

Impact of learning models on critical thinking with self-efficacy as mediator

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Abstrak

Penelitian ini bertujuan untuk (1) mengetahui pengaruh model pembelajaran terhadap kemampuan berpikir kritis siswa (2) mengetahui pengaruh self-efficacy pada siswa, serta (3) mengetahui pengaruh penerapan model pembelajaran terhadap kemampuan berpikir kritis siswa dengan self-efficacy sebagai variabel mediasi pada siswa MPLB SMKN 1 Surakarta. Penelitian ini merupakan penelitian kuantitatif dengan sampel dalam penelitian ini terdiri dari 138 siswa jurusan MPLB SMKN 1 Surakarta kelas 10 dan 11 yang melaksanakan pembelajaran di dalam kelas. Hasil penelitian menunjukkan (1) terdapat pengaruh signifikan model pembelajaran terhadap kemampuan berpikir kritis siswa (t -statistic 7,145 > 1,96 dan p -value 0,000 < 0,050) Hal ini menunjukkan bahwa jika semakin interaktif dan bervariasi model pembelajaran oleh guru maka kemampuan berpikir kritis siswa akan semakin tinggi. (2) terdapat pengaruh signifikan self-efficacy terhadap kemampuan berpikir kritis siswa (t -statistic 7,097 > 1,96 dan p -value 0,000 < 0,050). (3) terdapat pengaruh signifikan penerapan model pembelajaran terhadap self-efficacy (t -statistic 15,066 > 1,96 dan p -value 0,000 < 0,050) yang selanjutnya self-efficacy terhadap kemampuan berpikir kritis (t -statistic 19,203 > 1,96 dan p -value 0,000 < 0,050). Hal ini menunjukkan bahwa semakin tinggi self-efficacy siswa, maka kemampuan berpikir kritis akan semakin meningkat. Dengan demikian, penelitian ini menegaskan pentingnya peran guru dalam memilih model pembelajaran dan self-efficacy siswa juga terbukti sebagai faktor yang berkontribusi dalam memperkuat hubungan antara model pembelajaran dan kemampuan berpikir kritis.

Kata kunci: keterampilan berpikir kritis; metode pembelajaran; pendidikan kejuruan; psikologi pendidikan; self-efficacy

Abstract

This study aims to (1) determine the effect of learning models on students' critical thinking skills, (2) examine the effect of self-efficacy on students, and (3) investigate the effect of learning models on students' critical thinking skills with self-efficacy as a mediating variable among MPLB students of SMKN 1 Surakarta. This quantitative

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research sampled 138 students from grades 10 and 11 in the MPLB department of SMKN 1 Surakarta. Results showed that (1) learning models significantly influenced students' critical thinking skills (t-statistic = 7.145, p-value < .001), indicating that more interactive and varied teaching approaches led to higher critical thinking abilities; (2) self-efficacy significantly affected students' critical thinking skills (t-statistic = 7.097, p-value < .001); and (3) learning models significantly influenced self-efficacy (t-statistic = 15.066, p-value < .001), which in turn affected critical thinking abilities (t-statistic = 19.203, p-value < .001). These findings demonstrate that higher student self-efficacy corresponds with increased critical thinking skills. This research emphasizes the importance of teachers' roles in selecting appropriate learning models and confirms self-efficacy as a significant factor strengthening the relationship between learning models and critical thinking abilities.

Keywords: critical thinking skills; educational psychology; self-efficacy; teaching methods; vocational education

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Introduction

Critical thinking represents one of the essential 21st-century skills that students must develop (Roudlo, 2020). Critical thinking involves making rational decisions directed at determining whether to believe or act on something through a persistent, active, and thorough process. An individual's critical thinking ability can be recognized through specific indicators or characteristics (Haryani, 2017). Critical thinking helps students analyze information deeply and evaluate information sources wisely. When facing global challenges, critical thinking skills enable students to solve problems effectively and innovatively. Education that emphasizes critical thinking encourages students to ask relevant questions and seek valid evidence-based answers.

Wahyudin et al. (2012) define critical thinking as a way of thinking that involves the processes of criticizing, choosing, solving, and making decisions with rational and accountable reasons. Similarly, Johnson (as cited in Yaumi, 2012) states that critical thinking is a structured process that can evaluate facts, assumptions, logic, and language underlying others' questions (Noviyanto & Wardani, 2020). Students who think critically demonstrate advantages in various educational aspects. They can analyze information thoroughly and evaluate information sources wisely. Generally, critical thinking means the ability to analyze, evaluate, and synthesize information objectively and logically. It involves making decisions based on sound evidence and reasoning, as well as identifying, understanding, and addressing hidden biases and assumptions.

Critical thinking skills are important for developing the ability to make logical and coherent arguments, both in writing and orally. Critical thinking prepares students better for the rapidly changing workplace by improving their adaptation to complex, dynamic situations (Rahmadani et al., 2023). Education that encourages critical thinking supports the development of collaboration and communication skills, as students learn to listen to and consider different perspectives. Critical thinking also plays an important role in shaping active and responsible citizens who can participate constructively in democracy. Thus, students who master critical thinking skills are better equipped to face life's challenges (Darmawan et al., 2018).

In reality, many students have not yet developed the ability to think critically during the learning process. According to a 2018 survey by the Program for International Student Assessment (PISA), Indonesian students generally only reached levels 1 and 2 out of 6 possible levels, indicating that thinking ability among Indonesian students remains very low. Students often struggle to analyze information deeply and evaluate information sources wisely. The low level of students' critical thinking skills may be attributed to daily learning processes that are considered ineffective in developing students' interests, talents, and potential (Tamara, 2017). Additionally, this is caused by the underdeveloped education system

in Indonesia, as students' interest in proving concepts remains low. Research by Suratno (2017) shows that students' interest in proving principles or concepts, generalizing, and investigating remains significantly lacking.

In the context of this research, critical thinking deficiencies also occur at SMKN 1 Surakarta, particularly among students in the Office Management and Business Services (MPLB) competency. Teacher interviews revealed that students primarily rely on memorization, demonstrate limited ability to answer questions, and often struggle with Higher Order Thinking Skills (HOTS) questions. Preliminary studies based on questionnaires distributed to respondents indicated that 84.1% of students only sometimes ask questions when teachers present material, 65.9% rarely provide thoughtful opinions on information received, and 56.8% only sometimes analyze information they receive.

Several factors influence students' critical thinking, including classroom learning models and self-efficacy. Research by Nurhidayati (2022) demonstrates that teachers' selection of learning models significantly affects students' critical thinking skills. Beyond learning models, self-efficacy also influences students' critical thinking. Research by Yofika and Nanang (2021) indicates that self-efficacy relates to students' belief in their ability to complete school assignments. Self-efficacy affects the use of skills that students possess, including their critical thinking abilities. Additionally, preliminary studies showed that students identified several factors influencing their critical thinking: learning models (86.4%), self-efficacy (75%), anxiety (18.2%), and physical condition (20.5%).

The learning model comprises a series of teaching and learning processes from beginning to end, encompassing teacher and student activities within a particular learning design using specific teaching materials and interactions between teachers, students, and teaching materials (Muhadab, 2010). Research by Ulya et al. (2024) indicates that interactive learning models encourage students to discuss and express opinions, thereby improving their critical thinking skills. This aligns with research by Prasetyo and Kristin (2020), which emphasizes the teacher's crucial role during the learning process. The expected teacher role is that of a facilitator, providing guidance to students who have difficulty performing assigned tasks. Students are gradually directed to develop their critical thinking skills.

Based on the aforementioned issues, this research aims to examine more deeply the "Effect of Learning Models and Self-Efficacy on Critical Thinking Ability of MPLB Students of SMKN 1 Surakarta." This research is important considering that critical thinking ability represents an essential skill students must possess to face global challenges and an increasingly complex workforce. Additionally, critical thinking ability constitutes one of the key 21st-century skills needed in various fields of work and daily life. This research offers novelty by exploring the relationship between learning models and students' critical thinking with self-efficacy as a mediating variable, an area not widely studied in educational research. Unlike previous studies that focus primarily on the direct relationship between learning models and critical thinking, this study highlights how self-efficacy plays an intermediary role in enhancing the effectiveness of learning models on students' critical thinking skills. The findings are expected to provide new insights for developing more effective learning strategies to improve students' academic confidence and critical thinking skills.

Research Methods

This research was conducted at SMKN 1 Surakarta, located at Jalan Sungai Kapuas No. 28, Kedung Lumbu, Kec. Ps. Kliwon, Surakarta City, Central Java 57113, from September 2024 to February 2025. The implementation was divided into four stages: preparation, implementation, report preparation, and examination.

This study employed quantitative research methods. According to Sugiyono (2022), quantitative research follows a design based on positivist philosophy with specific populations and samples, using research instruments that are statistically measured to test hypotheses. This approach was selected to test the hypothesis regarding the influence of exogenous and endogenous variables. Exogenous variables affect the values of other variables in the model, while endogenous variables are directly or indirectly influenced by exogenous variables. In this study, learning models (X_1) and self-efficacy (X_2) served as exogenous variables affecting critical thinking skills (Y) as the endogenous variable.

The study involved 211 respondents from 10th and 11th grade students majoring in MPLB who participated in classroom learning activities, excluding 12th grade students who were completing Field Work Practices (PKL). Sampling utilized probability sampling techniques, specifically stratified random sampling. This technique divides the population randomly into more organized groups or strata. The final

sample comprised 138 respondents representing all students in their respective classes.

Data processing and analysis employed Smart PLS 4 software. The instrument validity test used a measurement model including a measurement test (outer model) and a structural stage (inner model). The outer model stage included convergent validity, discriminant validity, and reliability tests. The inner model stage involved r-square (R^2), path coefficients, effect size (f^2), and predictive relevance (Q^2) tests. After the data met the prerequisite analysis tests, hypothesis testing was conducted using the Bootstrapping method to determine the t-statistic and p-value.

Results and Discussion

Research results

A pilot test of the research instrument was conducted. Data analysis through PLS-SEM proceeded in three stages: measurement model (outer model), structural model (inner model), and hypothesis testing.

Table 1
Measurement Model

Variables and constructs	Loading factor	Composite Reliability	Cronbach's alpha	AVE
Critical Thinking		0,844	0,839	0,609
Y.1	0.792			
Y.2	0.819			
Y.3	0.811			
Y.4	0.764			
Y.5	0.712			
Learning Model		0,873	0,841	0,612
X1.1	0.835			
X1.2	0.703			
X1.3	0.870			
X1.4	0.720			
X1.5	0.768			
Self-efficacy		0,889	0,869	0,660
X2.1	0.840			
X2.2	0.857			
X2.3	0.874			
X2.4	0.806			
X2.5	0.666			

(Source: Primary data processed, 2024)

Based on Table 1, the highest loading factor value was item SE3 at 0.874, and all statement items met the minimum outer loading threshold, thus confirming validity. The Average Variance Extracted (AVE) value of each latent variable was then tested. The AVE value must be ≥ 0.50 to be declared valid. Based on the findings, the AVE values for exogenous and endogenous variables exceeded the AVE threshold. Therefore, all statement items met the confirmatory requirements and were considered valid for use.

Table 2*Structural Model*

Variables and constructs H1 and H2	R ²	F ²	Q ²
Learning model		0,294	
Self-efficacy		0,335	
Critical thinking	0,618		0,358

(Source: Primary data processed, 2024)

Table 2 presents the R square value, where critical thinking as an endogenous variable has a value of 0.618 or 61.8%. This indicates that critical thinking can strongly explain the causal relationship of learning models and self-efficacy. The effect size value of the learning model variable on critical thinking ability is 0.294, which falls into the moderate influence category. Meanwhile, the effect of the self-efficacy variable on critical thinking shows a value of 0.335, also categorized as a moderate influence. The predictive relevance value, indicated by $Q^2 > 0$, shows a value of 0.358 for the critical thinking variable. This value exceeds 0, meaning the model has good predictive ability for the critical thinking variable.

Table 3

Variables and constructs H3	R ²	F ²	Q ²
Learning Model		0,596	
Self-efficacy (mediation)	0,374	0,995	0,241
Critical thinking	0,499		0,287

(Source: Primary data processed, 2024)

Table 3 presents the R square values for endogenous variables, where self-efficacy as mediation has a value of 0.374 (37.4%) and critical thinking has a value of 0.499 (49.9%). This demonstrates that self-efficacy can strongly explain the causal relationship with the learning model, and the learning model can also strongly explain the causal relationship with self-efficacy. Furthermore, the effect size of the learning model on self-efficacy is 0.596 (59.6%), classified as a large influence. Meanwhile, the effect of self-efficacy on critical thinking has a value of 0.995 (99.5%), also classified as a large effect. The predictive relevance (Q^2) value for self-efficacy is 0.241 and for critical thinking is 0.287. Both values exceed 0, indicating that the model has good predictive ability for both variables. Specifically, the model explains 24.1% of the variability in self-efficacy and 28.7% of the variability in critical thinking, suggesting the model is quite effective in predicting both variables.

Table 4*Hypothesis Test*

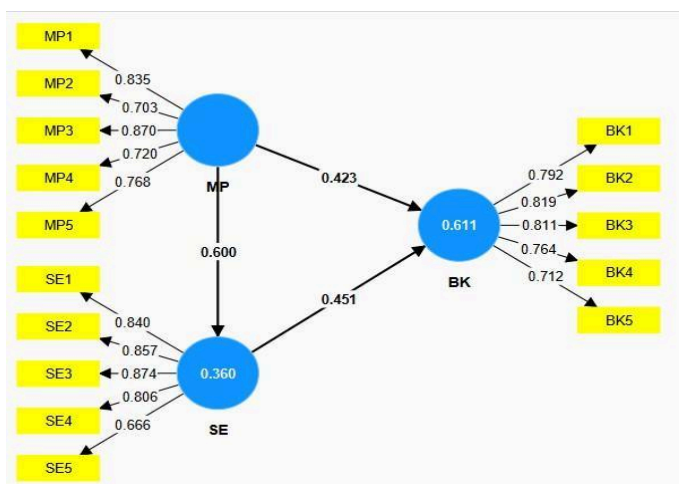
Path	t-statistic	p-value
Learning model=> Critical thinking	7,145	0,000
Self-efficacy => Critical thinking	7,097	0,000
Self-efficacy (mediation) => Critical thinking	19,253	0,000
Learning model => Self-efficacy (mediation)	15,066	0,000

(Source: Primary data processed, 2024)

Table 4 presents the hypothesis testing results. The t-statistic value for the relationship between learning model variables and critical thinking is 7.145, while the t-statistic value for the relationship between self-efficacy and critical thinking is 7.097, both exceeding the threshold value of 1.96.

Additionally, both p-values of 0.000 are smaller than 0.05, indicating statistical significance. These results demonstrate a positive and significant influence between learning models and critical thinking, as well as between self-efficacy and critical thinking. These findings support the theory that learning models and self-efficacy play important roles in critical thinking development.

The mediation variable test results show that learning models significantly affect self-efficacy as mediation, with a t-statistic value of 15.066 (exceeding the 1.96 threshold) and a p-value of 0.000 (less than 0.050). Furthermore, self-efficacy significantly affects critical thinking skills with a t-statistic value of 19.253 (far above 1.96) and a p-value of 0.000.



Discussion

Critical thinking represents an essential ability that students need to develop when facing modern-era challenges. Critical thinking skills encompass the ability to analyze, evaluate, and create solutions based on a deep understanding of problems. In learning contexts, critical thinking indicates educational success because it helps students understand concepts deeply and apply them to real situations. However, Indonesian students' critical thinking skills remain suboptimal, as evidenced by the 2018 PISA survey results showing low analytical skills among Indonesian students. Critical thinking provides more precise direction in thinking and working, helping to determine relationships between concepts more accurately. Therefore, critical thinking skills are necessary for problem-solving and finding solutions (Saputra, 2020).

Based on this research, learning models applied by teachers significantly influence students' critical thinking skills because the methods facilitate higher-order thinking processes. Activities like group discussions, case studies, and projects help students develop critical thinking skills. Research also shows that applying appropriate learning models can increase students' confidence and motivation to think analytically. Thus, learning models serve not only as tools to channel knowledge information but also as means to shape students' critical thinking patterns.

The results showed that statement item MP3, "I always feel encouraged to actively participate in the learning process," had the highest value among other statement items at 0.873. This aligns with research by Mazna et al. (2024), which demonstrates that applying interactive learning by involving students actively has proven effective in developing students' critical thinking skills. Through various learning models such as problem-based learning, role-playing, and inquiry learning, students not only acquire knowledge but are also invited to think critically, evaluate information, and make decisions based on trusted sources.

Results also indicated that statement item SE3, "I always see the positive side of the challenges I face," had the greatest value at 0.877. This aligns with research by Melyana and Pujiastuti (2020), which shows that students with high optimism or self-confidence demonstrate higher critical thinking skills. Students with high optimism tend not to fear taking risks in the learning process and typically generate many ideas when tackling problems. The importance of the SE3 statement is further supported by

research from Nurul et al. (2021), which states that good student self-efficacy positively impacts critical thinking ability, and vice versa.

Based on the novelty results, self-efficacy serves as a mediating factor that strengthens the relationship between learning models and critical thinking skills. Students with high self-efficacy tend to be more confident when facing challenges in the learning process. For example, during problem-based learning, students with high self-efficacy demonstrate greater confidence in completing tasks. With strong self-efficacy, students not only understand material but can also evaluate and apply it critically in real situations.

Research by Pratiwi (2022) indicates that both classroom learning models and self-efficacy influence students' critical thinking skills. Appropriate learning models provide students with deeper learning experiences and greater involvement in the learning process, while self-efficacy strengthens student confidence and motivation when facing academic challenges. This combination results in improved critical thinking skills. This research demonstrates that students with strong self-efficacy better analyze, evaluate, and solve problems critically. Thus, integrating effective learning models with self-efficacy as mediation can improve overall learning outcomes. Therefore, developing students' self-efficacy represents an important component in educational processes aimed at improving critical thinking skills.

Conclusion

Based on the study results, it can be concluded that there is a significant effect of the learning model on critical thinking among SMKN 1 Surakarta students with a t-statistic value of 7.145 and p-value of 0.000; there is a significant effect of self-efficacy on critical thinking with a t-statistic value of 7.097 and p-value of 0.000; and there is a significant effect of learning models on self-efficacy, which subsequently affects critical thinking with a t-statistic of 19.253 and p-value of 0.000. Based on these conclusions, researchers recommend that students actively participate in learning by taking advantage of every opportunity to discuss, ask questions, and complete tasks independently or in groups. Students should build confidence by practicing and facing challenges in the learning process without fearing mistakes, as these are part of learning. Additionally, teachers should develop more creative approaches in selecting or creating interesting and interactive learning media, such as videos, simulations, or educational games, to better motivate students. This study has several limitations. First, the research was conducted only at SMKN 1 Surakarta, so the results may not be generalizable to schools with different conditions. Second, the methodology was limited to quantitative analysis, which did not explore in depth other factors affecting students' critical thinking. Finally, the effectiveness of applied learning models may vary depending on individual learning styles, which were not fully analyzed in this study.

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