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Self-Confidence and Critical Thinking: Exploring Mathematical Students' Abilities in Minimum Competency Assessment

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Abstract: Critical thinking is one of the mathematical abilities that determine student learning outcomes. Self-confidence attitude needed to develop critical-thinking ability. The study focused on the describing students' critical-thinking ability in solving Minimum Competency Assessment (AKM) problems in each self-confidence category. This qualitative research involved three students grade VIII of junior high school in various self-confident categories. Through in-depth interviews, questionary methods, and AKM tasks, data collected to gain insights into students' perceptions of their self-confidence levels and their application of critical thinking strategies when facing AKM tasks. The results of this study showed the various indicators of critical thinking in each self-confidence category. The research result provides implications for educational practices in order to preparing students confidence for competency assessments in mathematics.

Keywords: Critical Thinking Ability, AKM Tasks, *Self-Confidence.*

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A. INTRODUCTION

The development of science continues as time passes, as is the case in learning in the 21st century which is famous for the 4C concept (*communication, critical thinking, creativity and collaboration*), are four important capabilities needed for the 21st century(Kemendikbud, 2018). In realizing learning goals in the 21st century, it is necessary to develop critical thinking skills in students as the nation's next generation (Azizah et al., 2021; Syafitri et al., 2021).

Critical thinking is an ability to solve problems that involves reasonable reasoning and can interpret and evaluate systematically various forms of information so as to obtain valid and trustworthy decisions. (Benyamin et al., 2021; Men, 2017). Critical thinking is also called HOTS (High Order Thinking Skill), which is one of the abilities in the 2013 curriculum in the cognitive domain so that students can connect, transform the knowledge and experience they have (Dhema, 2019). Learning that develops problems *High Order Thinking Skills* (HOTS) Applying critical thinking skills will be good preparation for students (Murdaningrat et al., 2022). Therefore, critical thinking requires special training, one of which is getting students used to working on questions that allow their critical thinking to develop. Thus, students will have the ability to use the information and ideas they currently have to solve problems and create new ideas (Azizah et al., 2021; Murdaningrat et al., 2022). One habit is to practice questions *Assesment Kompetensi Minimum* (AKM), because it is one of the fundamental

competency assessments so that students can develop their capacity and can participate positively in the community and educational environment so that they can create renewal and habituation for students in *critical thinking* or *critical thinking* (Pratama, 2022).

Asesmen Kompetensi Minimum (AKM) contains a problem with various contexts, it is hoped that students will be able to solve it using literacy and numeracy competencies (Purwanto, 2021). In designing learning tools for questions *Asesmen Kompetensi Minimum* (AKM), The process includes practical preparation and providing direction to teachers and schools who will create the questions. This is done by including aspects of 21st century skills, so that it can help students develop critical thinking skills (Deviana & Aini, 2022). Question AKM (*Asesmen Kompetensi Minimum*) can help students make analytical skills based on information and students don't just memorize or remember the material (Kurmalasari, 2022). Testing reading and writing skills when working on questions *Asesmen Kompetensi Minimum* (AKM), will improve *High Order Thinking skills* (HOTS) to students (Mahanal, 2019; Masitoh, 2020; Suhaesti, 2017). However, working on a problem both in the world and in real life cannot be separated from each individual's self-confidence.

Self-confidence or what is called *self confidence* is a person's belief in their own abilities so that they can feel confident and confident in themselves through what they do (Nurafni & Pujiastuti, 2019). One of the things that students have is self-confidence, because self-confidence is very important for success in learning (Amalia & Imami, 2021). For example, every student must have self-confidence to solve problems, because self-confidence is needed to develop critical thinking skills (Thoriqul & Mustangin, 2020). In the study, students who believed in themselves had better critical thinking skills. Additionally, research (Khoirunnisa & Malasari, 2021), suggests that students' self-confidence is positively correlated with their mathematical critical thinking abilities and vice versa. According to research (Purnama & Mertika, 2018), A person's self-confidence influences their ability to solve problems, so people who have high self-confidence can help students solve problems. Therefore *self-confidence* in students is very important because their ability to pose problems will improve their ability to learn mathematics for the better and is influenced by one factor, namely self-confidence (*self confidence*) (Purwanda et al., 2020).

Previously there had been research discussing students' critical thinking abilities in review *self confidence,* but no one focuses on solving the problems *Asesmen Kompetensi Minimum* (AKM). This research includes the critical thinking process in terms of *self confidence*, mathematical literacy abilities are seen from the use of mathematical questions with types *High Order Thinking Skills* (HOTS), mathematical and critical thinking skills *self-confidence* students with approach RME (*Realistic Mathematic Education)*, as well as students' mathematical critical thinking abilities on problems that require a high level of thinking (HOTS) (Delina et al., 2018; Khoirunnisa & Malasari, 2021; Prasetyo & Firmansyah, 2022; Simamora & Tilaar, 2021). Thus, in this research the focus is more on working on HOTS questions with critical thinking skills, whereas in this research the focus is on solving the questions AKM (*Asesmen Kompetensi Minimum)* observed from *self-confidence*. Therefore, based on the explanation above, the aim of this research is to describe students' critical thinking abilities when solving problems AKM (*Asesmen Kompetensi Minimum*) in terms of *self confidence* student.

B. METHOD

This research is a descriptive study with a qualitative approach which aims to describe students' critical thinking abilities in solving AKM questions based on self-confidence. The subjects of this research were 3 class VIII students at SMP Muhammadiyah 2 Batu City, consisting of 1 student with high self-confidence, 1 student with moderate self-confidence and 1 student with low self-confidence. The selection of research subjects was based on the results of the self-confidence questionnaire. The self-confidence questionnaire consists of 39 positive and negative questions adopted from Hendriana et al. (2017).

To determine students' critical thinking abilities, research subjects were given AKM test questions and continued with interviews using test instruments and interview guidelines. The test questions consist of 1 AKM question in the form of a description, with algebra content and personal context. The interview guide was prepared in a semi-structured manner by paying attention to the results of students' answers in solving AKM questions and referring to indicators of critical thinking skills adopted from Karim & Normaya's (2015) research, namely interpretation, analysis, evaluation and conclusions. Next, the data was analyzed using the steps proposed by Miles and Hubermen including: (1) data reduction; (2) data presentation; and (3) draw conclusions.

C. RESULTS AND DISCUSSION

The results of junior high school students' critical thinking skills in terms of students' self-confidence are presented based on the results of performance and interviews with students in solving the following AKM questions.

Figure 1. Fragments of the shopping receipt belonging to Firman and Gio at the Fans Sport Collection store

Fictures (a) and (b) respectively show fragments of the shopping receipt belonging to Firman and Gio at the Fans Sport Collection store. On the same day, Aldi wanted to buy 2 types of goods such as Firman and Gio, namely t-shirts and hats, but he only had Rp. 150,000. Analyze what goods Aldi can buy with the money he has!. Next, the presentation of the results of data analysis on students' critical thinking abilities in solving AKM questions is described based on the results of performance and interviews with 3 research subjects, namely SCT (subjects with high self-confidence), SCS (subjects with

moderate self-confidence), and SCR (subjects with high self-confidence). with low self-confidence).

1. High Self-Confidence Subjects

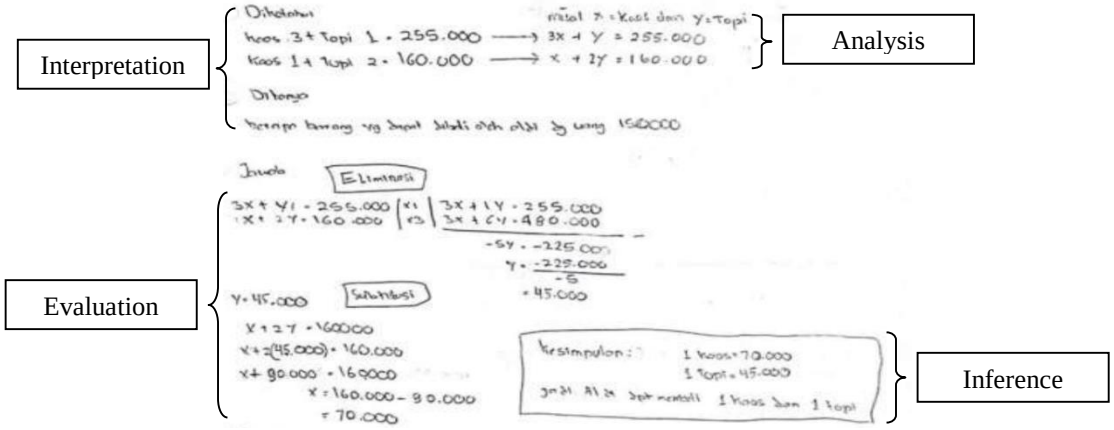

Figure 2. High Self-Confidence Subject Answers

Based on the results of the SCT subject's answers in Figure 1, it shows that the subject can write correctly and completely what he knows and is asked about the questions presented in his own language, thus fulfilling the interpretation indicators. SCT subjects also fulfill analysis indicators, where the subject first considers what is known to form two equations. Furthermore, in the evaluation indicators, SCT subjects also write down the complete solutions to the questions presented based on what is known and from the examples that have been made. In the inference indicator, the SCT subject can conclude based on the answers obtained and can connect it with what was asked in the question. So, it can be concluded that SCT subjects can fulfill all four indicators of critical thinking abilities. Apart from the answer sheet, the researcher conducted interviews with the subjects to clarify the results of the answers as follows:

Peneliti : *Can you explain again regarding the results of your answer?*

SCT : *It is known that Firman bought 3 t-shirts and 1 hat for 255,000, Gio bought 1 t-shirt and 2 hats for 160,000, Aldi money 150,000. Asked how many items Aldi could buy with 150,000*

Peneliti : *OK, how do you solve this problem?*

SCT : *Taking for example a t-shirt and a hat, there I took x for the t-shirt and y for the hat, then wrote it into 2 equations, namely equation 1 3x + 1y = 255,000 and equation 2 x + 2y = 160,000.*

Peneliti : *Next, what steps did you take to solve this problem?*

SCT : *Eliminate the x first, then multiply the two equations, for equation 1 times 1 you get 3x + 1y = 225 thousand, then for equation 2 times 3 you get 3x + 6y = 480 thousand. Because I eliminated x, I subtracted the two equations and the result was -5y = -225 thousand then y = -225 thousand/-5 = 45 thousand. So the price of the hat is 45,000. After getting y, I substituted it into the first equation to get 3x + 1(45,000) = 255,000*

then 3x = 255,000 - 45,000 then 3x = 210,000 to get x so x = 210,000/3 = 70,000 so the price of the t-shirt is 70,000.

Peneliti : *OK, so in conclusion?*

SCT : *In conclusion, Aldi can buy 1 hat for 45,000 and 1 t-shirt for 70,000, because the money is 150,000, the remaining money is 35,000.*

2. Medium Self-Confidence Subject

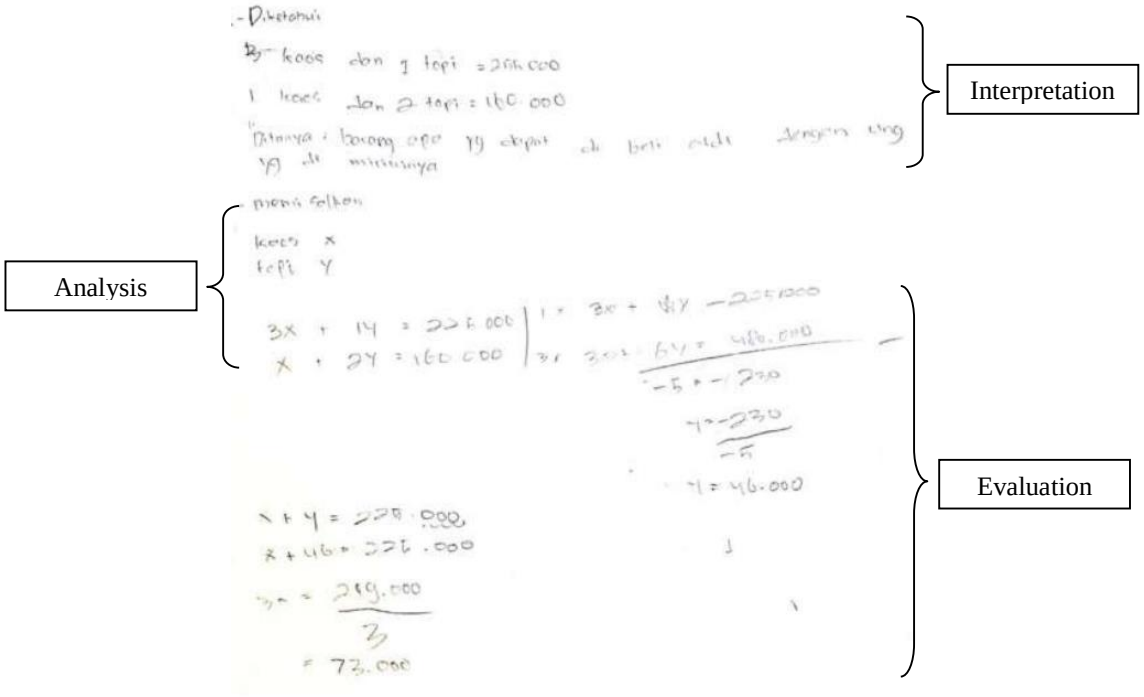

Figure 3. Medium Self-Confidence Subject Answers

Based on the results of the SCS subject's answers in Figure 2, it shows that the subject can write down what he knows and is asked about the questions presented in his own language, but it is still not complete. However, these shortcomings were conveyed during the interview, so that the subject met the interpretation indicators. The SCS subject also meets the analysis indicators, where the subject first considers what is known to form two equations. In the evaluation indicators, SCS writes down the solution steps for the problems presented. However, the answer he wrote was not accurate due to a calculation error so it did not meet the evaluation indicators. Meanwhile, in the inference indicator, the SCS subject did not conclude the results of his answer, but he added his conclusion during the interview but it was not correct so it did not meet this indicator. This is clarified through the results of interviews between researchers and subjects as follows:

Peneliti : *Can you explain again regarding the results of your answer?*

SCS : *Firman bought 3 t-shirts and 1 hat for 255,000, Gio bought 1 t-shirt and 2 hats for a total of 160,000 and was asked what items Aldi could buy with the money he had.*

Peneliti : Take a look again, is that all that is known in the question?
SCS : (silence and reading the questions again) Aldi's money Rp. 150,000.
Peneliti : OK, after that what do you do?
SCS : I for example a t-shirt with x and a hat with y and get the equation 3x + 1y = Rp. 255,000 for Firman and 1x + 2y = 180,000 for Gio.
Peneliti : OK, please explain what the next steps are?
SCS : I eliminated x by multiplying equation 1 by 1 and equation 2 by 3 because the coefficient of the variable x in equation 1 was 3 and in equation 2 was 1. Then I got the new equation 3x + 1y = 225,000 and 3x + 6y = 480,000 then subtracted and gets the value y = 46,000. After that, enter the y value in equation 1 to get the value x = 73,000
Peneliti : Are you sure that the calculations you did are correct?
SCS : Sure sis,
Peneliti : Then, what is the conclusion?
SCS : The value of x, namely the price of the t-shirt, is Rp. 73,000 and the y value is the hat price Rp. 46,000 bro.

3. Low Self-Confidence Subject

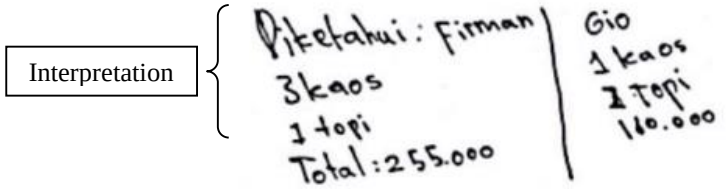

Figure 4. Low Self-Confidence Subject Answers

Figure 3 shows that SCR subjects can express the knowledge they have in the question, namely Firman and Gio's total shopping receipt. However, based on this answer, the SCR subject did not fully write down the part that was known, namely the amount of money Aldi had and the SCR subject was unable to write down what was asked in the question. However, these shortcomings were mentioned during interviews between researchers and SCR1. The following is an excerpt from an interview with the subject:

Peneliti : OK, what do you know about this problem?
SCR : Pictures a and b are pieces of receipts belonging to Firman and Gio, Aldi wants to buy 2 types of goods, and Aldi's money is IDR. 150,000.
Peneliti : Is that all that is known about the question?
SCR : No sis, this one (points to the question) sis.
Peneliti : OK, how do you explain this picture?
SCR : Image of a shopping receipt belonging to Firman who bought 3 t-shirts and 1 hat for a total of 255,000, while Gio bought 1 t-shirt and 2 hats for a total of 160,000.
Peneliti : Can you explain the meaning of your answer?
SCR : I can't, sis

According to the findings of this research, when solving AKM questions which contain indicators of critical thinking abilities, there are students who experience difficulties and there are also students who succeed in solving the questions correctly. The reason why students have difficulty solving mathematics problems well is due to a lack of critical thinking skills (Amanda & Nusantara, 2021). If students have good critical thinking skills, they can handle mathematical problems well (Maharani et al., 2019). So in solving mathematical problems, students need good critical thinking skills.

According to the research above, students' critical thinking abilities are influenced by self-confidence, such as research (Erayani et al., 2022) that there is a relationship between critical thinking skills and self-confidence because students can develop their creativity in answering all mathematical problems both in class and at home. In working on AKM questions, students who are confident can fulfill the four criteria for critical thinking abilities including interpretation, evaluation, analysis and inference. In line with research (Khoirunnisa & Malasari, 2021), The four indicators of critical thinking ability can be met by subjects with high self-confidence when solving questions. In line with proprietary research findings (Tresnawati et al., 2017), Self-confidence largely influences students' critical thinking abilities. Therefore, students who have high self-confidence can build confidence in themselves to face challenging tasks.

There are several other findings among the answers of students who have low, medium and high self-confidence. Subjects with high self-confidence wrote down the solutions to the questions given in a coherent manner. On the interpretation indicator, the subject writes down everything he knows in a coherent manner according to the question. In indicator analysis, the subject also writes in detail the mathematical example or model of what is known. In the evaluation indicator, the two subjects explained in detail the steps for solving the problem and at the inference stage, the subject was able to conclude from the results of what he had worked on.

Based on the research results above, 3 of the critical thinking indicators are met by moderate self-confidence subjects, namely interpretation, analysis, and evaluation. The findings in the subject of moderate self-confidence can be seen in the indicator analysis, where the subject in answering the question did not write an example, whereas in the question the subject wrote it completely. When answering questions, the subject is less detailed in providing explanations and observing the answers, and does not have the ability to analyze or relate the findings to the information requested in the problem. This attitude reflects that individuals who do not feel confident in their abilities tend to be reluctant to try to solve problems effectively, so they do not do it as well as possible. In other words, subjects can reach the level of critical thinking indicators if they have stronger self-confidence in their abilities. According to the results of the research (Tresnawati et al., 2017), where students who have a low level of self-confidence tend to show poor attitudes in solving problems, as a result the results obtained do not reach optimal levels.

Subjects with low self-confidence can only work on 1 indicator of critical thinking ability, namely interpretation, where they are only able to identify the information available in the problem. However, the other three indicators were not met due to a lack of thorough

understanding of the material and a lack of confidence in the answers given. According to research (Umbara & Priatna, 2022), It was concluded that students with low self-confidence usually feel unsure when working on mathematics problems. This is characterized by their habit of changing the answers they have chosen because they feel doubtful, and also because they feel embarrassed to ask the teacher when they don't understand the material being taught. Apart from that, they tend to be reluctant to express their opinions during the learning process because they are afraid of being wrong. Based on research findings (Melyana & Pujiastuti, 2020), This condition illustrates that students who lack self-confidence tend to only answer questions based on the knowledge they have, without considering clear decisions in solving problems. In the interview session, it was discovered that subjects with low self-confidence felt embarrassed when answering questions given by the researcher because they lacked confidence in expressing their opinions. Proprietary research results (Nurkholifah, et al., 2018) supports these findings by showing a positive relationship between the level of critical thinking skills and students' self-confidence. This indicates that the higher the student's level of self-confidence, the higher their critical thinking abilities, and otherwise.

D. CONCLUSIONS AND SUGGESTIONS

The conclusion obtained to answer the formulation of this research problem is that *self-confidence* Class VIII students of Muhammadiyah 2 Batu Middle School are divided into three levels, namely *self-confidence* low, medium, and high. First, subject who *self-confidence* high shows that the four indicators of critical thinking ability have been met by the subject, including *interpretation*, *analysis*, *evaluation*, and *inference*. Second, subject who *self-confidence* is showing that only two indicators of critical thinking ability are met by the subject, namely *interpretation* and *analysis*. Third, subject whose *self-confidence* is low show that only one indicator of critical thinking ability is met, namely *interpretation*. The researcher's hope is that similar research may also have to be carried out with a larger scope or more subjects than this research. In this way, further research results can be obtained related to students' self-confidence when solving AKM questions.

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