MATHEMATICAL CRITICAL THINKING ABILITY REVIEWING FROM DOMICILE, GENDER, AND ADVERSITY QUOTIENT

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ABSTRAK

Capaian matematis siswa pada kemampuan berpikir kritis matematis masih berada pada kategori rendah. Pada penelitian ini memliki tujuan menganalisis kemampuan berpikir kritis matematis berdasarkan domisili, *gender*, dan *adversity quotient* (AQ). Penelitian ini merupakan kajian studi kasus kualitatif. Subjek yang dipilih melalui *purposive sampling* berasal dari SMA yang ada di wilayah Jakarta dan Tangerang kelas XI. Data dianalisis menggunakan *Model Rasch* yaitu *Winstep* melalui tahapan reduksi dan pengkategorian, penyajian, serta penarikan kesimpulan. Hasil penelitian memperoleh kemampuan berpikir kritis matematis subjek berdasarkan domisili, subjek domisili kota mampu memenuhi seluruh indikator berpikir kritis dengan baik. Berdasarkan *gender*, subjek pada *gender* perempuan dan laki-laki memiliki kemampuan matematis yang sama pada indikator berpikir kritis. Berdasarkan *adversity quotient*, subek pada tipe *climber* subjek mampu menyelesaikan permasalahan dengan baik dan tepat, pada tipe *camper* subjek dapat menyelesaikan soal dengan tepat namun, pada indikator inferensia kedua subjek tidak menggambarkan grafik yang diminta dan tipe *camper* mendominasi seluruh subjek, sedangkan tipe *quitter* memiliki kemampuan *adversity quotient* yang rendah dengan indikator yang terpenuhi hanya interpretasi.

Kata Kunci: *Adversity Quotient*, Berpikir Kritis Matematis, Domisili, *Gender*.

ABSTRACT

Students' mathematical achievement in mathematical critical thinking skills is still in the low category. This study analyses mathematical critical thinking skills based on domicile, gender, and adversity quotient. This research is a qualitative case study. The subjects selected through purposive sampling came from high schools in the Jakarta and Tangerang class XI areas. The data were analyzed using the Rasch Model, namely Winstep through the stages of reduction and categorization, presentation, and conclusion. The results of the study obtained the ability to think critically mathematically based on domicile, the subject of urban domicile was able to meet all indicators of Critical thinking well. Based on gender, subjects of the female and male genders have the same mathematical abilities on critical thinking indicators. According to the adversity quotient, the subject in the subject climber type can solve the problem properly and precisely, and in the camper type the subject can solve the problem precisely however, in the inference indicators the two subjects do not describe the requested graph and are in the dominant camper type, while the quitter type has a low AQ ability with indicators that are met only interpretation.

Keywords: Adversity Quotient, Mathematical Critical Thinking, Domicile, Gender.

INTRODUCTION

The learning process in Mathematics subjects carried out in the classroom, in particular, can be one of the influencing factors on the success of education (Mujib & Mardiyah, 2017). For this reason, it is necessary to strengthen education to align with the growth of students' creative, critical thinking characteristics, and ability to collaborate and compete in the 21st century (Fridanianti et al., 2018). Mathematics is one of several subjects that can create a logical, creative, systematic, and critical mindset. In line with Permendikbud No. 23 of 2016 which mentions the purpose of school mathematics, one of which is so that students can show a logical, responsive, critical, responsible, analytical, thorough, not give up, and thorough attitude in solving problems (Kemendikbud, 2016). The current of globalization will not easily entangle students through good critical thinking skills and good character values will not be easily eroded by the times (Khasanah & Nurnugroho, 2021). It shows that students solving mathematical problems need the ability to think critically in mathematics.

The results of observations made by researchers on four schools in the Jakarta area and its surroundings in class XI at the high school level show that students are directed to memorize concepts only to be able to complete learning outcomes and pay less attention to students' critical thinking processes. It makes it difficult for students to understand the questions given so few learning outcomes are found that can achieve high mathematical abilities. For this, it is necessary to identify the problems experienced by students in solving mathematical problems so that students' critical thinking competencies can be developed (Amir, 2015).
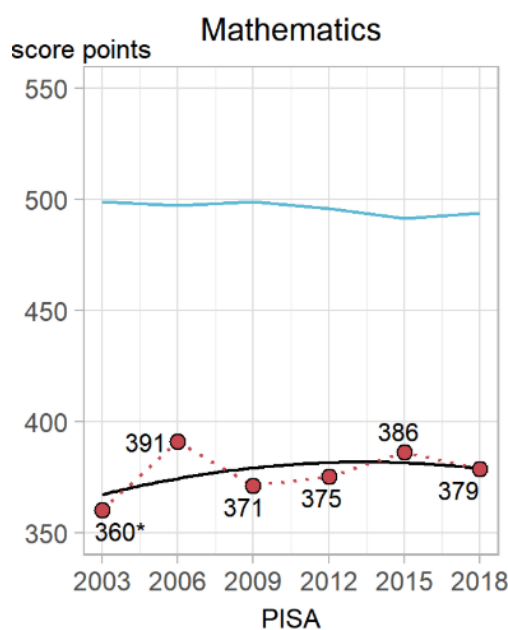

Figure 1. The trend of mathematics performance for Indonesian students

However, the fact is that students in Indonesia have low mathematical critical thinking skills. It is shown in the PISA assessment data (Program for International Student Assessment) that the achievement of content knowledge in mathematics for students in Indonesia is still lacking, one of which is critical thinking skills as seen in Figure 1 (OECD, 2019b, 2019a). The trend of mathematics performance for Indonesian students decreased from a score of 386 in 2015 to 379 in 2018. Then Kusaeri & Aditomo (2019), stated that students are not accustomed to being required to solve problems related to mathematical critical thinking skills. This makes, the need for changes in the process of learning mathematics in Indonesia, especially in the student's critical thinking ability. Thus, this research will focus on mathematical critical thinking ability.

Mathematical critical thinking is a skill as a basis in the thought process of analyzing arguments, synthesizing, developing logical thinking patterns, and evaluating to produce conclusions from relevant facts (Dhayanti et al., 2018; Ghanizadeh, 2017; Hidayat et al., 2018; Solihah, 2019; Zanthy, 2016). Chasanah (2019) argues that critical thinking places more emphasis on processes in mathematical learning, not results. Meanwhile, Hidayat (2017) states that mathematical critical thinking is a skill in combining initial abilities in mathematical reasoning in solving mathematical problems. To be able to solve problems in terms of mathematics, each student's response is different. Some students may feel challenged in completing it, however, some will feel unable to deal with it. In line with Rahayu & Alyani (2020), who states the ability of each student to solve a problem will be different in the way they view mathematical problems. So to find out the students' perspective in dealing with mathematical problems, an adversity quotient is needed.

The adversity quotient (AQ) is one of the intelligence used in turning difficulty into a challenge that must be solved (Hidayah et al., 2016). Paul G. Stoltz first developed the concept of AQ when there is someone who has good EI and IQ but still has less potential (Zhao et al., 2021). Generally, today's students often give up easily in the face of difficulties in solving problems, so AQ has an important role (Alyani & Zahra, 2020; Hidayat et al., 2018). For this reason, it is necessary to develop AQ so that students can solve the problems they face.

Hidayat & Sari (2019) describes three levels of AQ which consist of the quitter type, the camper type, and the climber type. Quitter is an AQ type with low fighting power, so it is easy to give up without any attempt to solve mathematical problems because they think Mathematics is difficult. Campers are the type who are willing to face challenges but lack maximum effort and are easily discouraged from achieving their goals. Meanwhile, the climber is the type with the highest fighting power among the two previous types, does not give up easily under any circumstances, and will always try his best (Dorji & Singh, 2019; Hidayah et al., 2016; Hidayat et al., 2018; Hidayat et al., 2018; Yanti & Syazali, 2016).

In addition, to achieve the best results, a supportive environment is needed in the process of growing well (Hadi & Faradillah, 2019). This is supported by research that results in higher IPA scores obtained from students from urban areas than students from rural areas (Kryst et al., 2015). The environment with a certain domicile can determine student learning activities.

The activities of students who get the opportunity to access learning resources and better learning experiences than those who do not will see the differences in them. This will make students with access to learning resources and learning experiences less competitive. In line with research that states that the more difficult education is to achieve, the less relaxed the

students' mindset will be and the lower their competitiveness (Gunur et al., 2018). Thus, place of residence is one of the factors that influence the growth of better education.

Not only do AQ and domicile become one of the factors of low mathematical critical thinking ability, but they are also triggered by abstract mathematical concepts so that not a few students find it difficult, uninteresting, and boring (Faradillah & Febriani, 2021). So it affects the low grades in mathematics in school. However, this can trigger the struggle of some students in learning mathematics (Daud et al., 2020). Petersen dan Hyde (2017) in their research found that men have better mathematical abilities than women. On the other hand, a study revealed that men and women have the same level of self-concept toward mathematical learning (Peteros et al., 2019). Meanwhile, Faradillah dan Febriani (2021) found that in their research, male students had a higher trauma level than female students with mathematics, as seen through the maps variable.

Studies related to mathematical critical thinking skills have been previously (Fridanianti et al., 2018; Batubara, 2019; Hidayat & Sari, 2019; Rahayu & Alyani, 2020). Fridanianti et al. (2018) found that the reflective cognitive style can fulfil every indicator of critical thinking, while the impulsive cognitive style tends to be less thorough when working on mathematical problems. Batubara (2019), in his research, resulted in an increase in mathematical critical thinking skills through guided method learning with GeoGebra, which was higher than not using GeoGebra. Hidayat dan Sari (2019) The mathematical critical thinking ability of large students is influenced by the adversity quotient of up to 61%. Rahayu dan Alyani (2020) revealed in their research that 75% of AQ influences mathematical critical thinking skills. Based on previous studies on mathematical critical thinking skills, it is necessary to conduct a study on mathematical critical thinking skills from the factors that have been described. So this study aims to describe students' mathematical critical thinking skills in terms of domicile, gender, and adversity quotient of students.

METHODS

This research is a research with descriptive qualitative methods. Data were obtained through the results of the Mathematical Critical Thinking Ability (MCTA) test, adversity quotient (AQ) questionnaire scores, and interviews. Based on the domicile and gender groupings of students, two students each with the type AQ climber, camper, and quitter. Then students are given questions on the MCTA test. The subjects chosen came from several schools in the Jakarta and Tangerang areas at the high school level equivalent to class XI. The instruments used are the MCTA test instrument and the adversity quotient (AQ) questionnaire that has been validated by experts. The MCTA instrument consists of 4 questions in the form of descriptions based on Pertiwi (2018), indicators namely interpretation, analysis, evaluation, and inference in Table 1. Meanwhile, the AQ questionnaire was adopted from Alyani and Zahra (2020) with quitter, camper, and climber indicators.

Table 1. Indicator of MCTA

Indicator	Description
Interpretation	Understand the problem by showing what is known or asked about the question accordingly.
Analysis	Identify the relationship between questions and concepts that can be shown through mathematical models and explanations.
Evaluation	Have a complete solving strategy, and be precise in calculations.
Inference	Formulate conclusions correctly

Instruments that have gone through the expert assessment stage are then tested for validity and reliability using the Rasch Model. Until the results are obtained valid and reliable and feasible to use without revision as in Figure 2. While the interview guidelines were adopted from the study (Hadi & Faradillah, 2019). Then obtained an interview instrument that is suitable for use without revision.

A street food seller is observing one of the park visitors who is jogging around the circular garden with the distance of the visitor's path from the center of the park is 6 m, while the distance of the street food seller to the center of the park is 12 m. Suppose the position where the street food seller sees as a coordinate point in meters and the center of the circle is on the x-axis, determine the equation of the visitor's path and graph the equation of the circle.

Figure 2. The MCTA Test

An already viable instrument was piloted on students to be reanalyzed using the Rasch Model. The purpose of the Rasch Model analysis is to find out the division of students by AQ type which can be seen through the Wright Maps table. The questionnaire on the AQ instrument, is based on the Likert scale with 5 choices, namely "strongly disagree", "disagree", "neutral", "agree", and "strongly agree".

Subjects with AQ criteria, two quitters, two campers, and two climbers, were given the MCTA (mathematical critical thinking ability) test in Figure 2 with appropriate indicators. In working on the MCTA test questions, subjects are not allowed to use cell phones or books as aids. The time given is 60 minutes for four questions and 30 minutes for interviews.

The analysis was carried out on the AQ questionnaire below through the Rasch model. Information obtained from Table 2, amounting to 1.00 logit exceeds logit 0.0, which describes the respondents (subjects) tend to agree with the items in AQ. The reliability values for objects and persons are 0.82 and 0.92, respectively, representing the respondents' consistency in answering AQ items and the quality of unique items (statements) (Sumintono & Widhiarso, 2014). So many respondents agree on the things and all statements on quality items. The interaction

shown by Cronbach's alpha of 0.93 indicates that respondents with items have very good interactions (Sumintono & Widhiarso, 2014).

Table 2. AQ Questionnaire Validity and Reliability

Item Reliability	Person Measure	Person Reliability	Alpha Cronbach
0.82	1.00	0.92	0.93

Through the indicators in Table 2, if all the MCTA indicators are met by the subject, then the item can be said to have a climber-type AQ. However, if there are errors in almost all stages of the MCTA indicator, it can be said that the subject has an AQ that is in the quitter category. Next, an interview with the subject was conducted by considering the results of the subject's MCTA in writing to obtain information and clarify the results of the subject's work. Interviews were conducted through unstructured interviews and were in the form of an outline of the problem (Hadi & Faradillah, 2019). This study uses triangulation techniques to check the validity of the data. Then the data were analyzed through the reduction stages according to the research objectives, presentation, and conclusions are drawn.

RESULT AND DISCUSSION

Calibration was carried out between items and respondents in the form of subject responses that were processed from raw scores to be converted at logit intervals through the Rasch Model to classify subjects according to the research objectives. Furthermore, the grouping is done through a table of variable maps on the results of the subject's AQ that has been processed with the Rasch Model. The result is shown in Figure 3.

There are 18 subjects with quitter type AQ, 38 climber type subjects, and 102 camper types. Codes L and P indicate gender while K and D indicate domicile in cities and villages. Because in this study the focus of the study was on domicile, gender, and AQ, the subjects were selected purposively. The selected subjects included climber types with codes 128 LK (S1) and 102PK (S2), camper types with codes 127PK (S3) and 204LK (S4), and climber types with codes 010LD (S5) and 013PD (S6). Where the subject of the climber type shows the dominance of the female gender and is domiciled in the city. In contrast, the quitter type is dominated by the subject of male gender and city domicile. This is in line with the maps variable in the research of Rahayu dan Alyani (2020) which shows that the dominant female subject is in the climber type while the male is in the quitter type. The following are the results of the subject's responses to the MCTA questions based on the six selected subjects' domicile, gender, and AQ categories.
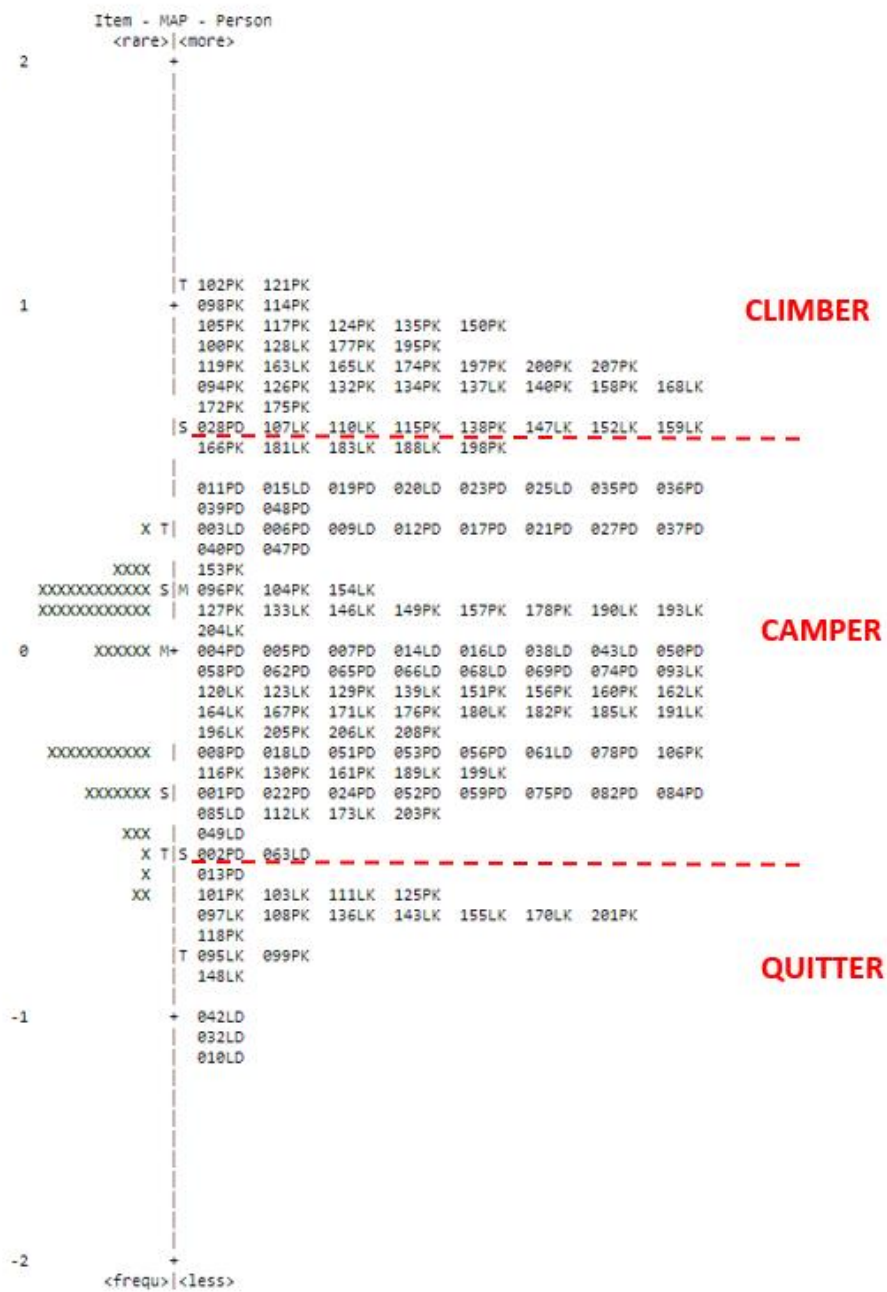
Figure 3. Variable Maps of AQ

The subject's response in writing the completion of the MCTA question number 1 is shown in Figure 4. S1 subjects can write down the interpretation indicators well. However, S1 cannot continue processing the information obtained and only writes down the visitors' radius.

Known : The distance between visitors and the center of the park is 6 m

The distance between a street food seller and the center of the park is 12 m

Asked : The equation of visitors trajectory and graph of its circle equation

Figure 4. The result of S1 Type Quitter

Researcher : *What do you understand from question number 1?*

S1 : *I only understand what is known and asked, ma'am, even then I copied from the question.*

Researcher : *Which part makes you confused?*

S1 : *I don't understand what the visitor's trajectory equation is like, never before taught ma'am.*

Researcher : *Have you tried to find a solution?*

S1 : *No, because I don't understand. So, I just rewrote the problem.*

Based on the results of interviews on the subject of S1, the subject does not know how to solve the MCTA questions. The subject can only copy the interpretation indicators by copying the questions. While other indicators can not be met. So subjects who have AQ quitter are easy to give up and are relatively weak in interpreting MCTA questions (Hidayat & Sari, 2019). The lack of understanding that the subject has in solving MCTA questions and based on the answers during the interview makes it easy for the subject to give up on solving them. In line with the categorization of male students who live in villages as having a low AQ (Faradillah & Febriani, 2021; Kryst et al., 2015; Rahayu & Alyani, 2020).

Known :

The distance between visitors and the center of the park is 6 m

The distance between a street food seller and the center of the park is 12 m

Asked : The equation of visitors trajectory and graph of its circle equation

Answer :

- Circle radius

- The distance from the center of the circle to the coordinates = 12 m

Figure 5. The result of S2 Type Quitter

Researcher : *What do you understand from question number 1?*

S2 : *Only the information on the question, ma'am, then I rewrite the information I got from the question.*

Researcher : *Why not continue, which part makes you confused?*

S2 : *Because I don't understand what formula to use and how to make the graphics are finished, that's all, ma'am.*

Researcher : *Have you tried to solve it?*

S2 : *It's been mom, but yes, because I don't understand, I just answer it sober.*

Researcher : *How do you acquire the knowledge you have before, are there other learning resources besides those taught by the teacher?*

S2 : *I got it from my teacher, but the material, there are package books but, limited in number in our school so they have to alternate with other classes and the internet can only be used if the network is stable.*

Based on Figure 5, interviews and responses to the MCTA questions for S2 subjects, the subjects could not complete the MCTA questions so the subjects were only able to fulfill the interpretation indicators and other indicators could not be met. Similar to S1, S2 still does not understand the problems in the questions. This can be seen when the subject writes down the analytical indicators the subject can process the information on the question but does not know what the next step is. So that subjects who live in villages easily give up on finding solutions to problems. This makes a Master's Degree in the AQ quitter category (Rahayu & Alyani, 2020). From the results of the interview, we can also see that the subject of S1 and S2 from the domicile side of the two subjects came from a school that was in the same domicile and the subject of S1 revealed that he had never been taught how to solve problems with the material provided by previous researchers. So that the environment influences the achievement of student learning outcomes. An environment with a certain domicile can determine student learning activities. The more difficult access to education is to achieve, the lower their competitiveness (Gunur et al., 2018). In terms of gender, based on the results of the work and interviews, they could only arrive at the interpretation stage because they did not understand the next step in solving the questions given. It is in line with Fuad (2016), who revealed that the mathematical ability of the two genders is not much different.

• Circle radius = 6m

• The distance from the center of the circle to the coordinates = 12 m

So, the center of the circle in cartesian coordinates is (12,0)

Equation of the trajectory : $(x - 12)^2 + (y - 0)^2 = 6^2$

$$(x^2 - 24x + 144) + y^2 = 36$$

$$x^2 + y^2 - 24x + 108 = 0$$

Conclusion :

So, the equation of the visitor's path is $x^2 + y^2 - 24x + 108 = 0$ and graphics.

Figure 6. The result of S3 Type Camper

Researcher : *What do you understand from question number 1?*

S3 : *From the question asked to find the equation of the trajectory from the distance of visitors and traders with the garden center.*

Researcher : *Are you sure that's all that is being asked, how about the graph?*

S3 : *Yes, ma'am, I was also asked about the graph, but I forgot to add it.*

Researcher : *Okay, then what method did you use to solve it?*

S3 : *I substituted the radius and the coordinates of bu, into the equation of the circle whose center is (a,b) then I write conclusions as taught by my math teacher.*

Researcher : *Are you sure about your answer?*

S3 : *Yes ma'am*

Researcher : *How are you sure your answer is correct?*

S3 : *I'm sure because I've found the answer, ma'am.*

Researcher : *What if it turns out that your answer is not quite right?*

S3 : *If it's not quite right, I'll fix it later.*

Figure 6 shows the response of the subject of S3 cannot meet the interpretation indicators on the question. However, being able to write down other indicators correctly. However, the subject of S3 did not fulfill the inferential indicator completely because he missed the requested chart. From the results of the interview, this subject looks easily feels satisfied with what he has achieved and does not want to try other ways to believe in the answers he gets. S3 is not trying to find the truth of the answers he finds and has no problem with his answer if it turns out to be wrong. This is in line with the results of research by Rahayu dan Alyani (2020) which revealed that camper-type subjects tend to be satisfied with what they get.

Distance of visitor to center = 6 m
Distance of street food sellers to the center = 12 m
Asked : Equation of visitor trajectory and make a graph
Center distance to the coordinate point = 12 m. so (12, 0)
$(x - 12)^2 + (y - 0)^2 = 6^2$
$(x^2 - 24x + 144) + y^2 = 36$
$x^2 + y^2 - 24x + 108 = 0$
So, the equation of the visitor's path $x^2 + y^2 - 24x + 108 = 0$

Figure 7. The result of S4 Type Camper

Researcher : *What do you understand from question number 1?*
S4 : *What I understand is that question number 1 asks students to find the equations of the equation along with the graph, from a known distance.*
Researcher : *If you have understood, what method did you use to solve it?*
S4 : *First, I determine the coordinates of the problem information (12,0) and the radius is 6 m then, I substituted it into the equation of a circle whose center is (a, b) until I found the result. However, I didn't graph it because I thought there was already a result.*
Researcher : *Are you sure about your answer?*
S4 : *Yes ma'am*
Researcher : *How are you sure your answer is correct?*
S4 : *I have checked my answer before, ma'am.*

Figure 7 shows the answers to S4 subjects who can fulfill the requirements by writing down information and knowing about the questions. The next indicator is analysis, the subject can identify the information correctly. After that, the evaluation indicators and the subject of inference can be written perfectly. Then the interview results showed that the subject of S4 could provide answers from the information he got about the written answers. However, this subject S4 does not continue with the instructions about making graphics, subject S4. When viewed in terms of gender, S3 and S4 subjects have mathematical solving capabilities that are not much different. This is in line with Peteros et al. (2019) who revealed that men and women have a level of self-concept that is not much different from learning mathematics. Meanwhile, in addition to domicile, these two subjects have a higher level of problem-solving ability when compared to the previous S1 and S2 subjects. This is in line with research which states that the

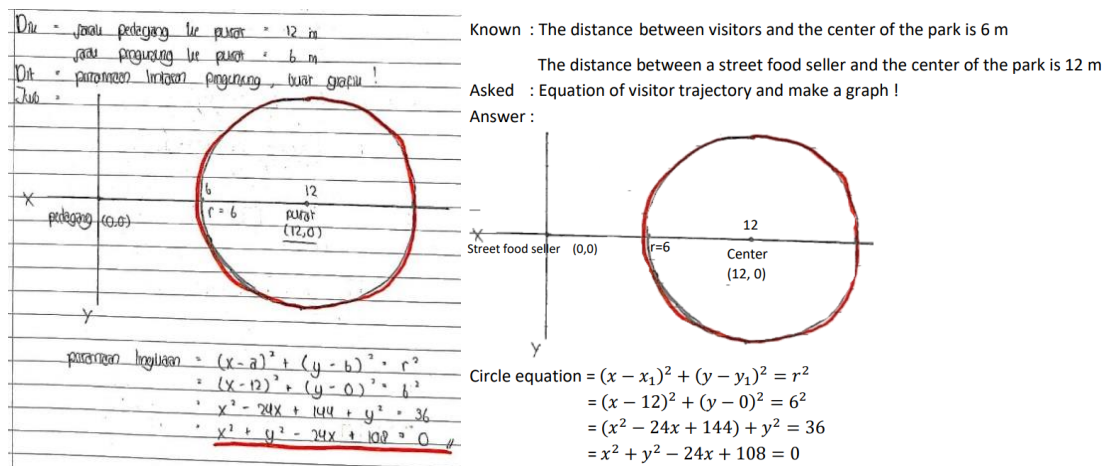science value obtained from urban students is higher than that of rural students (Kryst et al., 2015).

Known : The distance between visitors and the center of the park is 6 m

The distance between a street food seller and the center of the park is 12 m

Asked : Equation of visitor trajectory and make a graph !

Answer :

Circle equation = $(x - x_1)^2 + (y - y_1)^2 = r^2$

= $(x - 12)^2 + (y - 0)^2 = 6^2$

= $(x^2 - 24x + 144) + y^2 = 36$

= $x^2 + y^2 - 24x + 108 = 0$

Figure 8. The result of S5 Type Climber

Researcher : *What do you understand from question number 1?*

S5 : *From the information given about the distance between visitors and traders from the park center, then we were asked to find the equation of the visitor's trajectory and its graph.*

Researcher : *If you have understood, what method did you use to solve it?*

S5 : *I first determine the coordinates (12, 0), and the radius is 6 m. Then I analyze with describing graphs according to coordinates and radii. Then I substitute it into the equation of the circle whose center is (a,b).*

Researcher : *Are you sure about your answer?*

S5 : *Yes ma'am.*

Researcher : *How are you sure your answer is correct?*

S5 : *I have matched the graph that I made.*

Figure 8 shows the response of the subject of S5, which can correctly fulfill all the indicators on the question. The issue can understand the problem by writing down what is known and asking about the interpretation indicator. In indicator analysis, the subject uses a graph to show the relationship between the question and the concept. In the evaluation and inference indicators, the subject has carried out the right solution strategy until the solutions and conclusions obtained are right. It is reinforced by the results of the interview with the subject of S5, it can be seen that the subject of S5 can explain the process of solving the problem and in believing that the results obtained by this subject match with the graph. This subject belongs to the climber type because he never gives up in the process of solving problems so AQ affects the subject's MCTA. In line with Hidayat dan Sari (2019) in their research, students' AQ significantly influences students MCTA.
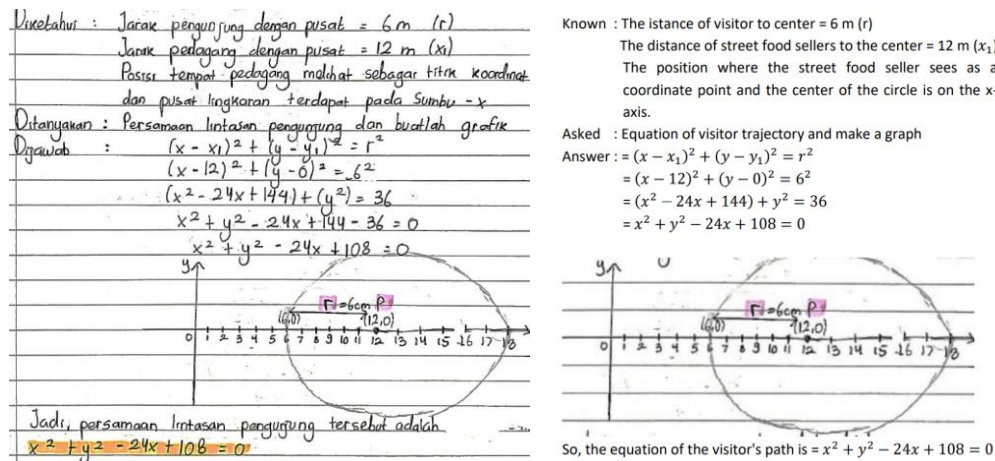
Figure 9. The result of S6 Type Climber

Researcher : What do you understand from question number 1?

S6 : What I know from the problem, the coordinates and the radius of the circle are given from a distance between visitors and merchants with a garden center.

Researcher : If you have understood, what method did you use to solve it?

S6 : First, I determine the coordinates of the point (12,0), and the radius is 6 m, then, I substitute into the equation of the circle whose center is (a,b). Then I graphed the equation.

Researcher : Are you sure about your answer?

S6 : Yes ma'am.

Researcher : How are you sure your answer is correct?

S6 : Through the graph, I made after finding the equation, ma'am. Because whether using graphics or not the result will remain the same, mom.

Researcher : How do you acquire the knowledge you have before, are there other learning resources besides those taught by the teacher?

S2 : Most of it I get from teachers, the rest from student books, the internet, learning media provided by my teacher, and school or out-of-school libraries.

Figure 9 shows the response of subject S6, which can fulfill all the indicators correctly so that this subject is classified as a climber type. Not different from the S5 subject, the S6 subject was able to meet all the criteria for the MCTA indicator well; however, in the analysis indicators, S6 students connected the questions with concepts through the model they got according to the information about the questions, namely the radius and center coordinates. Student statements reinforce this through interviews, the subject of S6 identifies the relationship between questions and concepts through the information he gets on the questions. The chart he gets is written as part of the inferential indicator. Viewed from the side of domicile and gender, the two subjects, namely the S5 and S6 subjects, were able to provide a complete process through the four indicators of MCTA questions were met very well. This is in line with research that states that

the thinking ability of students from urban areas is higher than that of students from rural areas because it is supported by adequate access to learning (Kryst et al., 2015).

CONCLUSION

In this study, several conclusions can be found from the results obtained through data analysis on the analysis of students' mathematical critical thinking skills in terms of domicile, gender, and AQ, namely: (1) Based on domicile, MCTA subjects with city domicile are dominated by subjects who can meet all indicators MCTA well, (2) Based on gender, female and male MCTA subjects have the same mathematical ability on the MCTA indicators. (3) The ability to think critically mathematically based on AQ in the climber type, the subject can solve problems properly and accurately, in the camper type the subject can solve the problem correctly, however, on the inferential indicator the two subjects do not describe the graph requested and are in the camper type that dominates, while the quitter type has a low AQ ability with indicators that are met only by interpretation. For the research that has been done, the researcher suggests for further research to link other factors that have an impact on students' mathematical thinking skills with different variables and subjects.

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