ climber are able to fulfill 3 indicators of communication ability well, while teacher candidates with AQ camper meets 2 indicators with the predicate capable and 1 indicator with the predicate quite capable. Research by D A F Yuniarti (2021) states that the majority of students in the camper category can achieve the four indicators of mathematical communication skills in writing, but the achievement of each indicator is less than optimal. Meanwhile, in the climber category, the majority of students achieved the specified indicators well, almost all indicators were met well. Apart from that, research conducted by Septianingtyas & Jusra (2020) states that students who get a high score on mathematical problem solving ability, then their AQ is also high are called climbers type, and if students get a medium score on mathematical problem solving ability, then the AQ it has is called the campers type.

The uniqueness of this research is that students have moderate communication skills, but have AQ climbers. This is because students are not careful in determining the final results so that the scores obtained are less than optimal. According to Septianingtyas & Jusra (2020), these students fall into the AQ category of climber-camper transition, which states that the way this type of

student answers is almost the same as climber type students. However, the ability pattern of students in the climber-camper transition type is slightly different from the climber type.

Furthermore, students with AQ quitter and moderate and low mathematical communication skills reached conclusions in accordance with the research results of D A F Yuniarti (2021) that in Osborn learning, most groups of students with AQ quitter could not achieve the four indicators of written mathematical communication skills. The fairly high indicator obtained by students in the quitter category is the third indicator, namely explaining the steps for solving mathematical problems that have been studied. So, there is still a possibility that a small number of students can achieve indicators of mathematical communication ability even though they are considered quite capable, as is the case in this discovery. Based on the results of research by Pratiwi & Murtianto (2021) it is also stated that prospective teachers with AQ quitter cannot meet all indicators of mathematical communication skills. Communication skills used include drawing, writing, and mathematical expressions. This shows the results that each individual in communicating the problems obtained is in accordance with their AQ.

4. Conclusion

Based on the results of research carried out regarding students' mathematical communication skills in solving problems in terms of the adversity quotient during the Covid-19 pandemic, the researchers drew several conclusions as follows.

1. Students with an adversity quotient climber do not always have high mathematical communication skills, but this can also happen to students who have moderate mathematical communication skills. The difference is that the climber2 subject with the mathematical communication ability test was less thorough than the climber1 subject in solving mathematical problems. Students' mathematical communication abilities in general with the adversity quotient climber are categorized as high. Climber1 and climber2 subjects were able to fulfill the 3 indicators of communication skills well even though they were not optimal.
2. Students with adversity quotient campers generally tend to have the same mathematical communication skills, namely moderate. The only difference is that camper1 subjects were less careful in writing test answers. Camper1 and camper2 subjects met 2 indicators with the predicate capable and 1 indicator with the predicate quite capable.

Students with an adversity quotient quitter do not always have low mathematical communication skills, but there are also students who have moderate mathematical communication skills. The only difference is that NAN subjects tend to give up when they encounter complicated problems, while NH subjects give up easily. NAN subjects met 2 indicators with the predicate quite capable and 1 indicator with the predicate less capable. Meanwhile, the dominant NH subjects were less able to fulfill the criteria for each indicator. Students' mathematical communication abilities in general with the adversity quotient quitter are categorized as low-medium.

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