



Effects of Digital Literacy, Interpersonal Communication, and Self-Regulated Learning on Students' Critical Thinking Skills

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DOI:

[10.32424/seej.v7i2.21473](https://doi.org/10.32424/seej.v7i2.21473)

Article History:

Received: 26 June 2025

Revised: 20 July 2025

Accepted: 20 Sept 2025

Published: 05 October 2025

Abstract:

This study analyzes the effects of digital literacy, interpersonal communication, and self-regulated learning on students' critical thinking skills in economics learning at SMA Negeri 1 Sidareja. Using a quantitative survey design, this study involved 151 grade XI students selected from a population of 249 through proportional random sampling. Data were collected through a 50-item closed questionnaire with a five-point Likert scale and analyzed using multiple linear regression after validity, reliability, and classical assumption tests. The results indicate that digital literacy, interpersonal communication, and self-regulated learning are positively and significantly associated with students' critical thinking skills. The model obtained $R = 0.755$, $R^2 = 0.570$, and Adjusted $R^2 = 0.561$, showing that the three predictors explain 56.1% of the variance in critical thinking skills. Digital literacy had the strongest standardized coefficient, followed by interpersonal communication and self-regulated learning. These findings contribute to economics education by showing that students' critical thinking is shaped not only by individual learning independence, but also by their ability to evaluate digital information and participate in dialogic classroom interaction. The findings suggest that economics teachers should implement learning activities such as analyzing digital economic news related to inflation, market changes, or consumer behavior, discussing different economic perspectives through collaborative classroom discussions, and assigning reflective tasks that encourage students to evaluate their reasoning, understanding, and learning processes. However, this study is limited by the use of self-reported questionnaire data and the involvement of students from only one senior high school, which may limit the generalizability of the findings.

Keywords: digital literacy, interpersonal communication, self-regulated learning, critical thinking, economics education.

Introduction

Education plays a crucial role in improving the quality of human resources and supporting national development. A good education system is expected to develop students' potential, strengthen their skills, and shape their mindset so that they are able to face current and future challenges.

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In twenty-first-century learning, students are not only expected to master subject content, but also to develop higher-order thinking skills, including the ability to analyze information, evaluate arguments, solve problems, and make responsible decisions. One essential skill in this context is critical thinking.

Critical thinking is particularly important in economics learning. Economics is not merely a subject that discusses concepts and theories, but also a field of study closely related to real-life issues such as scarcity, consumption, production, markets, prices, unemployment, and economic decision-making. These topics require students to understand information, compare alternatives, assess causes and consequences, and provide logical arguments. Therefore, economics learning should not only encourage students to memorize concepts, but also train them to interpret economic phenomena critically and apply economic reasoning in everyday life. Recent research in SEEJ also shows that higher-order thinking skills in economics subjects can be improved through contextual learning strategies that encourage students to analyze, evaluate, and create solutions based on learning problems (Umam & Melati, 2025).

The urgency of critical thinking is also related to the development of twenty-first-century skills, commonly known as the 4C skills: critical thinking, creativity, communication, and collaboration (Gyurova & Zeleeva, 2017). Students live in a rapidly changing environment shaped by globalization, digital technology, and complex social problems. In this situation, they must be able to process information independently, examine different perspectives, and make decisions based on evidence and reasoning. Without critical thinking, students may experience difficulties in solving problems and responding to the challenges they encounter in academic and social life.

However, students' critical thinking skills in Indonesia still require serious attention. International assessments such as the Programme for International Student Assessment show that Indonesian students still face challenges in tasks that require reasoning, analysis, evaluation, and problem-solving (OECD, 2023). These competencies are closely related to higher-order thinking skills. This condition indicates that students need more learning experiences that encourage active thinking, questioning, discussion, reflection, and evidence-based decision-making.

A similar issue was found in economics learning at SMA Negeri 1 Sidareja. Based on preliminary observations and interviews with economics teachers and grade XI students, many students were still passive during the learning process. Some students experienced difficulties in formulating questions, expressing opinions, and drawing conclusions when discussing economics materials. In addition, students' learning outcomes showed that several classes still had average scores below the predetermined achievement threshold for Economics at SMA Negeri 1 Sidareja, which was 78 out of 100. This indicates that some students had not yet reached the expected level of learning achievement. Although learning

outcomes cannot fully represent students' critical thinking skills, these variations provide preliminary evidence that students may still experience difficulties in analyzing questions, applying concepts, and constructing reasoned answers.

Table 1. Economics Learning Outcomes of Grade XI Students at SMA Negeri 1 Sidareja

Class	Number of Students	Completed	Not Completed	Average	Highest Score	Lowest Score
XI F 3	35	24	11	81	94	60
XI F 4	36	10	26	73	94	54
XI F 5	36	5	31	71	91	54
XI F 6	35	13	22	70	96	49
XI F 8	36	23	13	77	92	63
XI F 9	35	25	10	78	87	68
XI F 10	36	19	17	76	88	63

Source: Economics teacher archive of grade XI students at SMA Negeri 1 Sidareja, 2023.

One factor that may influence students' critical thinking skills is digital literacy. The development of technology and the internet has changed the way students access information and learn. Students can obtain learning resources from websites, digital books, online learning platforms, videos, and social media. However, easy access to information does not automatically improve students' understanding. Students need to be able to select, evaluate, and use digital information critically. Without adequate digital literacy, students may accept information passively, rely on unreliable sources, or fail to distinguish accurate information from misinformation. In economics learning, digital literacy is increasingly important because students frequently encounter digital information related to economic phenomena such as inflation, market conditions, consumption patterns, and government policies.

Interpersonal communication is another factor that may support critical thinking development. Learning is a social process involving interaction between teachers and students as well as among students. Through interpersonal communication, students can ask questions, express opinions, respond to arguments, and clarify their understanding. A supportive communication environment allows students to exchange perspectives and construct knowledge through discussion. In economics learning, interpersonal communication is important because many economic issues require students to compare viewpoints, discuss alternative solutions, and develop arguments based on evidence.

Self-regulated learning is also relevant to the development of critical thinking skills. Students with strong self-regulated learning are able to manage their learning processes by setting goals, selecting appropriate strategies, monitoring progress, and evaluating their understanding. These processes encourage students to become reflective learners who do not simply receive information but actively examine and improve their own thinking. In economics learning, self-regulated learning helps students

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independently explore economic concepts and connect theoretical knowledge with real-world phenomena.

Previous studies have examined the relationship between digital literacy and critical thinking, interpersonal communication and critical thinking, and self-regulated learning and critical thinking. However, many previous studies investigated these predictors separately or focused on different subject contexts, such as mathematics, physics, or general learning environments. The characteristics of economics learning differ from these contexts because economics involves dynamic social phenomena that require students to interpret information, evaluate economic conditions, consider different perspectives, and make decisions based on evidence. Therefore, limited empirical evidence has integrated digital competence, classroom interaction, and independent learning into a single model explaining critical thinking skills in senior high school economics learning.

To fill this gap, this study examines the effects of digital literacy, interpersonal communication, and self-regulated learning on students' critical thinking skills in economics subjects. The novelty of this study lies in integrating these three learning-related factors into one empirical model within the context of senior high school economics learning. This study contributes to the literature by showing that critical thinking development in economics learning is not only related to students' individual learning independence but also to their ability to evaluate digital information and participate in meaningful classroom interaction.

The three variables in this study are considered complementary factors because they contribute through different but interconnected learning mechanisms. Digital literacy provides students with access to diverse information sources and enables them to evaluate the accuracy, credibility, and relevance of digital information. Interpersonal communication provides a social environment where students can exchange ideas, discuss economic issues, construct arguments, and consider different perspectives. Meanwhile, self-regulated learning supports students' continuous cognitive engagement by encouraging them to set learning goals, monitor their understanding, and reflect on their learning processes. Therefore, critical thinking development requires the integration of information evaluation, meaningful interaction, and independent reflection.

Based on this theoretical explanation, the conceptual framework of this study is presented in Figure 1. The framework illustrates the proposed relationships between digital literacy, interpersonal communication, and self-regulated learning as independent variables and students' critical thinking skills as the dependent variable.

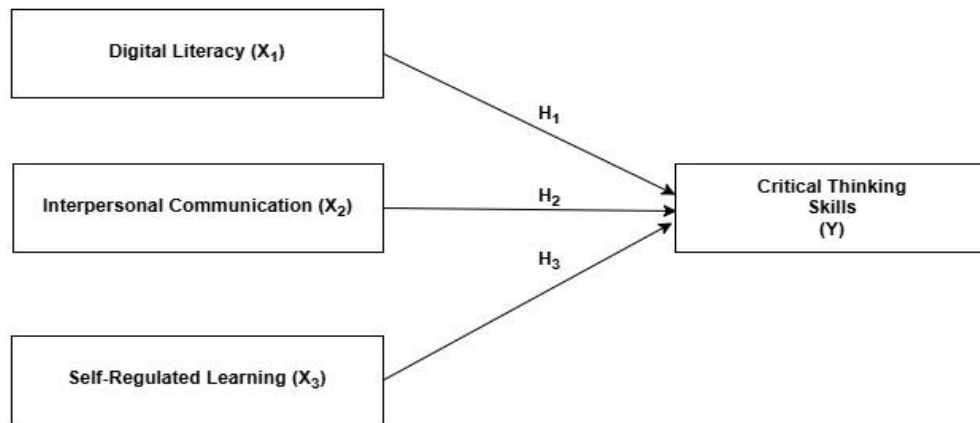


Figure 1. Conceptual Framework of the Study

Literature Review

Humanistic Learning Theory

This study is supported by humanistic learning theory, which views students as individuals who have potential, freedom, responsibility, and the ability to develop themselves. One of the main figures in humanistic psychology is Carl Rogers, who introduced the person-centered approach. This approach emphasizes empathy, authenticity, and unconditional positive regard in supporting individual growth and self-actualization (Rogers, 1961). In the context of learning, humanistic theory places students as active subjects who are able to explore their potential, express ideas, and take responsibility for their learning.

Humanistic learning is relevant to the model of this study because the three independent variables reflect student-centered learning processes. Digital literacy supports students' freedom to explore and evaluate information; interpersonal communication supports dialogic, empathetic, and open classroom interaction; and self-regulated learning reflects students' responsibility for managing their own learning. These processes are expected to encourage students to question information, reflect on their understanding, and construct knowledge actively. Humanistic theory therefore provides a broad foundation for the model, while the critical thinking framework, digital literacy framework, and self-regulated learning perspective provide more specific explanations for each construct. However, humanistic learning theory alone does not fully explain how students construct knowledge through interaction and experience. Therefore, constructivist learning theory is also relevant to explain the role of digital literacy and interpersonal communication in developing students' critical thinking skills.

Constructivist Learning Theory

Constructivist learning theory emphasizes that students actively construct knowledge through experience, interaction, and reflection rather than passively receiving information. Piaget (1970) explains that learning occurs when individuals build understanding by connecting new experiences with their existing cognitive structures. Meanwhile, Vygotsky (1978) highlights that learning is a social process in which knowledge develops through interaction, language, and collaboration with others. Contemporary discussions of learning theories also emphasize that constructivist learning encourages students to actively participate in constructing meaning through exploration, interaction, and reflection (Schunk, 2020).

Constructivist theory is relevant to this study because critical thinking develops through processes of exploration, discussion, evaluation, and reflection. Digital literacy enables students to explore and evaluate digital information as learning resources. Interpersonal communication supports social construction of knowledge through dialogue, exchange of perspectives, and collaborative problem-solving. Meanwhile, self-regulated learning strengthens individual reflection by encouraging students to monitor their understanding and evaluate their learning processes. Therefore, constructivist theory provides an additional explanation of how these three factors contribute to students' critical thinking skills in economics learning.

Critical Thinking Skills

Critical thinking is an essential skill that enables individuals to solve problems and make decisions based on logical reasoning. Facione (2015) explains that critical thinking involves interpretation, analysis, evaluation, inference, explanation, and self-regulation. These indicators show that critical thinking is not merely the ability to answer questions, but also the ability to understand information, assess arguments, draw conclusions, explain reasoning, and reflect on the thinking process.

In economics learning, critical thinking is needed because students are required to analyze economic problems, understand relationships among variables, and make decisions based on available information. Students who think critically are able to examine economic issues more deeply, compare different viewpoints, and develop arguments based on evidence. Therefore, critical thinking should be developed through learning activities that encourage active participation, problem-solving, and discussion. In the context of economics education, Perwita (2024) emphasizes that problem-centered learning design can support students' critical thinking ability because it requires students to examine problems, provide critical judgments, and analyze issues from different social and personal value perspectives.

Digital Literacy and Critical Thinking

Digital literacy refers to the ability to use digital devices and digital information effectively, wisely, and responsibly. Safitri et al. (2020) define digital literacy as the ability to use digital devices to obtain, manage, evaluate, and share information appropriately. Perwita et al. (2023) also state that digital literacy is the ability to master and use information in various formats through digital devices. A study published in SEEJ also shows that digital literacy has a positive and significant effect on learning achievement, indicating that students' ability to use digital resources is an important factor in supporting learning outcomes (Maksum et al., 2023).

Digital literacy is closely related to critical thinking because students need to evaluate the information they find in digital spaces. The internet provides various learning resources, but not all digital information is accurate, credible, or relevant. Students with good digital literacy are expected to select reliable sources, compare information, and avoid misinformation. Digital literacy is therefore not merely technical ability, but also includes cognitive and evaluative competence in using information (Ng, 2012). According to Nasionalita and Nugroho (2020), digital literacy includes functional skills beyond, creativity, collaboration, communication, ability to find and select information, critical thinking and evaluation, cultural and social understanding, and e-safety.

Previous studies show that digital literacy has a positive relationship with critical thinking. Rochmatika and Yana (2022) found that digital literacy had a positive effect on students' critical thinking skills. Marnita (2023) also found that digital literacy improved critical thinking in learning. Similarly, Andini et al. (2024) showed that digital literacy skills can predict students' critical thinking. Previous studies consistently indicate that digital literacy contributes to the development of critical thinking skills because digital environments require students to evaluate, compare, and interpret information rather than simply access it. However, much of the existing research has examined critical thinking in structured learning contexts, where problem-solving activities are often emphasized. In economics learning, critical thinking involves interpreting dynamic social phenomena, evaluating competing viewpoints, and making decisions based on incomplete and changing information. Therefore, digital literacy in economics is not only related to accessing learning resources but also to critically interpreting economic information from various digital sources, such as information related to prices, markets, inflation, consumption, and economic policy. Based on these theoretical and empirical findings, the first hypothesis is formulated as follows:

H1: Digital literacy has a positive effect on students' critical thinking skills.

Interpersonal Communication and Critical Thinking

Interpersonal communication is the process of exchanging messages between individuals. DeVito (2016) explains that interpersonal communication occurs between people who are interdependent and mutually influence one another through verbal and nonverbal messages. In learning, interpersonal communication occurs between teachers and students as well as among students. Through communication, students can express ideas, ask questions, respond to opinions, and clarify learning materials. Triningtyas (2016) also explains that interpersonal communication involves direct interaction in which individuals act as communicators and communicants.

Effective interpersonal communication is supported by openness, empathy, supportiveness, positive attitudes, and equality (Maman, 2021). These indicators are important in the classroom because students need a supportive environment to express their thoughts. When students feel respected, they are more willing to participate in discussions and share ideas. This process can improve critical thinking because students learn to organize arguments, respond to different views, and evaluate ideas.

Previous research supports the relationship between interpersonal communication and critical thinking. Pangestu et al. (2019) found that interpersonal communication had a positive effect on critical thinking. Yulianto et al. (2019) also found that interpersonal communication significantly influenced students' critical thinking. Ahsanudin (2019) reported similar findings in mathematics learning. The consistency of these findings may be explained by the role of interpersonal communication in facilitating the exchange of ideas, feedback, and different perspectives during the learning process. Through communication, students have opportunities to express their reasoning, evaluate others' viewpoints, and refine their understanding, which are important processes in developing critical thinking skills. However, previous studies have often examined interpersonal communication and critical thinking in broader learning contexts or different subject areas. In economics learning, interpersonal communication has a distinctive role because students often discuss real-world economic phenomena that involve multiple perspectives and require evidence-based arguments, such as market changes, consumer behavior, and economic policies. Therefore, the second hypothesis is formulated as follows:

H2: Interpersonal communication has a positive effect on students' critical thinking skills.

Self-Regulated Learning and Critical Thinking

Self-regulated learning refers to students' ability to manage their own learning process independently. Students with self-regulated learning are able to identify learning needs, set goals, choose learning strategies, monitor their progress, and evaluate learning outcomes. Zimmerman (2002) describes self-regulated learners as active participants in their own learning processes who use metacognitive,

motivational, and behavioral strategies. Amalia et al. (2018) also state that self-regulated learning is an individual effort to learn independently, driven by personal motivation to master certain materials and solve problems.

Self-regulated learning supports critical thinking because students are trained to reflect on their understanding and evaluate their learning process. Students who learn independently tend to be more responsible, persistent, and active in solving learning difficulties. This reflective process is relevant to critical thinking because students need to monitor whether their reasoning is logical, whether the information they use is sufficient, and whether their conclusions are supported by evidence. According to Widuroyekti et al. (2022), indicators of self-regulated learning include responsible freedom, progressiveness and persistence, initiative or creativity, self-control, and self-confidence.

Several previous studies have shown that self-regulated learning is related to critical thinking. Sukowati et al. (2020) found that self-regulated learning strategies improved students' independent learning and critical thinking skills. Winiari et al. (2019) also found that self-regulated learning had a positive effect on critical thinking. Anugraheni and Adhistana (2023), Ghimby (2022), and Asmar and Delyana (2020) also reported similar findings. Previous studies have shown that self-regulated learning is associated with students' critical thinking because both involve metacognitive processes. Self-regulated learners actively plan their learning strategies, monitor their understanding, and evaluate their progress, which are also essential processes in critical thinking development. In economics learning, students need independence not only to understand concepts but also to connect economic theories with current issues and real-world situations. While previous studies have often examined self-regulated learning in subjects with more structured problem-solving activities, economics learning involves contextual problems related to social and economic phenomena that may have multiple interpretations and solutions. Therefore, the third hypothesis is formulated as follows:

H3: Self-regulated learning has a positive effect on students' critical thinking skills.

Based on the theoretical explanation above, this study positions digital literacy, interpersonal communication, and self-regulated learning as independent variables, while students' critical thinking skills are positioned as the dependent variable. These three independent variables are expected to support students' ability to think critically in economics learning.

Research Methodology

This study employed a quantitative survey design. The quantitative approach was used because this study aimed to analyze the effects of digital literacy, interpersonal communication, and self-regulated

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learning on students' critical thinking skills using numerical data and statistical analysis. The survey method was used because data were collected directly from respondents through questionnaires.

This research was conducted at SMA Negeri 1 Sidareja. The population consisted of all grade XI students in the 2023/2024 academic year who studied economics, totaling 249 students. The sample was determined using the Isaac and Michael formula with a 5% error rate, resulting in 151 respondents. The sampling technique used was proportional random sampling so that each class was represented proportionally.

Data were collected using a closed questionnaire with a five-point Likert scale. The response options ranged from strongly disagree to strongly agree. Positive statements were scored from 1 to 5, while negative statements were reverse-coded before analysis. The instrument consisted of 50 statement items developed from the indicators of each variable. Critical thinking skills were measured using indicators of interpretation, analysis, evaluation, inference, explanation, and self-regulation. Digital literacy was operationalized through selected indicators from the digital literacy framework, namely functional skills beyond, collaboration, communication, ability to find and select information, critical thinking and evaluation, cultural and social understanding, and e-safety. Interpersonal communication was measured through openness, empathy, supportiveness, positive attitude, and equality. Self-regulated learning was measured through responsible freedom, progressiveness and persistence, initiative or creativity, self-control, and self-confidence. The distribution of instrument items is presented in Table 2.

Table 2. Research Instrument Blueprint

Variable	Indicators	Main Source	Number of Items	Example Statement Item
Critical Thinking Skills	Interpretation, analysis, evaluation, inference, explanation, self-regulation	Facione (2015)	13	"I am able to combine several arguments collected during group discussions."
Digital Literacy	Functional skills beyond, collaboration, communication, ability to find and select information, critical thinking and evaluation, cultural and social understanding, e-safety	Nasionalita and Nugroho (2020)	14	"I am able to think critically when encountering information in digital environments."
Interpersonal Communication	Openness, empathy, supportiveness, positive attitude, equality	DeVito (2016)	11	"I become a good listener when my friends share their stories."
Self-Regulated Learning	Responsible freedom, progressiveness and persistence, initiative or creativity, self-control, self-confidence	Widuroyekti et al. (2022)	12	"I try to study harder to understand learning materials that I do not understand."

Source: Research instrument blueprint, 2024.

Before being used in the main analysis, the questionnaire was tested for validity and reliability. The validity test involved 30 students with similar characteristics to the research population and used an

r-table value of 0.361 at the 5% significance level. An item was considered valid when the calculated correlation value was higher than the r-table value. Reliability was assessed using Cronbach's Alpha, with a minimum acceptable value of 0.60. Since the questionnaire data were ordinal, the data were transformed into interval data using the Method of Successive Interval to support multiple linear regression analysis (Ningsih & Dukalang, 2019).

Classical assumption tests were conducted before hypothesis testing, including normality, multicollinearity, heteroskedasticity, and linearity tests. The main data analysis technique used in this study was multiple linear regression analysis. The regression model is written as follows:

$$CTS = \alpha + \beta^1 DL + \beta^2 IC + \beta^3 SRL + \varepsilon$$

Where CTS represents students' critical thinking skills, DL represents digital literacy, IC represents interpersonal communication, SRL represents self-regulated learning, α represents the constant, β_1 – β_3 represent regression coefficients, and ε represents the error term. The t-test was used to examine the partial effect of each independent variable, the F-test was used to examine model feasibility, and the coefficient of determination was used to determine the proportion of variance in critical thinking skills explained by the independent variables.

To minimize potential social desirability bias during questionnaire completion, several procedural steps were implemented. Prior to data collection, permission was obtained from the school and the economics teachers. Respondents were informed that their participation was for research purposes, that the questionnaire did not require personal identity, and that their responses would be treated confidentially. The questionnaire instructions encouraged respondents to select answers that best represented their actual conditions and experiences. In addition, clear instructions regarding the response scale and questionnaire completion procedures were provided to ensure that respondents had a consistent understanding of each statement. These procedures were implemented to reduce potential response bias in the collected data.

Results and Discussions

Results

Before conducting the main analysis, the research instrument was tested for validity and reliability. The validity test showed that all questionnaire items were valid because the calculated correlation values were higher than the r-table value of 0.361 at the 5% significance level. The reliability test also showed that all variables were reliable because the Cronbach's Alpha values were higher than the minimum reliability standard of 0.60. The reliability results are presented in Table 3.

Table 3. Reliability Test Results

Variable	Cronbach's Alpha	Reliability Standard	Description
Critical Thinking Skills	0.791	0.60	Reliable
Digital Literacy	0.800	0.60	Reliable
Interpersonal Communication	0.749	0.60	Reliable
Self-Regulated Learning	0.710	0.60	Reliable

Source: Primary data processed, 2024.

Table 3 shows that all variables met the reliability criterion, indicating that the questionnaire was internally consistent and appropriate for further analysis.

The classical assumption tests were conducted before multiple linear regression analysis. The normality test showed a significance value of 0.200, indicating that the residual data were normally distributed. The multicollinearity test showed that all tolerance values were higher than 0.10 and all VIF values were lower than 10, indicating that there was no multicollinearity among the independent variables. The heteroskedasticity test showed that the significance values of the independent variables were higher than 0.05, indicating that the regression model was free from heteroskedasticity. The linearity test also showed that digital literacy, interpersonal communication, and self-regulated learning had linear relationships with students' critical thinking skills. Therefore, the data met the requirements for multiple linear regression analysis.

The descriptive results of the research variables are presented in Table 4.

Table 4. Descriptive Results of Research Variables

Variable	Percentage Score	Category
Critical Thinking Skills	74.49%	High
Digital Literacy	69.01%	High
Interpersonal Communication	81.81%	Very High
Self-Regulated Learning	67.42%	High

Source: Primary data processed, 2024.

Table 4 shows that students' critical thinking skills obtained a percentage score of 74.49%, which was categorized as high. This indicates that students generally had relatively good critical thinking skills, although some aspects still needed improvement. Digital literacy obtained a score of 69.01%, which was categorized as high, suggesting that students were generally familiar with digital technology and were able to use digital media in learning activities. However, their ability to evaluate digital information critically still needed to be strengthened. Interpersonal communication obtained the highest score, 81.81%, and was categorized as very high. This indicates that students had strong interpersonal interaction in the classroom. Meanwhile, self-regulated learning obtained a score of 67.42%, which was categorized as high, indicating that students had relatively good independent learning habits.

The results of multiple linear regression analysis are presented in Table 5.

Table 5. Multiple Linear Regression Results

Variable	B	Std. Error	Beta	t	Sig.
Constant	0.984	3.110	-	0.316	0.752
Digital Literacy	0.364	0.066	0.382	5.516	0.000
Interpersonal Communication	0.434	0.082	0.345	5.298	0.000
Self-Regulated Learning	0.243	0.093	0.181	2.604	0.010

Source: Primary data processed, 2024.

Based on Table 5, the regression equation can be written as follows:

$$CTS = 0.984 + 0.364DL + 0.434IC + 0.243SRL$$

The regression equation shows that digital literacy, interpersonal communication, and self-regulated learning have positive coefficients. A one-unit increase in digital literacy is associated with a 0.364 increase in students' critical thinking skills, assuming other variables remain constant. A one-unit increase in interpersonal communication is associated with a 0.434 increase in students' critical thinking skills. A one-unit increase in self-regulated learning is associated with a 0.243 increase in students' critical thinking skills. These interpretations should be understood within the context of a non-experimental survey design.

The coefficient of determination is presented in Table 6.

Table 6. Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.755	0.570	0.561	4.677

Source: Primary data processed, 2024.

Table 6 shows that the R value was 0.755, indicating a strong relationship between digital literacy, interpersonal communication, self-regulated learning, and students' critical thinking skills. The R Square value was 0.570, while the Adjusted R Square value was 0.561. This means that digital literacy, interpersonal communication, and self-regulated learning explained 56.1% of the variation in students' critical thinking skills. Meanwhile, the remaining 43.9% was explained by other variables not examined in this study, such as intelligence, self-efficacy, parental support, learning facilities, learning motivation, classroom climate, and teaching strategies.

The F-test showed an F value of 64.776, which was higher than the F-table value of 2.67, with a significance value of 0.000. This indicates that digital literacy, interpersonal communication, and self-regulated learning simultaneously had a significant association with students' critical thinking skills. Therefore, the regression model was feasible to explain the relationship among the research variables.

The t-test results showed that all hypotheses were accepted. Digital literacy had a positive and significant association with students' critical thinking skills, as indicated by a t-value of 5.516 and a significance value of 0.000. Interpersonal communication also had a positive and significant association

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with students' critical thinking skills, as indicated by a t-value of 5.298 and a significance value of 0.000. Self-regulated learning had a positive and significant association with students' critical thinking skills, as indicated by a t-value of 2.604 and a significance value of 0.010. These results indicate that students with higher digital literacy, better interpersonal communication, and stronger self-regulated learning tend to have better critical thinking skills in economics learning.

Discussion

The first finding shows that digital literacy is positively and significantly associated with students' critical thinking skills. This finding indicates that students who are able to access, select, evaluate, and use digital information tend to have better critical thinking skills. In economics learning, digital literacy is highly relevant because students often encounter current information related to prices, markets, inflation, consumption, financial behavior, and public policy. These topics require students not only to find information, but also to evaluate whether the information is accurate, credible, and relevant to the economic concepts being studied.

The dominance of digital literacy in this study can be seen from its standardized coefficient, which was the highest among the three independent variables. This suggests that students' ability to deal with digital information is an important factor in supporting critical thinking. Economics learning is closely connected to real-world data and current issues. Therefore, students who can compare digital sources, identify misinformation, and interpret online information are more likely to construct evidence-based arguments. This finding supports Andini et al. (2024), Marnita (2023), and Rochmatika and Yana (2022) who found that digital literacy contributes positively to students' critical thinking skills.

Although students' digital literacy was categorized as high, the result also indicates that digital literacy still needs to be strengthened, especially in relation to critical evaluation of online information. Students may be familiar with digital technology and digital communication, but familiarity with technology does not automatically mean that they are able to think critically in digital spaces. Therefore, economics teachers should not only use digital media as learning tools, but also guide students to evaluate information, compare sources, and analyze digital economic data. Learning activities such as comparing economic news from different websites, checking the credibility of online sources, and interpreting simple economic data can help students develop both digital literacy and critical thinking skills.

The second finding shows that interpersonal communication is positively and significantly associated with students' critical thinking skills. This means that students who have better interpersonal communication tend to have stronger critical thinking skills. Critical thinking does not develop only through individual learning, but also through social interaction. In classroom discussions, students learn

to express ideas, listen to different perspectives, respond to arguments, and clarify their understanding. These activities help students organize their thoughts and evaluate the logic of their arguments.

The descriptive result showed that interpersonal communication obtained the highest percentage score and was categorized as very high. This indicates that students generally had strong communication and social interaction in the classroom. However, high interpersonal communication does not automatically mean that all communication leads to critical discussion. In learning, communication needs to be directed toward academic dialogue, question-and-answer activities, argumentation, and collaborative problem-solving. Because the questionnaire included positive and negative statements, negative items were reverse-coded before interpretation. Therefore, high scores on reverse-coded indicators reflect more positive interpersonal behavior.

In economics learning, interpersonal communication can support critical thinking because many economic topics require students to discuss problems, compare alternatives, and consider different viewpoints. When students discuss economic cases, they are encouraged to explain their reasoning and listen to others' arguments. This process helps students build stronger analytical and evaluative skills. This finding is consistent with Pangestu et al. (2019), Yulianto et al. (2019), and Ahsanudin (2019), who found that interpersonal communication contributes to critical thinking. Therefore, economics teachers should create a classroom environment that supports openness, respect, and dialogic interaction so that students can practice critical thinking through communication.

The third finding shows that self-regulated learning is positively and significantly associated with students' critical thinking skills. This indicates that students who are able to manage their own learning process tend to have better critical thinking skills. Self-regulated learning allows students to set learning goals, select strategies, monitor their progress, and evaluate their understanding. These processes are closely related to critical thinking because students are required to reflect on their learning and assess whether their understanding is sufficient.

In economics learning, self-regulated learning is important because students need to connect concepts with real-life economic phenomena. Students who have good self-regulated learning are more likely to search for additional information, review learning materials, and identify difficulties in understanding economic concepts. This helps them become more active and reflective learners. The finding supports Anugraheni and Adhistana (2023), Roslinda et al. (2022), Ghimby (2022) who found that self-regulated learning is related to critical thinking.

However, the standardized coefficient of self-regulated learning was lower than those of digital literacy and interpersonal communication. This may indicate that students' independent learning habits

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still require structured support from teachers. One possible explanation is that senior high school students may still experience teacher-directed learning environments, where teachers provide learning materials, explanations, and structured guidance. As a result, although students may demonstrate responsibility in completing learning tasks, their ability to independently plan learning objectives, select learning strategies, monitor progress, and evaluate their own understanding may not yet be fully developed. In economics learning, this condition may become more apparent because understanding economic concepts requires students to independently explore current issues, evaluate diverse sources of information, and connect theoretical concepts with real-world situations. Therefore, self-regulated learning may become more effective when teachers provide scaffolding through structured assignments, reflective journals, independent projects, and continuous feedback.

Overall, the findings show that critical thinking skills in economics learning are supported by three complementary factors. Digital literacy helps students evaluate information, interpersonal communication helps students exchange ideas and build arguments, and self-regulated learning helps students manage their own learning process. Among these factors, digital literacy had the strongest relative contribution, which reflects the importance of digital information evaluation in economics learning. These findings imply that economics teachers should integrate digital-based learning, classroom discussion, and independent learning activities. For example, teachers may design activities in which students analyze and synthesize digital economic news related to inflation, market changes, or consumer behavior, evaluate the credibility of information sources, and discuss their interpretations through collaborative classroom forums or online discussion platforms. Students may then complete reflective tasks by explaining their reasoning, evaluating different perspectives, and identifying how their understanding of economic issues develops. By combining these strategies, students can be encouraged to become more critical, reflective, and responsible learners.

Conclusion

This study examined the association between digital literacy, interpersonal communication, self-regulated learning, and students' critical thinking skills in economics learning at SMA Negeri 1 Sidareja. The findings show that the three predictors are positively and significantly associated with students' critical thinking skills, with digital literacy showing the strongest relative contribution. These results indicate that critical thinking in economics learning is supported not only by students' independent learning habits, but also by their ability to evaluate digital information and engage in meaningful classroom interaction. The main contribution of this study is the integration of digital literacy,

interpersonal communication, and self-regulated learning into a single empirical model for explaining students' critical thinking skills in senior high school economics learning. Practically, economics teachers are encouraged to design learning activities that involve source evaluation, case-based discussion, collaborative problem-solving, and reflective independent tasks. This study is limited to grade XI students at one senior high school and uses self-reported questionnaire data to measure all variables, including critical thinking skills. Therefore, future research should involve broader samples from different schools and educational contexts to improve the generalizability of the findings. Future studies may also employ longitudinal or experimental designs to further examine the relationship between these factors and students' critical thinking skills. In addition, the use of more objective measures, such as performance-based critical thinking tests, observations, or interviews, is recommended to complement self-reported questionnaire data.

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