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# The Influence Of Mathematical Critical Thinking Skills: Motivation, Learning Model, And Learning Style

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**Abstract**

This study aims to examine the influence of motivation, learning models, and learning styles on students' mathematical critical thinking skills. Critical thinking is an essential skill in mathematics, as it helps students solve complex problems by applying logical reasoning and analysis. The importance of motivation, appropriate learning models, and personalized learning styles is crucial to fostering critical thinking abilities in students. The research uses a normative juridical approach, focusing on the relationship between educational norms and the application of different learning strategies. Data is collected through literature review, analyzing previous studies, educational policies, and theoretical frameworks related to motivation, learning models, and learning styles. The descriptive qualitative method was employed to interpret and analyze the data. The results reveal that motivation plays a significant role in enhancing critical thinking skills. Students with higher motivation levels tend to perform better in mathematical reasoning and problem-solving. Moreover, the choice of learning models impacts the development of students' critical thinking skills. Problem-based learning models, for instance, engage students in real-world problem-solving activities, thereby enhancing their mathematical reasoning abilities. Furthermore, accommodating students' individual learning styles is essential for optimizing their critical thinking potential. Visual learners, for example, may excel in analyzing diagrams and charts, while auditory learners might benefit from verbal explanations. In conclusion, the findings suggest that motivation, learning models, and learning styles are all significant factors that influence students' mathematical critical thinking skills. Educators should focus on creating an engaging learning environment that fosters motivation, employs diverse learning models, and adapts to different learning styles to enhance students' critical thinking abilities in mathematics. These efforts will lead to improved academic performance and better problem-solving skills among students.

## I. INTRODUCTION

Education is an effort or activity consciously, regularly, and systematically carried out by humans to develop the potential of human resources (Maharani & Chotimah, 2023). Mathematics is a mandatory and important subject needed by students because mathematics is the mother of all subjects in school. Mathematics is closely applied in daily life, such as paying for groceries, measuring height, etc. However, in reality, some students do not enjoy studying mathematics and consider it difficult, resulting in low mathematics scores in class.

One of the internal factors supporting learning is critical thinking skills (Nizan et al., 2023). Students are required to understand school lessons, especially in mathematics, which is associated with numbers and formulas, making critical thinking essential for solving mathematical problems. Many factors influence a person's critical thinking ability, including motivation, learning models, and learning styles (Ismiati et al., 2021).

Critical thinking is a directed and clear process used in mental activities and reasoning such as problem-solving, decision-making, analyzing, assuming, researching, processing information, evaluating, and effectively communicating reasoning. Motivation is an internal and external factor (Fauziah & Kuntoro, 2022). When someone has high motivation, they are enthusiastic about learning, make maximum efforts, allocate more time for study, take responsibility, and are confident in answering questions, which leads to persistence. The greater the motivation, the better the critical thinking skills.

Learning models help overcome a lack of thinking skills and serve as solutions in the

teaching process of mathematics (Djarwo, 2020). Flexible learning models can encourage students who are less interested in mathematics, train them to learn independently, be responsible, and be confident, thereby increasing focus and yielding positive results in student achievement. Effective learning models lead to significant improvements in mathematical critical thinking skills (Sudiarta et al., 2021).

Learning style refers to a unique and consistent way in which students absorb and process acquired information (Supit et al., 2023). Difficulty in learning often stems from a lack of understanding of one's learning style. Therefore, learning style is a crucial factor in influencing student learning, as each student has different abilities in receiving and processing information, whether from abstract to concrete.

Based on previous research on the influence of mathematical critical thinking ability: motivation, learning models, and learning styles, several findings can be applied to this article: Research titled "The Influence of Learning Style on Students' Mathematical Critical Thinking Ability in Solving Trigonometry Problems" found no significant influence of learning style on students' mathematical critical thinking ability. There was no difference in learning styles between visual, auditory, and kinesthetic students. The slight differences in student scores suggest that no single learning style dominates mathematical critical thinking skills. Teachers may focus on strategies that target students with visual, auditory, and kinesthetic learning styles. With a better understanding of student learning styles, strategies, methods, approaches, and teaching techniques can be identified and improved to develop mathematical critical thinking skills and other essential abilities. Further research based on these results is needed.

Research titled "The Influence of Emotional Intelligence and Learning Motivation on Mathematical Critical Thinking Ability" found a significant influence of emotional intelligence and learning motivation on mathematical critical thinking skills. Additionally, emotional intelligence significantly affects mathematical critical thinking, as does learning motivation.

Research titled "Improving Critical Thinking Ability and Student Achievement Motivation by Applying the Discovery Learning Model in High School" found that applying the Discovery Learning model led to an improvement in students' mathematical critical thinking ability and achievement motivation, showing better results than expository learning.

Thus, based on previous research findings and real-world facts, when someone has strong motivation, an appropriate learning model, and an optimal learning style, their mathematical critical thinking ability improves, resulting in higher mathematics scores. This is crucial for teachers, students, and parents to understand how learning styles, learning models, and motivation influence critical thinking in mathematics. The title of this research is "The Influence of Mathematical Critical Thinking Ability: Motivation, Learning Models, and Learning Styles."

## II. RESEARCH METHODS

The research method used for the study titled The Influence of Mathematical Critical Thinking Skills: Motivation, Learning Model, and Learning Style, is a descriptive qualitative approach and literature study. This type of research focuses on analyzing and describing the influence of various factors, such as motivation, learning models, and learning styles, on students' mathematical critical thinking skills. The descriptive qualitative approach is chosen to gain an in-depth understanding of how these factors interact and affect students' learning processes in mathematics. Data will be collected from various scholarly sources, journals, books, and relevant studies. The literature study method will be employed to review and analyze existing research, theories, and findings to form a comprehensive discussion and conclusion. This approach will allow for a thorough examination of the relationship between critical thinking, motivation, learning models, and learning styles, offering valuable insights into improving mathematical learning outcomes.

## III. RESULTS AND DISCUSSION

### A. The Influence of Motivation on Critical Thinking Skills

The influence of motivation on critical thinking skills is that when motivation is strong, critical thinking skills will also improve (SADIKIN, 2022). If a student perceives a math task as difficult and gives up easily, it is often due to low learning motivation, which hinders the development of their critical thinking abilities. It can be concluded that there is a clear influence between learning motivation and critical thinking skills. One of the factors affecting critical thinking skills is the motivation to learn. The higher the motivation a person has, the better their critical thinking skills

will be. This has been proven by research results, which show a correlation between learning motivation and mathematical critical thinking skills.

### B. The Influence of Learning Models on Critical Thinking Skills

Mathematical critical thinking skills influence the learning process (Rohmat & Lestari, 2019). Therefore, these skills must be continuously developed. Critical thinking skills can be taught by incorporating practical sessions. Students can build their mathematical critical thinking skills by practicing rational thinking and solving real-world problems. Additionally, the development of students' critical thinking abilities can be enhanced by implementing interactive learning processes. As a result, teachers must create interactive learning environments by applying appropriate teaching approaches. Students who engage in learning activities with specific learning models enjoy studying mathematics because they are frequently involved in the learning process and can solve problems using various methods and approaches.

Research findings also demonstrate that students' experiences significantly improve after participating in problem-based learning models. This shows that the learning model has a positive impact on students' mathematical critical thinking skills.

### C. The Influence of Learning Styles on Critical Thinking Skills

If the criteria for mathematical critical thinking align with how individuals absorb and process information, students' abilities in these aspects will improve. There is no difference among students if the learning process accommodates each student's learning style. Each learning style group has its own way of absorbing and processing information. Similarly, critical thinking skills vary, with each aspect having its own problem-solving criteria (Lestari et al., 2019). Low problem-solving abilities indicate that students' critical thinking skills are still underdeveloped. This is because mathematical reasoning, conceptual understanding, and problem-solving strategy mastery are essential aspects of critical thinking skills.

These critical thinking skills can be enhanced by examining and critiquing one's reasoning process (Wiryanto et al., 2021). Students with an auditory learning style can extract relevant information or knowledge from problems to help them solve the issue, identify ideas for problem-solving, but they may still struggle to fully express these ideas, limiting their ability to evaluate them effectively. Auditory learners often face challenges when learning involves complex formulas and calculations.

In contrast, students with a kinesthetic learning style can generate multiple correct solutions and methods for problem-solving, excelling in finding effective ways to address problems. Visual learners, on the other hand, can neatly and systematically express their ideas based on their knowledge and the information they receive, allowing them to solve and answer problems efficiently (DIKDAS, 2021). They can analyze and organize information, making them capable of solving high-level thinking problems with precise solutions. If this is the case, visual learners possess greater critical thinking skills, and there is indeed an influence between learning styles and mathematical critical thinking abilities.

### D. The Influence of Motivation, Learning Model, and Learning Style on Critical Thinking Skills

Based on the research results, it was found that there is an influence between motivation, learning models, and learning styles on students' mathematical critical thinking skills. This indicates that each learning model and learning style applied to students, whether they have high, medium, or low learning motivation, has a significant impact on their mathematical critical thinking abilities. Although the learning models and styles applied may differ in each class, the overall goal remains the same: to enhance students' mathematical critical thinking skills.

## IV. CONCLUSION AND SUGGESTIONS

### A. Conclusion

Critical thinking in mathematics learning refers to the way students solve mathematical problems. This can be seen from students' low scores in mathematics. Therefore, applying critical thinking to mathematics learning through motivation, learning models, and learning styles improves students' performance in mathematics. Mathematics is a subject closely associated with numbers and formulas, requiring critical thinking skills to solve mathematical problems. Many factors influence a person's critical thinking ability, including motivation, learning models, and learning styles. The conclusion drawn is that there is a significant influence between motivation, learning models, and learning styles on students' mathematical critical thinking skills. This

indicates that each learning model and learning style applied to students, whether they have high, medium, or low motivation, significantly affects their mathematical critical thinking skills. Although the learning models and styles applied may vary in each class, the common goal remains the same: to enhance students' mathematical critical thinking abilities.

**B. Suggestion**

Based on the conclusion, it is recommended that educators focus on enhancing students' motivation, applying effective learning models, and accommodating diverse learning styles to improve their mathematical critical thinking skills. Teachers should strive to implement engaging, interactive learning models that stimulate critical thinking, regardless of students' motivation levels. Additionally, recognizing and adapting to different learning styles visual, auditory, or kinesthetic can ensure that all students benefit from the teaching process. Continuous assessment of students' progress in critical thinking and tailored support will further help maximize their potential in mathematics.

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