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Strategic Factors That Influence Critical Thinking Ability in Mathematics Learning in Elementary Schools

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Abstract

Mathematical critical thinking skills are a person's ability to understand the thought process to achieve rational thinking to do something or believe in what should be done. Many factors influence students' critical thinking abilities, including physical condition, motivation, intellectual development, anxiety, and habits. This research aims to determine and analyze the factors influencing critical thinking abilities in mathematics learning. This type of research is quantitative research with a survey method. The population in this study were all fifth-grade elementary school students in Kartasura District, taking two schools as research samples. The number of samples in this research was 200 students selected using purposive sampling. Data collection techniques in this research used instruments consisting of (1) a physical condition questionnaire, (2) a motivation questionnaire, (3) an anxiety questionnaire, (4) a habits questionnaire, (5) intellectual development questionnaire, and (6) a thinking ability questionnaire critically. The data analysis used was Structural Equation Modeling (SEM) using the Smart AMOS 23 computer program. The results of this study showed that 1) physical condition and intellectual development had a significant effect on anxiety, 2) physical condition, motivation, and intellectual development had a significant effect on habits, and 3) habits and anxiety have a significant effect on critical thinking. Meanwhile, motivation has no significant effect on anxiety. Based on the research results, it can be concluded that physical condition, motivation, intellectual development, anxiety, and habits influence students' critical thinking abilities.

Keywords: Strategic Factors, Critical Thinking, Mathematics Learning

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INTRODUCTION

Education is a process of individual personality development that cannot be separated from teaching and learning activities (Erwiza et al., 2019). The teaching and learning process that develops in schools, especially in the classroom, is generally determined by the roles of teachers and students as directly involved individuals. Active student involvement in the teaching and learning process at school is primarily determined by the teacher's teaching ability (Aswin et al., 2022). It is now time for education that views students only as objects of education to be eliminated. Learning today must be centered on students, not teachers. Teachers are emphasized as playing a more important role as students' companions, or in other words, teachers are facilitators for students (Amalia et al., 2021).

In this case, the teacher must present learning strategies to provide guarantees for achieving learning objectives. Teachers do not only present material but must involve students in critical thinking in learning. Teachers must choose effective learning strategies and models (Akmam et al., 2019). The learning model is an approach teachers use to carry out an appropriate and efficient learning process planned to achieve learning

objectives (Sutama et al., 2022). Teachers as educators have an essential role in developing students' critical thinking processes because they can improve students' cognitive abilities and thinking power. The ability to think critically must be cultivated from an early age because educating students to think critically develops children to defend themselves from the attacks of information around them actively. Children's critical thinking abilities lead them to make appropriate, careful, systematic, and logical decisions (Hafni et al., 2019).

Dewi et al. (2020) previously researched critical thinking skills titled "Critical thinking abilities of elementary school students in Thailand in mathematics education." The results of the research showed that students' mathematical critical thinking skills were best in reading time in the form of an analog clock, namely 72%; on the subject of the difference between day and nighttime signs, 63%; while the question of drawing signs of day and night was 51%. This research concludes that the mathematical problem-solving abilities of 3rd-grade elementary school students in Thailand are not optimal. The results of this research provide information regarding mathematical problem-solving abilities in elementary schools that still need to be improved. Meanwhile, this research was conducted by Mahmood and Othman (2020) and was titled "Practices of Learning Styles and Critical Thinking of Students in Malaysia." The research results show a moderate and significant relationship between learning style practices and students' critical thinking. The analysis also shows that emotional, physical, psychological, and environmental dimensions contribute to students' thinking in Form Six Colleges across Malaysia. Previous research examined how the learning styles and critical thinking abilities of each child in Malaysia are different and are still relatively low. In contrast, the children's critical thinking abilities in Thailand are not yet optimal and need improvement. The novelty of this research is that the researcher wants to research the analysis of factors that influence students' critical thinking abilities that have never been studied before.

Along with the times, increasingly rapid technological advances require education to continue to develop and produce high-quality Human Resources (HR) who can think critically, creatively, and systematically, solve problems, and have good morals (Narimo et al., 2020). Critical thinking skills are critical because critical thinking can be used to solve problems and to make correct decisions (Fernanda et al., 2019). Critical thinking is a process of reasoned decisions about what to believe and do. One of the subjects that can train critical thinking skills is mathematics. Through learning mathematics, students are expected to have the ability to think logically, analytically, systematically, critically, and creatively and work together (Sutarni & Gatiniggsih, 2022).

Mathematics needs to be given to students from elementary school as a condition for developing science and technology (Kurniawati & Ekayanti, 2020). Apart from that, Mathematics is needed to equip students to become independent learners and able to overcome problems that arise in life. Therefore, implementing mathematics learning is not enough to provide rote information in the form of rote theories or concepts; it needs to be oriented toward developing the skills needed for problem-solving. Purnama (2022) stated that students must have problem-solving skills because learning is memorizing information and solving problems. Apart from that, Mathematics will be a meaningless lesson for students if they cannot implement mathematical concepts into the context of everyday life (Sutama et al., 2022).

Critical thinking skills are students' cognitive processes in systematically and explicitly analyzing problems, distinguishing them carefully and thoroughly, and identifying and reviewing information to plan problem-solving strategies (Hillary et al., 2023). This opinion is reinforced by (Sucianti, 2019), who explains that critical thinking is deeply reflective in decision-making and problem-solving to analyze situations,

evaluate arguments, and draw appropriate conclusions. People who think critically can conclude what they know, know how to use information to solve problems, and look for relevant sources to support problem-solving (Sidiq et al., 2021). Based on the explanation above, critical thinking skills are essential to solving problems.

The application of critical thinking skills in learning is critical. Research shows that critical thinking in Mathematics learning can improve student achievement (Makhrus & Hidayatullah, 2021). Palinussa et al. (2023) stated that critical thinking is crucial in learning. There are two phases in this process. First, students build their minds through basic ideas, principles, and theories inherent in the content. This phase is called internalization. The second phase occurs when students effectively use these ideas, principles, or theories in life as a form of application. Meanwhile, several characteristics of students who can think critically are explained by Khotimah et al. (2023) as follows: (1) able to understand the logical relationship between ideas, (2) able to formulate ideas concisely and precisely, (3) able to identify, build and evaluate arguments, (4) able to evaluate decisions, (5)) able to evaluate evidence and able to hypothesize, (6) able to detect inconsistencies and common errors in reasoning, (7) able to analyze problems systematically; (8) able to identify the relevance and importance of ideas, (9) able to assess a person's beliefs and values, and (10) able to evaluate a person's thinking abilities.

However, the critical thinking skills of Indonesian students are still poor. The 2015 Trends in International Mathematics and Science Study (TIMSS) results show that Indonesian students' Mathematics scores are 45th out of 50 countries. The ability of Indonesian students to work on questions in the reasoning domain also shows that their abilities are still very minimal (Kemendikbud, 2019). Referring to these findings, implementing Mathematics learning in elementary schools should not only require students to answer questions correctly but should encourage students to come up with new ideas. Apart from that, the OECD PISA results (2022) also show that students' thinking abilities in our country are still at a low level; Indonesia is ranked 68th with a score in math (379), science (398), and reading (371). This problem occurs because the content and learning process do not explore students' high-level thinking skills (Amalia et al., 2021). Several relevant studies, such as those conducted by Liwaul et al. (2022), stated that students' critical thinking abilities at the junior high school level, especially in quadratic function material and flat-sided geometric figures, are still relatively low.

Based on the results of observations and interviews with elementary school mathematics teachers in Kartasura District show that students' mathematical critical thinking abilities are still relatively low. The low critical thinking ability of students is caused by several factors, including students' lack of concentration and not focusing on the learning delivered by the teacher; in the learning process, students must be encouraged by the teacher himself to ask questions, students are more silent, sitting, listening, taking notes, and memorize so that teaching and learning activities become less exciting and enjoyable. When students work on math problems given by the teacher, many still cannot understand the meaning of the problem and how to solve it. Students do not understand the concept of solving the problem given by the teacher and are less able to solve the problem on the problem given. The level of students' reasoning is also still insufficient. Teachers also still tend to use conventional methods during mathematics learning.

However, this does not mean that students' low thinking abilities are only caused by students' low thinking abilities due to their low intelligence but are also influenced by other factors (Sirait, 2019). A student's physical condition also influences his readiness to accept learning and be able to think well. Students' good physical or health condition encourages good memory and thinking skills. Apart from that, the anxiety experienced by students in facing the learning process also influences it. Students who are always

anxious tend to lack concentration, resulting in weak thinking abilities. The habit of repeating the material taught is also essential. Also, without motivation, it is tough to improve critical thinking skills. Apart from that, according to Piaget's cognitive theory for elementary school children aged 7-8 and 9-14 who are in the concrete operational period, teachers are required not only to be able to convey the material but the way the teacher conveys the material must also be considered, teachers are required to be innovative and capable. Creating a pleasant learning atmosphere so that students can accept the material and not get bored because teachers use monotonous learning (Oktaviasari & Khotimah, 2023). The factors stated are what influence a person to be able to think critically (Ahdiyenti et al., 2022).

Based on the description above, it can be concluded that critical thinking ability is a crucial ability that students should have. However, this does not mean that students' low thinking abilities are only caused by students' low thinking abilities but are also influenced by other factors. Based on the background of the problem above, this research aims to analyze what factors influence the critical thinking abilities of fifth-grade elementary school students in Kartasura District.

METHODS

By the problem formulation, the appropriate type of research is quantitative with a survey design. This research consists of one endogenous latent variable (Ennis, 2018) and five exogenous latent variables (Rubenfeld & Scheffer, 2019). Where critical thinking ability (Y) is an endogenous latent variable (dependent variable), while physical condition (X1), motivation (X2), intellectual development (X3), anxiety (X4), and habits (X5) are exogenous latent variables (Independent variable). The design of variable relationship patterns in this research can be seen in Figure 1.

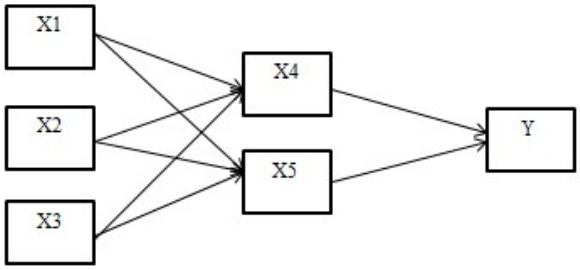

Figure 1. Design of a Variable Relationship Pattern

Measurement of physical condition variables uses indicators such as healthy body condition, including students not getting tired easily, not getting sleepy quickly, and the health of the five senses, especially the eyes and ears. The measurement of intellectual development variables uses indicators such as curiosity, independence in thinking, and the ability to solve problems. Measuring motivation variables uses indicators such as a solid will to act, tenacity in facing difficulties, and being able to defend one's opinion. The measurement of anxiety variables uses indicators such as cognitively; students have difficulty concentrating motorically, students feel nervous, and somatically physical reactions due to nervousness such as breathing problems, sweating, and so on. Measuring critical thinking variables uses indicators such as providing simple explanations (*elementary clarification*), building essential skills (*basic support*), making conclusions (

inferring), making further explanations (*advanced clarification*), and organizing strategies and tactics (*strategies & tactics*).

This research was conducted at a class V elementary school in Kartasura District, Sukoharjo Regency, Central Java Province. The sampling method used in this research is *purposive sampling*, namely sampling based on considerations where the sample is selected based on specific criteria. The research population was from fifth-grade elementary school students in Kartasura District. According to Hair et al. (2019), at least five times the number of indicator questions in the research questionnaire. The number of questions in each questionnaire consists of 5 questions. The number of indicators used in this research is 30, so the sample size is 30 times 5 or 150 respondents, so the research sample size is 200 respondents, which has exceeded the minimum limit. This research used six instruments: physical condition, motivation, anxiety, habits, intellectual development, and students' critical thinking abilities.

Data collection techniques in this research include observation, interviews, and questionnaires on physical conditions, motivation, anxiety, habits, intellectual development, and students' critical thinking abilities. The questionnaires are packaged and then distributed to students.

Data analysis in this research uses *Structural Equation Modeling* (SEM) analysis, which analyzes the model as a path equation (Wayudi et al., 2020). The series of data processing processes includes model testing and measurement, including validity and reliability. In contrast, structural model testing includes testing the significance of the influence of exogenous latent variables on endogenous latent variables.

RESULTS & DISCUSSION

Result

Validity and Reliability Test

For the results of this research to be representative, a validity analysis must be carried out. A validity test is a measure that shows the level of validity of an instrument in research. This research uses *Confirmatory Factor Analysis* (CFA) in the AMOS program. CFA tests the indicators (questionnaire statements) ability to inform a variable. The validity of each indicator is seen from the size of *the loading factor.* The instrument is valid if the loading factor is ≥ 0.50 (Ghozali, 2017). Based on the validity test using CFA AMOS, 1 of the five variable indicators of physical condition, motivation, anxiety, habits, and intellectual development was declared invalid and had to be discarded because the indicators PC3, M2, ID2, W3, and H1 had a value (factor loading < 0.50) so that these indicators must be excluded from the model (reduction) and retesting will be carried out on indicators that have a value above 0.5. Meanwhile, the remaining four indicators each have a value (factor loading > 0.5), so the indicators can be declared valid and used for further testing.

Table 1 shows that each variable's construct reliability (CR) value is greater than 0.70, and the *Average Variance Extracted* (AVE) value is more significant than 0.50. This means that the latent variables in this research are reliable and can be tested using the SEM model.

Table 1. Reliability Test

Variable	CR	Cut of Value	AVE	Cut of Value	Information
Physical condition	0.856	> 0.70	0.600	> 0.50	Reliable
Motivation	0.813	> 0.70	0.521	> 0.50	Reliable
Worry	0.815	> 0.70	0.525	> 0.50	Reliable
Habit	0.831	> 0.70	0.552	> 0.50	Reliable
Intellectual Development	0.838	> 0.70	0.552	> 0.50	Reliable
Critical thinking	0.915	> 0.70	0.682	> 0.50	Reliable

SEM Assumption Test
Creating a Theoretical Based Model

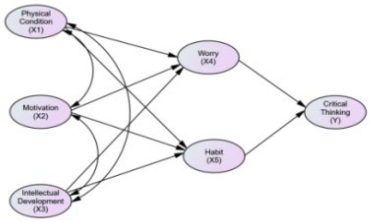

Figure 2. Conceptual Model

In Figure 2, the model generally consists of 5 independent and one dependent variable. The independent variables are physical condition, motivation, intellectual development, anxiety, and habits. Meanwhile, the dependent variable is critical thinking.

Path Diagram Development

The theoretical model that has been created is then depicted in a path diagram to make it easier for researchers to see the causal relationships that they want to test. A path diagram is a visual representation of a model that describes all the relationships between the variables (Pamungkas et al., 2019). Path Diagram development can be seen in the figure 3.

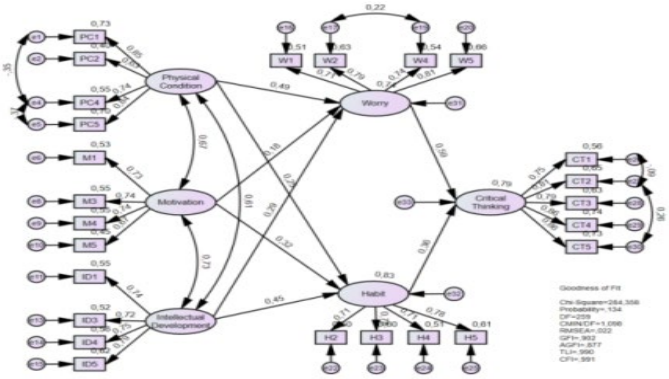

Figure 3. SEM Analysis Results

Composing Structural Equations Converting Path Diagrams into Structural Equations

Table 2. Recapitulation of Structural Equations

	Intellectual Development	Motivation	Physical Condition	Worry	Habits
Worry	,292	,184	,495	-	-
Habits	,451	,325	,250	-	-
Critical_Thinking	-	-	-	,587	,358

Figure 3 and Table 2 show the strength of the relationship between the variables used in this research, where each variable has a positive influence.

Matrix Input and Structural Equations

The input matrices used are covariance and correlation. The estimated model used is the maximum *likelihood* (ML) estimate; the ML estimate has been met with the following assumptions:

Sample Size

The number of data samples meets SEM assumptions, namely a minimum of 150 data, and corresponds to the recommended amount of data, namely 200 data.

Data Normality

The normality test was carried out by comparing the CR (critical *ratio)* value in *the assessment of normality* with a critical value of ± 2.58 at the 0.01 level. The normality tests that have been carried out show that most *univariate normality tests* have a normal distribution because the critical ratio (CR) values for kurtosis and skewness are in the range of ± 2.58. Based on the evaluation results, it can be concluded that the *multivariate* model is usually distributed with a critical value of 1.306, which is below 2.58.

Assessing *Goodness Criteria of Fit*

Assessing *the goodness of fit is the main goal in SEM, which is to determine to what extent the hypothesized model "Fits*" or fits the data sample. *The goodness of fit's* results are displayed in the figure 4.

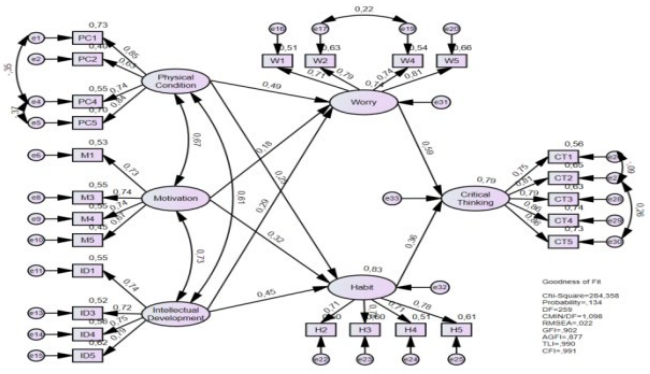

Figure 4. Structure of *the Goodness of Fit Model*

Table 3. Results of *Goodness of Fit Testing* on the Structural Model

Goodness Of Fit Index	***Cut off Value***	**Results**	**Criteria**
Absolute Fit Measure			
Chi-Square	< 297,538	284,358	Good Fit
Probability	> 0.05	0.134	Good Fit
CMIN/DF	< 2	1,098	Good Fit
GFI	≥ 0,90	0,902	Good Fit
AGFI	≥ 0,90	0,877	Marginal Fit
RMSEA	≤ 0,08	0,022	Good Fit
TAG	≥ 0,90	0,990	Good Fit
CFI	≥ 0,90	0,991	Good Fit

From Table 3. above, the results of the recapitulation of the food model determination test can be seen that the chi-square value is 284.358 < 297.538 (Attachment Chi Square Table), the probability value (p-value) is 0.134 (p > 0.05), including the excellent category. *Fit*), the CMIN/DF value of 1.098 is less than 2, which is included in the excellent category (*good fit)*, the GFI value is 0.902 more than 0.90, this result is included in the excellent category (*good fit)*, the AGFI value is 0.8 77 is more than 0, 8 0 and less than 0.90, these results are included in the relatively good category (*marginal fit*), and the RMSEA value of 0.0 2 2 is less than 0.08, included in the excellent category (*good fit*), overall The *absolute fit measure* value is good (*good fit*). Furthermore, a CFI value of 0.991 above 0.90 is included in the excellent category, *and a TLI or NNFI value of 0.990 is more than 0.90, including a* good *fit*. This way, the model is declared fit with the existing data, and hypothesis testing can be carried out. Hypothesis testing is done by looking at the output's critical ratio (CR).

Structural Equation Modeling (SEM) Results
Partial Test

Table 4. Hypothesis Testing of the Effect of Exogenous Variables on Endogenous

			Estimate	**S.E**	**CR**	**P**	**Label**
Worry	<---	Physical_Condition	,385	,070	5,509	***	par_20
Habits	<---	Motivation	,268	,086	3,114	,002	par_21
Habits	<---	Intellectual_Development	,472	,103	4,565	***	par_22
Habit	<---	Physical_Condition	,192	,059	3,264	,001	par_23
Worry	<---	Motivation	,153	,088	1,736	,083	par_24
Worry	<---	Intellectual_Development	,308	,103	3,003	,003	par_25
Critical_Thinking	<---	Habits	,388	,105	3,682	***	par_26
Critical_Thinking	<---	Worry	,630	,115	5,490	***	par_27

Partial testing looks at the CR value and p-value for each independent variable (exogenous latent) against the dependent variable (endogenous latent). Based on Table 4.,

the test can be partially explained as follows:

1. Partial physical conditions have a significant influence on anxiety. This can be seen in the CR value of 5.509, which is greater than 1.96 (5,509 > 1.96), and the *p-value* is less than α (0.000 < 0.05). Then H_0 is rejected, and H1 is accepted. So, $H2_1$ in this study is accepted.
2. Physical conditions partially have a significant influence on habits. This can be seen in the CR value of 3.264, which is greater than 1.96 (3.264 > 1.96), and the *p-value* is less than α (0.001 < 0.05). Then H_0 is rejected, and H_1 is accepted. So, $H2_1$ in this study is accepted.
3. Motivation partially does not have a significant effect on anxiety. This can be seen in the CR value of 1.736, which is smaller than 1.96 (1.736 < 1.96), and the *p-value* is more significant than α (0.083 > 0.05). So, H_0 is accepted, and H_1 is rejected. So, $H2_1$ in this study is rejected.
4. Motivation partially has a significant influence on habits. This can be seen in the CR value of 3.114, which is greater than 1.96 (3.114 > 1.96), and the *p-value* is less than α (0.002 < 0.05). Then H_0 is rejected, and H_1 is accepted. So, $H2_1$ in this study is accepted.
5. Partial intellectual development has a significant influence on anxiety. This can be seen in the CR value of 3.003, which is greater than 1.96 (3.003 > 1.96), and the *p-value* is less than α (0.003 < 0.05). Then H_0 is rejected, and H_1 is accepted. So, $H2_1$ in this study is accepted.
6. Partial intellectual development has a significant influence on habits. This can be seen in the CR value of 4.565, which is greater than 1.96 (4.565 > 1.96), and the *p-value* is less than α (0.000 < 0.05). Then H_0 is rejected, and H_1 is accepted. So, $H2_1$ in this study is accepted.
7. Partial anxiety has a significant influence on critical thinking. This can be seen in the CR value of 5.490, which is greater than 1.96 (5.490 > 1.96), and the *p-value* is less than α (0.000 < 0.05). Then H_0 is rejected, and H_1 is accepted. So, $H2_1$ in this study is accepted.
8. Partial habits have a significant influence on critical thinking. This can be seen in the CR value of 3.682, which is greater than 1.96 (3.682 > 1.96), and the *p-value* is less than α (0.000 < 0.05). Then H_0 is rejected, and H_1 is accepted. So, $H2_1$ in this study is accepted.

Discussion

The Influence of Physical Conditions on Critical Thinking Ability in Mathematics Learning

Physical condition is humans' most basic physiological need to live life. When a student's physical condition is disturbed, while the student is faced with a situation that requires mature thinking to solve a problem, conditions like this affect the student's mind; students can concentrate and think quickly because their body does not allow them to react to existing responses. Physical conditions that can influence students' critical thinking abilities include healthy body conditions, including students not getting tired easily, not getting sleepy quickly, and their five senses, especially the eyes, and ears, being healthy.

Based on the results of hypothesis testing, it is known that the physical condition variable has an influence on students' critical thinking abilities through the anxiety variable with a CR of 5.509 > 1.96 and the *p-value* is less than α (0.000 < 0.05), which means that physical condition has a significant influence on a person's critical thinking ability. Poor physical condition can affect student anxiety, so students' critical thinking

abilities become low. Poor health conditions such as illness, fatigue, or stress can cause anxiety in students during learning. Poor nutritional intake can affect brain performance and reduce critical thinking abilities, so students become anxious. Getting enough rest ensures the brain works optimally and maintains critical thinking abilities. This is in line with those who say that the better the student's physical condition, the better the student's critical thinking ability; conversely, the worse the student's physical condition, the lower the student's critical thinking ability.

Meanwhile, the results of the hypothesis test of the physical condition variable have an influence on students' critical thinking abilities through the habit variable with a CR of 3.264 > 1.96 and a *p-value* of less than α (0.001 < 0.05), which means that physical condition has a significant influence on a person's critical thinking ability. Based on the results of hypothesis testing, it can be concluded that healthy physical conditions can influence students' habits so that students' critical thinking abilities increase. Good health conditions can foster good habits, influencing students' critical thinking abilities. This aligns with the opinion that the higher a student's study habits are, the more the student's critical thinking abilities will increase, and vice versa. If the student's study habits are lower, the student's critical thinking abilities will be lower.

The Influence of Motivation on Critical Thinking Ability in Mathematics Learning

Motivation is an urge that arises in a person consciously or unconsciously to act with a specific goal (Akmam & Hidayat, 2019). Motivation that can influence students' critical thinking abilities is students' strong will to act, being tenacious in facing difficulties, and being able to defend their opinions.

Based on the results of hypothesis testing, it is known that the motivation variable has an influence on students' critical thinking abilities through the habit variable with a CR of 3.114 > 1.96 and a *p-value* of less than α (0.002 < 0.05), which means that motivation has a significant influence on a person's critical thinking abilities. Based on the results of hypothesis testing, it can be concluded that high student motivation can influence student habits so that students' critical thinking abilities increase. This is in line with the opinion of Amalia et al. (2021) that the higher the student's motivation, the better the student's critical thinking ability; conversely, the lower the student's motivation, the lower the student's critical thinking ability. Therefore, teachers and parents must motivate students and build their interest in mathematics to help them maintain or improve their critical thinking skills.

Meanwhile, the results of hypothesis testing show that the motivation variable has no influence on students' critical thinking abilities through the anxiety variable with a CR of 1.736 < 1.96 and a *p-value* more significant than α (0.083 > 0.05), which means that motivation does not have a significant influence on a person's critical thinking ability through anxiety.

The Influence of Intellectual Development on Critical Thinking Ability in Mathematics Learning

Intellectual development is a process or stage of growth that a person goes through toward becoming more advanced in knowledge, intelligence, and the ability to think. Intellectual development that can influence students' critical thinking abilities is curiosity, independence in thinking, and the ability to solve problems.

Based on the results of the hypothesis test, it is known that the intellectual development variable has an influence on students' critical thinking abilities through the anxiety variable with a CR of 3.003 > 1.96), and the *p-value* is less than α (0.003 < 0.05) which means that intellectual development has a significant influence on a person's critical thinking ability. Based on the results of hypothesis testing, it can be concluded

that students' low intellectual development can influence student anxiety, so students' critical thinking abilities become low. This is in line with the opinion of et al. (2021), who say that students with low intellectual development cannot understand the lesson material quickly and understand the questions given.

Meanwhile, the results of the hypothesis test for the intellectual development variable have an influence on students' critical thinking abilities through the habit variable with a CR of 4.565 > 1.96 and a *p-value* of less than α (0.000 < 0.05), which means that intellectual development has a significant influence on a person's critical thinking ability. Based on the results of hypothesis testing, it can be concluded that high intellectual development can influence students' habits so that students' critical thinking abilities increase. This is in line with those who say that the better the student's intellectual development, the better the student's critical thinking ability; conversely, the worse the student's intellectual development, the lower the student's critical thinking ability. This is related to the opinion that intellectual development or intelligence is a person's mental ability to respond and solve a problem, connect one thing with another, and respond well to every stimulus because each person's intellectual development is different.

The Influence of Anxiety on Critical Thinking Ability in Mathematics Learning

Anxiety is a student's emotional state, which is characterized by restlessness and fear of possible danger. Anxiety arises automatically if the individual receives excessive stimulus that exceeds the limits to handle it. Anxiety is one of the inhibiting factors in learning that can interfere with the performance of students' knowledge functions, for example, concentrating, remembering, forming concepts, and solving problems (Munawaroh, 2018).

Based on the results of hypothesis testing, it is known that the anxiety variable has an influence on students' critical thinking abilities with a CR of 5.490 > 1.96 and a *p-value* of less than α (0.000 < 0.05), which means that anxiety has a significant influence on a person's critical thinking abilities. This is in line with the opinion of Liwaul et al. (2022), who said that the higher the student's anxiety level, the lower their critical thinking ability. This finding is relevant to previous research examined. Research results show that mathematics anxiety has a negative influence on students' critical thinking abilities in mathematics, meaning that the higher a student's mathematics anxiety, the lower their mathematical critical thinking abilities. When an individual feels anxious constantly, and he cannot overcome his anxiety, this can harm his physical health. This is also in line with research conducted by, who said that students with high mathematical anxiety tend to have low learning outcomes; this will have an impact when students do practice questions, while students with low mathematical anxiety tend to have high learning outcomes.

The Influence of Habits on Critical Thinking Ability in Mathematics Learning

Mathematics study habits combine how a person absorbs, organizes, and processes information. Study habits influence the level of students' mathematical reasoning abilities. Based on the results of hypothesis testing, it is known that the habit variable has an influence on students' critical thinking abilities with a CR of 3.682 > 1.96), and the *p-value* is less than α (0.000 < 0.05), which means that habits have a significant influence on a person's critical thinking abilities. This aligns with research conducted by (Oktafiani & Suryandari, 2022). Susanti and Krisdiana (2021) stated that study habits influence students' critical thinking abilities in mathematics. Critical thinking skills are one of the factors in improving mathematics learning outcomes. They will further develop if critical thinking skills are supported by good study patterns or habits at home and school.

Based on the results and discussion, it can be concluded that physical condition, motivation, and intellectual development through anxiety and habits influence the critical thinking abilities of fifth-grade elementary school students in Kartasura District.

CONCLUSION

Based on the results of data analysis and hypothesis testing that has been carried out, it can be concluded that 1) there is a significant influence regarding the influence of physical condition variables on worry, 2) there is no significant influence regarding the influence motivation variable towards worry, 3) there is a significant influence regarding influence intellectual development variable towards worry, 4) there is a significant influence regarding the influence of physical condition variables on habit, 5) there is a significant influence regarding influence motivation variable towards habit, 6) there is a significant influence regarding influence intellectual development variable on habits, 7) there is a significant influence regarding the influence of the worry variable on critical thinking, 8) there is a significant influence regarding the influence of the habit variable on critical thinking. Students with high physical condition, motivation, intellectual development, anxiety, and habits are expected to achieve good mathematics learning outcomes, leading to critical thinking skills.

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