

## MATHEMATICAL CRITICAL THINKING ABILITY BASED ON STUDENT'S SELF-EFFICACY USING PHENOMENOLOGICAL STUDY APPROACH

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### Abstract

Critical thinking skills are a key skill used in thinking processes. The literature shows that students' critical thinking skills must be improved. Therefore, it is necessary to describe critical thinking ability through variables that moderate it. There is one variable related to critical thinking: self-efficacy. The existence of a significant positive relationship between self-efficacy and critical thinking indicates this. Therefore, this study aims to describe mathematical critical thinking ability based on students' self-efficacy. This study used a phenomenological approach. The researcher gave a self-efficacy questionnaire to class X students at a public high school in the Bandung city and tests on critical thinking skills, and conducted interviews with students with high self-efficacy (ST), medium self-efficacy (SS), and low self-efficacy (SR). The results show that ST belongs to high-level mathematical critical thinking skills in solving math problems. If students have high self-efficacy, so it will also have an impact on high critical thinking skills. SS is in the category of moderate-level critical thinking skills, thus showing that students with moderate self-efficacy do not necessarily have moderate-level mathematical critical thinking skills. SR cannot solve the problem correctly and completely, so students with low levels of self-efficacy have low mathematical critical thinking skills.

**Keywords:** Critical Thinking Skills, Self-Efficacy

### Abstrak

Kemampuan berpikir kritis menjadi kemampuan kunci yang digunakan pada proses berpikir. Literatur menunjukkan kemampuan berpikir kritis siswa masih perlu ditingkatkan. Oleh karenanya perlu dideskripsikan kemampuan berpikir kritis melalui variabel yang memoderatorinya. Terdapat salah satu variabel yang berkaitan dengan berpikir kritis, yaitu *self-efficacy*. Hal ini ditunjukkan dengan adanya hubungan positif yang signifikan antara *self-efficacy* dan berpikir kritis. Berkaitan dengan itu, tujuan penelitian ini untuk mendeskripsikan kemampuan berpikir kritis matematis berdasarkan *self-efficacy* siswa. Penelitian ini menggunakan pendekatan fenomenologi. Peneliti memberikan angket *self-efficacy* ke siswa kelas X di salah satu SMA Negeri di kota Bandung, dilanjutkan dengan memberikan tes kemampuan berpikir kritis, dan melakukan wawancara terhadap siswa dengan *self-efficacy* tinggi (ST), sedang (SS), dan rendah (SR). Hasil menunjukkan bahwa ST tergolong dalam kategori kemampuan berpikir kritis matematis tingkat tinggi dalam menyelesaikan soal matematika. Apabila siswa memiliki efikasi diri yang tinggi maka akan juga berdampak pada kemampuan berpikir kritis yang tinggi. SS berada pada kategori kemampuan berpikir kritis tingkat sedang, sehingga memperlihatkan bahwa siswa dengan kategori *self-efficacy* sedang belum tentu mempunyai kemampuan berpikir kritis matematis pada tingkat sedang pula. SR tidak dapat menyelesaikan soal yang diberikan dengan benar dan lengkap, sehingga siswa dengan tingkat *self-efficacy* rendah memiliki kemampuan berpikir kritis matematis yang rendah pula.

**Kata kunci:** Kemampuan Berpikir Kritis Matematis, Self-Efficacy



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## INTRODUCTION

Education must aim to educate students so they can construct their knowledge rather than remember the concepts given by the teacher. Thus, students can have higher-order thinking skills, such as self-regulation strategies, critical thinking, problem-solving, metacognitive thinking, and others. Among these abilities, critical thinking is a key ability used in most thought processes (Kozikoğlu, 2019). This is in line with Fisher's opinion in (Rositawati, 2019); along with the development of the information age, which is increasingly rapid and life is increasingly complex, the ability to think critically is seen as a basic competency that is needed to be mastered just like reading and writing.

According to Facione (2013), critical thinking skills consist of 6 aspects: interpretation, analysis, inference, evaluation, explanation, and self-regulation. This aspect will be used as an indicator of critical thinking skills in this study. Interpretation includes the sub-skills of categorizing, conveying significance, and clarifying meaning. The analysis includes testing data, detecting arguments, and analyzing arguments as a sub-skill of analysis. Evaluation means assessing the credibility of statements or representations, which are reports or descriptions of perceptions and experiences, and assessing the logical strength of inferential relationships, descriptions, or other forms of representation. Inference means identifying and obtaining the necessary elements to make reasonable conclusions, make conjectures and hypotheses, consider relevant information and conclude consequences from the data. Explanation means being able to state the results of one's reasoning and justify that reasoning from a

conceptual, methodological, and contextual perspective. Self-regulation means self-consciously monitoring one's cognitive activities and the elements used in the results obtained, especially by applying skills in analysis and evaluation for one's judgment.

Students with advanced critical thinking skills are more successful in making decisions and examining their learning processes (Gurcay & Ferah, 2018). Students' critical thinking skills differ from one another because there are several factors that influence it (Aswin et al., 2022), one variable related to critical thinking is self-efficacy (Bandura, 1997). Turan & Koç, (2018) revealed a significant positive relationship between self-efficacy and critical thinking. Hasanah et al. (2019) stated that Self-efficacy is a positive impact in the form of a decision, belief, or appreciation regarding the extent to which individuals see their ability to carry out tasks in achieving the desired results.

Tresnawati et al. (2017) found that students with high self-confidence did the problem correctly because they proved it with the correct initial idea and the correct steps were carried out. Whereas students with self-efficacy that are still relatively low and undeveloped only see mathematical problems in terms of their difficulty and do not use their abilities to previous knowledge in solving problems (Lestari et al., 2019) Thus, if students cannot develop self-efficacy within themselves, it implies they cannot solve mathematical problems with the right process, which also impacts students' critical thinking processes.

Based on the facts above, previous studies have shown a significant positive relationship between critical thinking and self-efficacy. This

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research is a form of follow-up to the results of this research, where this study aims to describe mathematical critical thinking abilities based on students' self-efficacy.

## RESEARCH METHOD

This research uses a type of phenomenological research, which means explaining the meaning of the life experiences of several people about a concept or symptom, including their self-concept or outlook on life (Creswell, 2017). The subjects of this study were even semester class X students in 2021/2022 at one of the high schools in Bandung City. The subject criteria of the research to be carried out are 3 students with high, medium and low self-efficacy.

Research data was collected using self-efficacy questionnaires, mathematical critical thinking skills tests, and interviews. Each instrument used to obtain the research data has been validated by experts. This research instrument has been validated by 2 mathematics education lecturers and 1 mathematics teacher. The self-efficacy questionnaire uses a Likert scale with four answer options, namely strongly disagree, disagree, agree, and strongly agree, ranging from 1 to 4.

Table 1. Self-Efficacy grouping criteria

| Score Range                              | Criteria |
|------------------------------------------|----------|
| $X < (\mu - \sigma)$                     | Low      |
| $(\mu - \sigma) \leq X < (\mu + \sigma)$ | Middle   |
| $(\mu + \sigma) \leq X$                  | High     |

Source: Azwar (2012)

Based on table 1, students will be grouped according to their level of self-efficacy by calculating the questionnaire scale using the successive interval (MSI) method. The test consists of 3 essay questions with the material being

tested: a system of two-variable linear equations (SPLDV). Analysis of students' critical thinking skills test can be done by using the following formula:

$$y = \frac{\text{Total score obtained}}{\text{Maximum number of scores}} \times 100 \dots (1)$$

$y = \text{Test Scores}$

Then the students' critical thinking skills are grouped based on the results of the student critical thinking skills test obtained. The grouping is based on what is used by Masrurotullaily, Hobri, and Suharto, namely, 3 levels.

Table 2. Critical thinking ability criteria

| Score Range          | Criteria |
|----------------------|----------|
| $76 \leq x \leq 100$ | High     |
| $60 \leq x \leq 75$  | Middle   |
| $0 \leq x \leq 59$   | Low      |

Source: (Masrurotullaily et al., 2013)

Table 2 is used to classify the results of students' answers by paying attention to high, medium, and low abilities. Based on the results of questionnaires and tests, three students of class X were selected, consisting of 1 student with a high level of self-efficacy, one with a moderate level of self-efficacy, and one with a low level of self-efficacy for an interview. Semi-structured interviews were used to confirm the results of problem-solving that had been done and to dig deeper into students' mathematical critical thinking abilities towards mathematics lessons, especially in the matter of systems of two-variable linear equations according to indicators of critical thinking skills. The are indicators of critical thinking skills used in this study which are indicators according to Facione, adapted by Normaya can be seen in Table 3.

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Table 3. Critical thinking ability indicators

| Indicators     | Sub-indicators                                                                                                                                                                 |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Interpretation | Understanding the problems indicated by writing known and asking questions correctly.                                                                                          |
| Analysis       | Identify the relationships between statements, questions, and the concepts in the questions shown by making the correct mathematical model and giving the correct explanation. |
| Evaluation     | Using the right strategy to solve questions with complete and correct calculations.                                                                                            |
| Inference      | Make the right conclusions.                                                                                                                                                    |

Based on Table 3, four indicators of critical thinking skills will be measured through SPLDV problems, that is interpretation, analysis, evaluation, and inference. Students fulfill the Interpretation indicator if they understanding the problems indicated by writing known and asking questions correctly, fulfill Analysis indicator if they can identify the relationships between statements, questions, and the concepts in the questions shown by making the correct mathematical model and giving the correct explanation. Fulfill Evaluation indicator if they Using the right strategy to solve questions with complete and correct calculations, and fulfill inference indicator if they Make the right conclusions.

## RESULTS AND DISCUSSION

Based on the results of student questionnaires, student test results, and interview results, the following is a description of students' mathematical critical thinking abilities with high (ST), medium (SS), and low (SR) self-efficacy.

### Mathematical Critical Thinking Ability of Students with High Level of Self-Efficacy (ST)

The data obtained from the student self-efficacy questionnaire shows that students with high self-efficacy (ST) fulfill three dimensions of self-efficacy, namely the first level dimension (level); ST will always try to solve both easy and difficult math problems with enthusiasm and never give up. In addition, they are also confident that they can complete the assigned tasks and achieve success with harder effort. Second is the dimension of strength (strength), where ST strongly believes in completing every math task the teacher gives. In addition, students feel confident in their hard work, perseverance, and ability to adapt to any given math assignment. Third, the dimension of generality makes the experience, not an obstacle but increases confidence. In this case, ST still has the confidence to succeed in doing math assignments with various models or variations of questions.

Based on the results of the mathematical critical thinking ability test by the indicators of critical thinking ability in Table 3, it is obtained:

a. The first indicator is an interpretation

In answering story questions with SPLDV material, data was obtained that ST wrote down the information on the questions, namely what was known and asked according to the context. ST writes down known and asked information using its mathematical sentences, so it's different from a complete word problem. This shows that ST has been able to understand the intent of the questions well. By making their mathematical sentences, it shows that the subject understands the problems in the problem. Langness reinforces this in (Listiwati, 2016)

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which states that students who write down information on questions using their sentences will develop their ability to understand and solve mathematical sentence problems.

In answering the questions on the critical thinking skills test on questions number 1, 2, and 3, from the data obtained, ST can write down the information contained in the story questions, namely writing down what is known and asked according to the context of the question. But in question number 3, ST had written down what was asked in the question correctly but incompletely like this: "Asked = price of each item?". The question sentence already leads to the problem, and it's different from what is in the problem. This is not a serious problem as long as students can understand the meaning of the problem in the problem precisely and clearly.

b. The second indicator is analysis

Based on the findings of the research data at the analysis stage, data was obtained that ST wrote down the concepts in questions number 1 to 3 by making a mathematical model using mathematical symbols. Apart from being able to make a mathematical model, when interviewed, ST could also explain the purpose of the mathematical model used to solve all of these problems. As stated in the analysis indicators cited by Purwati et al., (2016) that students are said to be able to analyze issues if they can connect the concepts found in the problem by using a mathematical formula model to solve the problem.

c. The third indicator is evaluation

Judging from the findings of the research data at the evaluation stage, it was found that ST was able to use the

right strategy in calculating questions 1, 2, and 3 using the mathematical model that had been made previously at the analysis stage to get the correct answer to the question. In question number 1, ST could not solve the problem using the substitution method. However, he solved the situation properly and correctly using elimination and mixed methods. ST also performs sequential and complete calculations. In the opinion of J. Butterworth and G. Thwaites, quoted by Nurjaman (2021) in their book, evaluation means assessing whether data is good or not from an argument that supports the conclusions from the data submitted. ST also performs calculations with a mathematical model according to the context of the problem so that it can be understood clearly. Supported by the opinion of Perkins & Murphy (Agoestanto et al., 2016) said that the evaluation stage is where students can make decisions by connecting arguments that contain facts from a problem.

d. The fourth indicator is inference

The findings of the data obtained by the researchers in the study show that ST in concluding the answers to questions number 2 and 3 are correct and correct according to the context of the questions. However, in question number 1 ST, the conclusion was written correctly, but it needed to be completed from what was asked in the question; as in the example in question number 1, the conclusion was: The price of 1 pen = Rp. 1,800 and 1 book = Rp. 6,500. From this conclusion, the reader can understand, but for completeness, according to the context of the problem: So, the price of 1 pen is Rp. 1,800.00, and the price of 1 book is Rp. 6,800.00. However, this is fine as long as students can conclude correctly

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using their sentences. When interviewed, ST could explain the conclusions from the answer to question number 1 correctly and completely.

All the answers in numbers 1, 2, and 3 show that ST can fulfill the four indicators of critical thinking, including interpretation, analysis, evaluation, and inference. This is in line with the research of Tresnawati et al., (2017) found that students with high self-confidence work on problems correctly, because students prove with the correct initial idea and the work steps are done correctly. This is because ST works on math test questions with full confidence and does not easily give up. According to Kusaeri in Subaidi (2016), students' self-efficacy will guide them in acting to solve the problems and tasks they face.

Based on the above analysis, overall, ST subjects have high-level mathematical critical thinking skills in solving math problems. This is in line with the opinion of Hoffman and Reiss in Agus (2021), which states that students' critical thinking abilities are supported by personality factors such as self-efficacy. By having self-efficacy in learning, students will use cognitive learning strategies by thinking critically in solving an existing task or problem. If students have high self-efficacy, it will also impact high critical thinking skills. Students with increased necessary thinking skills will be able to draw the right conclusions because they can consider the decisions they make and can be accounted for. Therefore, in learning mathematics, thinking critically is needed to solve mathematical problems, so high self-efficacy is required so that decisions are taken correctly.

### **Mathematical Critical Thinking Ability of Students with Moderate Level of Self-Efficacy (SS)**

The data obtained from the student self-efficacy questionnaire shows that students with moderate self-efficacy (SS) fulfill the three dimensions of self-efficacy but are less strong than students with high self-efficacy. This can be seen from the first level dimension, and SS emphasizes easy questions more than difficult questions. When faced with difficult questions, SS felt unsure about being able to complete the task given. Second is the dimension of strength (strength), in which SS strongly believes in its ability to complete difficult tasks. Then the three dimensions of generality where when SS gets, the experience of getting poor grades does not make students give up, but he is sure he will succeed if he studies harder. In addition, SS is also less confident in completing mathematical tasks with other models or variations.

Based on the results of the mathematical critical thinking ability test by the indicators of critical thinking ability in Table 3, it is obtained:

#### **a. Interpretation indicators**

It was found that the SS wrote down the information contained in the questions on questions number 1 to 3 quite well. SS writes information in mathematical sentences sequentially and according to the context of the problem.

#### **b. Analysis indicator**

SS is required to relate various information and facts as a mathematical model. From this analysis, SS can plan to solve the problem. As Nurjaman said in his book that one of the characteristics of critical thinking is that one can analyze, organize, and dig up

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information based on facts. In the findings of the research data, at the analysis stage, the subject SS questions numbers 1, 2, and 3 made a mathematical model, even though it was not correct.

c. Evaluation indicators

SS subjects must be able to formulate strategies and carry out the correct calculation process to get the right answers. According to Anderson in Basito et al., (2018), the evaluating category includes the learning process of observing and criticizing, involving testing for internal inconsistencies or errors in an operation or product. From the findings of the answers and interviews, SS has not been able to use the right strategy to solve the questions given but is correct in the results of calculating the answers. This can be seen from the SS subjects who needed help to use the right strategy and solve problems. It can be concluded that SS subjects still need to be able to fulfill the evaluation indicators in critical thinking correctly and completely. This is known because, according to Facione in (Putri, 2018), evaluation means using the right strategy in solving or answering questions and completing and correctly doing calculations.

d. Inference indicator

Based on the findings of the SS research at this inference stage, in answering questions number 2 and 3, the conclusions have been written correctly and completely, but the sentences need to be corrected. An example of SS's decision in number 3 is, "Then, the price of the goods Ajeng bought was Rp. 30,000 for the lips cream and Rp. 20,000 for the foundation." What should have been, "So, the price for 1 lipscream is Rp.

30,000.00, and the price for one powder foundation is Rp. 20,000.00, which was bought by Ajeng". In number 1, SS did not write a conclusion because it could not solve the problem.

From the overall answers of subjects with moderate self-efficacy in answering the questions in this study, it can be concluded that SS subjects have low critical thinking skills. It can be seen from the students' necessary thinking skills on the interpretation indicators that it is quite good; students have written down what is known correctly and completely, but what is asked still needs to be completed in the sentence. The analysis indicators have determined the relationship between information by making the mathematical model in the questions, although some still need to be quite right. For evaluation indicators, they have not been able to use the right strategy in solving the questions but have done their calculations, and the answers are correct. Likewise, for the inference stage, students have made conclusions even though they are not quite right because they do not conclude in full, only the final answer, without being equipped with an adjustment to the context in question. This is in line with research conducted by Fatihah et al., (2021), which explains that students with moderate levels of efficacy tend to have difficulty writing down known and asked information. In addition, it was also explained that even though students could write down information that was known and requested, they needed help solving questions with the right and appropriate formula.

There is a weakness in students' mathematical critical thinking skills on SS subjects, namely being in a hurry to answer questions so that they forget and are not careful, which results in several

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indicators on questions that are not written down and are still not precise in their completion. In the opinion of Zafri in Dores et al., (2020) said that what causes students to rush in answering questions such as anxiety is the emotional condition of students, which is marked by fear and worry or anxiety that it can harm them. Anxiety has two characteristics, namely (1) constructive anxiety is characterized by the motivation to learn and make changes for the better; (2) destructive anxiety is characterized by the emergence of maladaptive behavior and dysfunction related to severe anxiety/panic so that it limits a person's thinking. Therefore, SS subjects still could not solve the questions properly and correctly even though they understood the questions' intent.

These findings show that students in the moderate self-efficacy category cannot necessarily think mathematically critically at an intermediate level either. This can be seen from the results of the work and completion of critical thinking skills tests conducted by SS subjects, where there are still many things that need to be corrected in analyzing and solving the problems. So overall the ability to think critically mathematically SS subject is in the low-level category.

### **Mathematical Critical Thinking Ability of Students with Low Level of Self-Efficacy (SR)**

The data obtained from the student self-efficacy questionnaire shows that students with low self-efficacy (SR) fulfill the three dimensions of self-efficacy but are less strong than students with high and moderate self-efficacy. This can be seen from the first dimension, namely the level SR felt unsure about being able to solve the questions from the

assignments given. When faced with difficult questions, students easily get discouraged and lazy to work on them. Second is the dimension of strength, where SR has a weak belief in his ability to complete difficult tasks, SR felt unsure about being able to do difficult math problems and thought he would get a bad grade. Then the third dimension is generality, where SR needs to remember the subject matter that has been taught before. In addition, when getting experience in obtaining poor grades on assignments, SR is not confident in his ability to succeed in the next task and becomes lazy to study because his previous grades needed to be better.

Based on the results of the mathematical critical thinking ability test following the indicators of critical thinking ability in Table 3, it is obtained:

#### **a. Interpretation**

In this indicator, students can interpret if students can understand the intent of the questions. On the answer sheet, SR only wrote down known information and asked correctly and incompletely on number 1 only. For numbers 2 and 3, SR did not write down any information that was known and asked on the answer sheet. According to O'Sullivan & Dallas in (Azizah et al., 2018), students' ability to formulate problems is very effective because it relates to solving the problem and helps focus students' ideas or topics. In question number 1, SR wrote it down completely and in order, but when asked, SR wrote it down correctly, but it needed to be completed. This can be tolerated as long as the intent of what is asked can be understood by students who are known and asked on the answer sheet. According to O'Sullivan & Dallas in Azizah et al., (2018) , students'

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ability to formulate problems is very effective because it relates to solving the problem and helps focus students' ideas or topics. In question number 1, SR wrote it down completely and in order, but when asked, SR wrote it down correctly, but it needed to be completed. This can be tolerated as long as the intent of what is being asked can be understood by students.

#### b. Analysis

From the research data findings, it was found that the SR subject in question 1 could make a mathematical model that was known from the problem correctly but without explanation. For numbers 2 and 3, SR did not write down problem analysis in the questions to make a mathematical model, and when interviewed, SR was also unable to explain. A study by Azizah et al., (2018) explained that problem analysis activities aim to guide students to think more broadly and critically, provide a challenge, test mathematical abilities rather than procedural ones, and enrich learning materials. From this, the SR subject is said to have been unable to relate the concepts of related questions using a mathematical model. SR writes correctly but is incomplete. This can be tolerated as long as the intent of what is being asked can be understood by students.

#### c. Evaluation

In the opinion of J. Butterworth and G. Thwaites, quoted by Nurjaman in their book, evaluation means assessing whether data is good or not from an argument that supports the conclusions from the data submitted. From the findings of the research data, it was found that there needed to be corrected answers in carrying out the

calculations on questions 1, 2, and 3. This is because SR has not yet converted information into a mathematical model. In addition, SR was also unable to apply the right settlement strategy and calculations. The SR subject in question number 3 uses his way of logic to solve the problem. When being interviewed, the SR subject revealed that he did not know how to solve it, and the important thing was to finish it.

#### d. Inference

According to Facione in Putri (2018), inference means making conclusions by expressing the core/ideas correctly. This means students must be able to conclude a problem from the answers that have been obtained before. The research data findings explain that SR needs to be improved in making appropriate conclusions according to the context. This can be seen from the SR subject not making any conclusions in questions 1 and 2 because they forgot and were not careful because of the hasty work. This was known during the interview process. For question number 3, SR has concluded with his sentence. However, due to not using the right strategies and calculations, the answer is wrong, and the conclusions written need to be corrected.

Based on the overall answers of subjects with low self-efficacy in answering questions 1 to 3, it can be seen that students' critical thinking skills in all indicators of critical thinking still need to be carried out correctly and precisely. It can be seen from the SR subject is unable to complete the questions given correctly and completely. This is in line with Turan & Koç, (2018) revealed that there is a significant positive relationship between

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self-efficacy and critical thinking, so that students with low self-efficacy have yet to be able to involve critical thinking indicators because there are still many mistakes in the process. According to Heruman who was quoted by (Mukminah et al., 2021) in his article explaining that errors in calculations are caused by students not understanding information on questions and basic mathematical concepts. In addition, they need to be more cautious in doing the work because they want to finish quickly and be more thorough in checking the calculation process results in acquiring the final answer to the wrong question.

Students' critical thinking skills in the learning process depend on their self-efficacy. Students who have low self-efficacy will tend to solve the questions given soberly following the students' knowledge, and there is no desire to explore their knowledge, follow procedures, or rely more on memorization, so these students become weak in decision-making during the process of solving the problems they experience. The results of research conducted by Siwi & Haerudin (2019) explain that students with low levels of self-efficacy are relatively unable to understand the context of the questions properly, are less thorough in making calculations and solving problems in questions, and have not been able to conclude properly and correctly. Students with low efficacy usually need help understanding problems, cannot determine the formula to solve them, and are less thorough in solving problems (Imaroh et al., 2021). Meanwhile, Rahmawati et al., (2021) explained that students with low self-efficacy are also at a low level of thinking and problem-solving. So, in this finding, it is concluded that students

with low levels of self-efficacy also have low mathematical critical thinking skills.

## **CONCLUSIONS AND SUGGESTION**

Based on the results of the research and discussion that has been described, conclusions can be drawn are students' mathematical critical thinking ability based on self-efficacy: students with high self-efficacy have high mathematical critical thinking skills because they can fulfill the four indicators of critical thinking with a strong belief in the three dimensions of self-efficacy: the level, strength, and generality. Students with moderate self-efficacy have poor mathematical critical thinking skills because they have not been able to fulfill the four indicators of critical thinking with a less strong belief in the three dimensions of self-efficacy, namely the level dimension, the strength dimension, and the generalization dimension. Students with low self-efficacy also have low mathematical critical thinking skills because they cannot fulfill the four indicators of critical thinking with less confidence in the three dimensions of self-efficacy, namely the level, strength, and generality dimensions.

The suggestions researchers can provide for future research are efforts to increase students' self-efficacy in solving problems requiring critical thinking skills because this study found that high self-efficacy can solve problems involving all critical thinking indicators. Factors that cause students to be unable to solve problems involving critical thinking aspects also need to be studied more deeply. In addition, future researchers can look at students' critical thinking skills from other mathematics materials.

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