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COMPUTATIONAL THINKING OF ACCOUNTING STUDENTS IN TERMS OF CRITICAL THINKING AND PROBLEM-SOLVING SKILLS

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ABSTRACT

Initially computational thinking was associated with informatics, even as a part of that field of science. However, according to different expert opinions, computational thinking can be incorporated into other fields of knowledge and real life. In addition, computational thinking is also still low for students at Vocational Schools majoring in accounting. Thus, computational thinking is a variety of knowledge and real-life areas that are influenced by critical thinking and problem-solving factors. The purposes of this research are (1) to find out whether there is an effect of critical thinking skills on computational thinking, (2) to find out whether there is an effect of problem-solving skills on computational thinking, and (3) to find out whether there is an effect of critical thinking skills and problem-solving skills. towards computational thinking. The research method used was a quantitative explanation. The sample used was convenience sampling, namely students majoring in accounting in Malang City. Methods of data collection using a questionnaire. Data analysis using multiple linear regression. The results of this study indicate that (1) Critical thinking skills had a significant positive effect on the computational thinking of students majoring in Accounting in Malang City. (2) Problem solving skills does not affect the computational thinking of students majoring in Accounting in Malang City. (3) Critical thinking skills and problem-solving skills effect simultaneously or jointly on the computational thinking of Accounting Department students in Malang City.

Keywords: *Computational thinking, critical thinking, problem-solving, student, accounting.*

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INTRODUCTION

Computational thinking has emerged as a competency in recent years due to the rapid implementation of digital technology, not only in the industrial sector but also in education systems, administration, and management systems, as well as the higher education sector (Bilbao et al., 2021). Computational thinking, also known as "berpikir komputasi" in Indonesian, encompasses various fields of knowledge and real-life applications, involving skills and abilities such as problem-solving in various everyday situations, not limited to computer science (Bilbao et al., 2021; Angraini et al., 2022; Sari et al., 2022). With computational thinking, students will understand and practice thinking systematically, rationally, and critically (Sukamto et al., 2019; Fajri et al., 2019; Putra et al., 2019).

In developed countries, computational thinking has been widely implemented in education, and even the United Kingdom stands out as a pioneering country that confidently included computational thinking in its curriculum in 2012 (Kuswanto et al., 2020). Furthermore, various advanced Asian countries have taken action to introduce computational thinking, each adopting their own approaches. Singapore, for instance, has proclaimed computational thinking as a "national capability," reflecting a part of Singapore's campaign for a "Smart Nation" (Seow et al., 2019). Malaysia, commonly known as a neighboring country, has also actively participated in implementing the integration of computational thinking in education since 2017 (Ling et al., 2018).

In Indonesia, efforts to implement computational thinking have indeed begun, and one notable study conducted by Angraini et al. (2022) focused on instructional materials based on interactive multimedia to enhance computational thinking. The research demonstrated that students who received interactive multimedia instructional materials showed an increase in their mathematical computational thinking skills compared to those who received solely conventional approaches. Therefore, computational thinking holds significant importance for students in this rapidly developing digital era.

Initially, computational thinking was primarily associated with informatics, even considered as a subset of that scientific field. Consequently, many researchers still directly link computational thinking with skills such as programming, coding, and others (Swaid, 2015; Mannila et al., 2014; Román-González et al., 2017). However, according to different authors, computational thinking can be applied to various other fields of knowledge and real-life situations (Wing, 2010; Grover & Pea, 2013; Bilbao et al., 2017). Gradually, it is gaining a foundation in academic plans across different countries and is being integrated into educational systems. As a result, computational thinking can be applied to various fields beyond just informatics (Dagiene & Stupuriene, 2016; Varela et al., 2019; Angeli & Giannakos, 2020). Hence, the indicators of computational thinking, such as decomposition, pattern recognition, abstraction, and algorithm, can be applied to other fields, including accounting, for students majoring in accounting. Additionally, it has been found that computational thinking skills are still low among students in Vocational Schools majoring in Accounting (Bilbao et al., 2021).

The previous research gaps are diverse, effected by various factors, and it is suggested to add or replace certain variables due to the lack of effect. In some studies, the questionnaire results only provided binary options "yes" or "no" (Youjun & Xiaomei, 2022), some studies were conducted only in specific countries, such as Romania (Harangus & Kátai, 2020), or limited to one country, like Mexico, and collected data during the Covid-19 pandemic. Moreover, research by Su & Yang (2023) recommended conducting research in developing countries, as there have been numerous studies on computational thinking in developed countries such as the United States, Greece, Spain, Portugal, and the United Kingdom. Previous research by Kuswanto et al. (2020) examined the relationship between mathematical abilities and computational thinking in primary school-age students, and the results indicated no significant correlation; in fact, there was a negative correlation. This was likely due to the presence of other factors, such as critical thinking skills and problem-solving abilities, influencing the outcomes. Based on the research by John Lemay et al. (2021) regarding the relationship between computational thinking and academic performance, the study found a positive correlation. However, the research had some limitations, effected by other factors such as teaching methods and student learning outcomes. While the scope of the teaching factor is extensive, the learning outcomes factor has been investigated in a study by Susanti (2019), which found a positive relationship between computational thinking and learning outcomes. Additionally, according to the research conducted by Harangus & Kátai (2020) on the relationship between problem-solving and computational thinking, there was a significant connection between the two. Nonetheless, the variables could be retested and studied more comprehensively, as recommended by Kuswanto et al. (2020) due to the limitations and recommendations from this research, it is essential to include an additional variable, namely critical thinking skills, to conduct further in-depth research.

In a previous study conducted by Rahman (2022) on the integration of computational thinking into the EDP-STEM (Engineering Design Process-Science, Technology, Engineering, and Mathematics) model to enhance the critical thinking skills of junior high school students, the findings revealed that the integration of computational thinking with SimSketch modeling could be successfully implemented to improve students' critical thinking abilities. In other words, the integration of computational thinking was well-executed and significantly enhanced students' thinking skills. Furthermore, research by Sugiyarta (2021) focused on developing e-LKPD (Electronic Student Worksheets) with linear programming content using a computational thinking approach to improve students' critical thinking skills. The research results indicated that the use of e-LKPD with linear programming content, combined with a computational thinking approach, effectively and practically enhanced students' critical thinking abilities during the learning process.

Furthermore, a previous study by Pratiwi & Akbar (2022) on the effect of the problem-based learning model on computational thinking skills showed that there was a significant effect of the problem-based learning model on computational thinking skills. This means that using a problem-based learning approach has a stronger impact on students' computational thinking skills compared to conventional learning methods, and students who possess computational thinking skills will excel in problem-solving. Then, the research conducted by Dewi et al. (2021) on the effect of science learning with a computational thinking approach using Scratch as an aid to problem-solving abilities, showed significant positive results. The study demonstrated that science learning with a computational thinking approach using Scratch had a substantial effect on problem-solving abilities, leading to significant improvements in problem-solving skills among students, with a high level of achievement. By employing computational concepts, students can effectively tackle problems.

Thus, the objectives of this research were (1) to determine whether there is an effect of critical thinking skills on computational thinking, (2) to determine whether there is an effect of problem-solving skills on computational thinking, and (3) to determine whether there is a simultaneous effect of critical thinking skills and problem-solving skills on computational thinking. The contribution of this research is expected to provide explanations that can serve as a basis for reflection, support, and input for decision-makers in further research to delve deeper into computational thinking. Additionally, it aims to obtain information on the research direction that yields results in line with the problem statement.

In the explanation above, the author intended to examine "Computational Thinking of Accounting Students in Relation to Critical Thinking Skills and Problem-Solving Skills" in Malang City. This was done because these variables were recommended by previous researchers. Furthermore, this research had novelty in its subject, as it focused on students majoring in Accounting, which had not been studied previously in the context of computational thinking in the Malang City.

Computational thinking (CT) guides the brain to think logically and critically. Additionally, CT involves algorithmic thinking, which means thinking by organizing activities to solve problems in a sequence that is systematic, structured, and understandable to individuals (Kawuri et al., 2019; Maharani, 2020). Therefore, computational thinking is highly essential for students to possess, as it equips learners with valuable skills. Furthermore, CT is considered by experts as a means to understand and address complex problems using computational concepts and techniques, such as decomposition, pattern recognition, abstraction, and algorithms. These skills are seen as crucial in supporting various aspects of education in the 21st century (Ansori, 2020).

There are four indicators of computational thinking, as referenced from (Tabesh, 2017; Gadanidis, 2017; Sung et al., 2017; Kale et al., 2018). (1) Decomposition is the ability to break down complex data, processes, or problems into smaller and more manageable parts; (2) Pattern recognition is the ability to identify similarities or differences in patterns, trends, and regularities within data, then can be used to generate predictions and present the data itself; (3) Abstraction is the process of generalizing and identifying general principles that create patterns, trends, and regularities within data or information; (4) Algorithms are a set of instructions developed to solve the same problem sequentially, allowing others to utilize the information to address the same problem.

Therefore, according to (Wing, 2010; Grover & Pea, 2013; Bilbao et al., 2017), it can be concluded that computational thinking aims to solve problems from various fields of knowledge. In the four indicators, data is converted into the Bloom's Taxonomy domain, specifically at the analysis level (C4) (Kuswanto et al., 2020).

There are several relevant factors from previous research, including: (1) Research conducted by Angraini et al. (2022) concluded that there was an improvement in the mathematical computational thinking abilities of college students who received interactive multimedia teaching materials compared to students who received conventional complete learning approaches. (2) Research by Ramadhan et al. (2020) found that extracurricular activities enabled students to solve problems in new ways, as computer games using visual programming languages trained students in logical concepts, helping them to solve problems systematically. (3) Based on research by Kuswanto et al. (2020) indicate that there is no statistically significant relationship between the effect of computational thinking abilities and mathematical skills, and the correlation direction is negative. Therefore, it can be concluded that there is no significant relationship between een computational thinking skills of elementary school-age children and mathematical skills. (4) Based on research by Harangus & Kátai (2020) there is a significant relationship between family background and students' own performance in computational thinking. Additionally, for college students, there is a relationship between the reading comprehension level and problem-solving skills towtowardmputational thinking. (5) Research conducted by Youjun & Xiaomei (2022) concluded that computational thinking is associated with language competence. (6) A study conducted by John Lemay et al. (2021) found a relationship between CT skills and academic performance. (7) Another research by Bilbao et al. (2021) stated that there is a relationship between computational thinking and abstraction abilities, indicating that some students struggle with abstraction. There are also instances of students facing difficulties in algorithmic thinking. (8) Research by Diantary & Akbar (2022) aimed at measuring computational thinking abilities through a test and found no significant difference between the two schools with different accreditation statuses. However, the measurable computational thinking abilities were observed among students with lower grades.

In the description of the relevant research findings, it can be concluded that there are several differences between previous research and the research on computational thinking concerning critical thinking skills and problem-solving abilities. Namely: (1) differences in the research variables used, (2) the usage of research subjects, (3) differences in theory, and (4) variations in research methodologies employed, which serve as a reference in determining the measurement tools for each variable, thus resulting in different indicators used in the studies.

Critical thinking skills are crucial abilities in both the field of education and daily life routines. Critical thinking is a cognitive skill that is essential and must be learned by students as it enables them to solve problems and make informed decisions. It allows individuals to analyze, judge, replace, or improve their thoughts to make accurate decisions (Khasanah & Ayu, 2019). Furthermore, critical thinking involves seeking logical solutions to make decisions and take action. It emphasizes a conscious understanding of the subject matter and aims to achieve specific objectives by evaluating and selecting the most appropriate options for decision-making (Komariyah et al., 2018).

According to experts, it can be said that critical thinking is the ability of an individual to observe a problem comprehensively, then analyze the information received, and critically evaluate its validity to make a decision. Additionally, critical thinking is closely related to computational thinking. This is because computational thinking requires students to think critically, as they need to analyze and solve problems using logical and systematic approaches. Therefore, critical thinking skills play a significant role in the development of computational thinking abilities in individuals.

According to Ennis (2011) the indicators of critical thinking skills that students should possess are as follows: 1) identifying the main points of a problem; 2) providing necessary evidence to solve a problem; 3) establishing logical, relevant, and accurate arguments; 4) generating multiple solutions to a problem; 5) determining the consequences of using a statement to make a decision.

H_1: There is a significant effect of critical thinking skills on computational thinking.

Problem-solving skills are fundamental abilities for resolving issues that involve critical, logical, and systematic thinking, which individuals must possess and utilize in various aspects of daily life (Wardani & Sutama, 2015; Kaya et al., 2014). Additionally, according to (Amalia et al., 2017; Siahaan & Surya, 2020) problem-solving skills can help develop, enhance, and foster creativity. The ability to solve problems will develop swiftly when individuals acquire new skills through problem-solving activities. Therefore, overcoming problems plays a crucial role as a foundational skill for learners to form concepts and succeed in problem-solving activities.

Based on expert reviews, problem-solving skills can be described as the ability to solve various problems in daily life by having critical, logical, and systematic thinking, which helps enhance an individual's creativity and competence in problem-solving. Furthermore, problem-solving skills are closely related to computational thinking. This is because computational thinking demands that students be able to overcome problems.

Indicator of problem-solving skills collaborated from (Wardani & Sutama, 2015) and (Hamiyah & Jauhar, 2014) includes four indicators, including: 1) understanding the problem; 2) planning the solution; 3) solving the problem according to the plan; and 4) performing a reevaluation in all steps.

H_2: There is a significant effect of problem-solving skills on computational thinking.

H_3: There is a simultaneous significant effect of critical thinking skills and problem-solving skills on computational thinking.

RESEARCH METHOD

The research was classified as explanatory quantitative research and consisted of independent variables (X) and dependent variables (Y) among students majoring in Accounting in the Malang City. The involvement of the independent variables and dependent variables was illustrated in the diagram below.

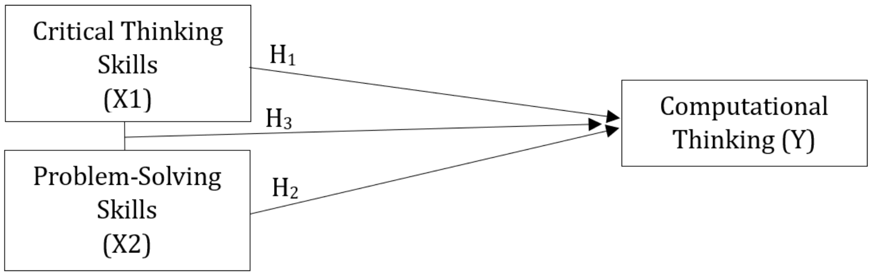

Figure 1.
Research Design

The source and type of data used in the research were primary data. Primary data refers to data that the researcher directly obtains from the subjects or objects of the study or through direct observation of an event, making it original data (Sugeng, 2020). The source and type of data used in the research were primary data. Primary data refers to data that the researcher directly obtains from the subjects or objects of the study or through direct observation of an event, making it original data.

To avoid misunderstandings or misinterpretations of the terms used in this research, it is necessary to clarify the meanings of each term as follows. (1) Computational Thinking (Variable Y). Computational thinking is the extent to which students can think computationally, which includes decomposition, the ability to break down data or problems into smaller parts; pattern recognition, the ability to identify similarities or differences in patterns; abstraction, the process of generalizing and identifying general principles to create patterns, trends, and consistencies; and algorithms, the development of step-by-step instructions to solve problems sequentially, enabling others to use the information to address similar problems.

(2) Critical Thinking Skills (Variable X_1). Critical thinking skills that students should possess include: 1) formulating the main points of a problem; 2) presenting

necessary evidence to solve a problem; 3) establishing logical, relevant, and accurate arguments; 4) determining solutions with multiple alternatives; 5) identifying the consequences of using a statement to make a decision.

(3) Problem-Solving Skills (Variable X_2). Problem-solving skills that students are required to possess include: 1) understanding the problem; 2) planning the solution; 3) implementing the solution according to the plan; and 4) performing reevaluation at every step.

In this current research, the data collection technique used was a Likert scale questionnaire. With the questionnaire technique, research data was obtained by distributing questionnaires to selected respondents as the research sample. The respondents filled out the questionnaire, and then the data was tested for validity and reliability. The sample size in this research used convenience sampling, which means the sample was determined based on availability and ease of access. In other words, the sample selected was those individuals who were present at the right place and time without considering strata within the population members randomly (Putri, 2020).

In the research instrument, a questionnaire with a Likert scale using four points was used, as follows: a) Strongly Agree with a score of 4; b) Agree with a score of 3; c) Disagree with a score of 2; and d) Strongly Disagree with a score of 1. The following were the indicators for each variable:

Table 1.
Instrument Items for Variables

Variable	Indicator	Item Number
Critical Thinking Skills (X_1)	1) Formulating the main points of a problem	1, 2, 3
	2) Presenting necessary evidence to solve a problem	4, 5, 6
	3) Establishing logical, relevant, and accurate arguments	7, 8, 9
	4) Determining solutions with multiple alternatives	10, 11, 12
	5) Identifying the consequences of using a statement to make a decision	13, 14, 15
Problem-Solving Skills (X_2)	1) Understanding the problem	1, 2, 3
	2) Planning the solution	4, 5, 6
	3) Implementing the solution according to the plan	7, 8
	4) Performing reevaluation at every step	9, 10
Computational Thinking (Y)	1) Decomposition	1, 2
	2) Pattern Recognition (Pattern Recognition)	3, 4
	3) Abstraction	5, 6
	4) Algorithms	7, 8

Based on the categories of the research instrument items that were described, to achieve the intended results, the instrument had to undergo testing. The following

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was the tool for instrument validation. The use of validity was conducted to demonstrate and confirm how well the conceptual measurement needed to be measured. The validity testing in this study used Pearson's Product Moment analysis. The calculated r_{-value} was referenced to the r_{-table} value at a significance level of 5%. If the calculated r_{-value} was > r_{-table}, then the instrument items were considered valid. However, if the calculated r_{-value} was < r_{-table}, then the instrument items were considered not valid (Sugeng, 2020). Therefore, the results of the validity test could be presented in the following table.

Table 2.
Validity Test Results

Variable Name	Item	r tabel N= 16	r value	Description
Critical Thinking Skills	1	0,497	0,538	Valid
	2	0,497	0,775	Valid
	3	0,497	0,671	Valid
	4	0,497	0,709	Valid
	5	0,497	0,761	Valid
	6	0,497	0,687	Valid
	7	0,497	0,275	Not Valid
	8	0,497	0,704	Valid
	9	0,497	0,709	Valid
	10	0,497	0,131	Not Valid
	11	0,497	0,593	Valid
	12	0,497	0,716	Valid
	13	0,497	0,808	Valid
	14	0,497	0,589	Valid
	15	0,497	0,609	Valid
Problem Solving Skills	1	0,497	0,423	Not Valid
	2	0,497	0,738	Valid
	3	0,497	0,687	Valid
	4	0,497	0,738	Valid
	5	0,497	0,701	Valid
	6	0,497	0,777	Valid
	7	0,497	0,831	Valid
	8	0,497	0,767	Valid
	9	0,497	0,510	Valid
	10	0,497	0,173	Not Valid
Computational Thinking	1	0,497	0,715	Valid
	2	0,497	0,750	Valid
	3	0,497	0,635	Valid
	4	0,497	0,877	Valid
	5	0,497	0,630	Valid
	6	0,497	0,864	Valid
	7	0,497	0,611	Valid
	8	0,497	0,597	Valid

Based on Table 2, there were statements that were not valid. Therefore, those statements were excluded, meaning they were not distributed to the sample used for the research analysis. Subsequently, a reliability test was conducted to understand the stability of the measurement tool, whether the tool would be reliable and consistent with repeated testing. The reliability test for the current research used Cronbach's Alpha analysis, where the research instrument was considered reliable if the Cronbach's Alpha value was ≥ 0,7 (Sugeng, 2020). The obtained reliability test values were presented in the following table.

Table 3.
Reliability Test Results

Nama Variabel	Cronbach's Alpha	Description
Critical Thinking Skills	0,890	Reliable
Problem Solving Skills	0,831	Reliable
Computational Thinking	0,848	Reliable

Source: Data processed using SPSS

Before testing the hypothesis, there are assumptions that need to be tested using classical assumption tests through:

Table 4.
Prerequisite Test

Normality Test	Multicollinearity Test	Heteroscedasticity Test
The normality test is used to determine whether the independent and/or dependent variables are normally distributed in the regression model or not. If the variables are not normally distributed, it may affect the statistical test results. The normality test is conducted using the Kolmogorov-Smirnov test. If the test shows a normal distribution with a significance level > 0,05, it indicates that the data follows a normal distribution. However, if the significance level is < 0,05, it means the data is not normally distributed	Next, there is a test for multicollinearity, which examines whether there is a correlation among the independent variables in the regression model. Multicollinearity can be tested using two methods: VIF (variance inflation factor) and tolerance value, by testing each independent variable. If the VIF value is ≤ 10 and the tolerance value is ≥ 0,1, it indicates that there is no multicollinearity in the data. However, if the VIF value is ≥ 10 and the tolerance value is ≤ 0,1, it indicates the presence of multicollinearity	Next, the heteroscedasticity test examines whether there are different residual variances among all observations in the regression model. A good regression model should not exhibit heteroscedasticity. The decision basis is if there is a specific pattern present, indicating the presence of heteroscedasticity. If there is no clear pattern and the points are scattered above and below the zero line on the Y-axis, it indicates the absence of heteroscedasticity

Source: (Ghozali, 2016)

In addition, to determine the extent of the effect of independent variables on the dependent variable, multiple linear regression analysis was performed using hypothesis testing. In other words, the partial test (T-test) was used to examine the effect of each independent variable on the dependent variable (Ghozali, 2016). The significance level used for the testing was 0.05 or 5%. The decision criteria for the testing were as follows. (1) If the p-value > 0,05, then the independent variable did not have a significant effect on the dependent variable; (2) If the p-value ≤ 0,05, then the independent variable had a significant effect on the dependent variable.

Furthermore, the F-test was applied to demonstrate whether all the independent variables in the model had a joint or simultaneous effect on the dependent variable. The independent variables were considered to have a significant effect if the p-value was < 0,05. The F-test could be detected when the calculated F-value was greater than the tabulated F-value, indicating that the model's variables satisfied the hypothesis acceptance criteria.

RESULTS AND DISCUSSION

The current study focused on analyzing students majoring in accounting at vocational high schools in Malang City as the study population. The sample size was determined using convenience sampling, which involved selecting samples based on their availability and accessibility. A Likert scale questionnaire was used, with responses ranging from: a) Strongly Agree with a score of 4; b) Agree with a score of 3; c) Disagree with a score of 2; and d) Strongly Disagree with a score of 1. The questionnaire was distributed to four schools in Malang City, comprising twenty-nine (29) statements, and involved two (2) independent variables and one (1) dependent variable. The following are the results of the research analysis.

Descriptive Statistical Test Results

The results of the descriptive statistical analysis, which included the minimum value, maximum value, mean, and standard deviation for each variable, were presented in the following table.

Table 5.
Results of Descriptive Statistical Analysis

Descriptive Statistic					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Critical Thinking Skills	33	31,00	47,00	39,8182	3,20600
Problem Solving Skills	33	20,00	26,00	23,8485	1,27772
Computational Thinking	33	19,00	32,00	23,3030	2,59187
Valid N (listwise)	33				

In the figure above, the following are explanations for each variable.

1. Critical Thinking Skills

This variable was obtained using thirteen (13) statements from 33 respondents. According to the results, it was found that the average response (mean) of the respondents regarding Critical Thinking Skills was 39,8182, indicating that the respondents agreed with the statements used for this variable. The variable had a minimum value of 31.00. Furthermore, it had a maximum value of 47,00, indicating the highest response, which was "Strongly Agree". The variable also had a standard deviation value of 3,20600, showing variability in this variable. The standard deviation value of 3,20600 > 1 indicated that the data distribution of this variable was diverse. Therefore, since the standard deviation value was less than the mean value, the mean value could be used as a representation of the entire dataset.

2. Problem-Solving Skills

This variable was obtained using eight (8) statements from 33 respondents. According to the figure, it was found that the average response (mean) of the respondents regarding Problem-Solving Skills was 23,8485, indicating that the respondents agreed with the statements used for this variable. The variable had a minimum value of 20,00, indicating the lowest response on this variable was "Disagree". Furthermore, the variable had a maximum value of 26,00, indicating the highest response, which was "Strongly Agree". The variable also had a standard deviation value of 1,27772, showing variability in this variable. The standard deviation value of 1,27772 > 1 indicated that the data distribution of this variable was diverse. Therefore, since the standard deviation value was less than the mean value, the mean value could be used as a representation of the entire dataset.

3. Computational Thinking

This variable was obtained using eight (8) statements from 33 respondents. According to the figure, it was found that the average response (mean) of the respondents regarding Computational Thinking was 23,3030, indicating that the respondents agreed with the statements used for this variable. The variable had a minimum value of 19,00, indicating the lowest response on this variable was "Strongly Disagree". Furthermore, the variable had a maximum value of 32,00, indicating the highest response, which was "Strongly Agree". The variable also had a standard deviation value of 2,59187, showing variability in this variable. The standard deviation value of 2,59187 > 1 indicated that the data distribution of this variable was diverse. Therefore, since the standard deviation value was less than the mean value, the mean value could be used as a representation of the entire dataset.

Results of Classic Assumption Test

1. Normality Test

This test aimed to determine whether the regression model was normally distributed or not. A good regression model should have normally distributed residual values. In the current study, the Kolmogorov-Smirnov test was used to test normality with the assistance of SPSS software. The results of the normality test are shown in the following table.

Table 6.
Results of Normality Test

Variable Name	Asymp.Sig	A
Critical Thinking Skills (X_1) Problem Solving Skills (X_2) Computational Thinking (Y)	0,26	0,05

Source: Data processed using SPSS

Based on the results of the test, it can be concluded that the data in this study was normally distributed. This was indicated by the value of asymp.sig > A, which was 0,26 > 0,05.

2. Multicollinearity Test

This test was conducted to determine the presence of relationships between independent variables (Ghozali, 2016). A good regression model should not have multicollinearity, which means no correlation exists between independent variables. The multicollinearity test in this study is shown in the values of tolerance and variance inflation factors (VIF) in the table below.

Table 7.
Results of Multicollinearity Test

Variable Name	*Tolerance*	VIF	Description
Critical Thinking Skills (X_1)	0,663	1,508	No multicollinearity
Problem Solving Skills (X_2)	0,663	1,508	No multicollinearity

Source: Data was processed using SPSS

In the table, it can be observed that both independent variables had tolerance values > 0,1 and VIF (Variance Inflation Factors) < 10, indicating the absence of multicollinearity between the independent variables in the regression model.

3. Heteroskedasticity Test

This test was conducted to determine whether the variance between the values of Y (dependent variable) was constant or varied (Suharyadi & Purwanto, 2015). A good regression model should have scattered points without forming specific patterns on the graph. The test in this study was performed using a Scatterplot, which allowed us to visualize the relationship between the predicted values of the dependent variable (ZPRED) and their residuals (SRESID), as shown in the following figure.

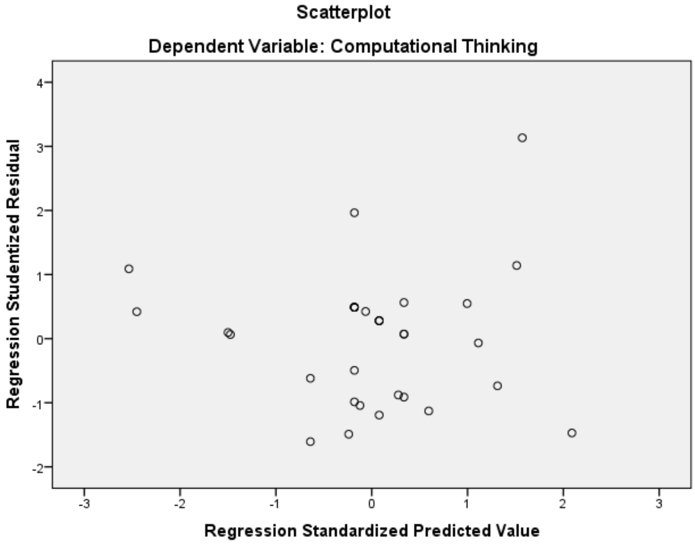

Figure 2.
Result of Heteroskedasticity Test
(Source: Data processed using SPSS)

Based on the above graph, it can be observed that in the scatterplot, the points are randomly scattered both above and below the zero line on the Y-axis, and there is no clear pattern. In other words, it can be concluded that the regression model in this study does not exhibit heteroskedasticity.

Hypothesis Testing Results

Multiple Linear Regression analysis was used to test all hypotheses in this study, including:

1. T-Test

Partial testing (T-Test) was conducted to examine the effect of independent variables on the dependent variable (Ghozali, 2016). The results of the T-Test were depicted below.

Table 8.
T-Test Results

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-1,461	6,879		-,212	,833
Critical Thinking Skills	,425	,140	,526	3,031	,005
Problem Solving Skills	,329	,352	,162	,934	,358
Dependent Variable: Computational Thinking					

Source: Data processed using SPSS

The Effect of Critical Thinking Skills on Computational Thinking

Based on the Sig. value, which represents the effect of X_1 on Y, i.e., 0,005 ≤ 0,05, and the t-value of 3,031 > t-table (critical value) of 2,042, it can be stated that H_1 is accepted, indicating that critical thinking skills have a positive effect on computational thinking. The results of the first hypothesis indicate that as students' critical thinking skills increase, their computational thinking also improves. This means that students' critical thinking skills are well-developed, which in turn affects their computational thinking.

This is consistent with the studies conducted by (Rahman, 2022; Sugiyarta, 2021), which state that critical thinking skills have an impact on computational thinking. Critical thinking skills enable students to have excellent computational thinking and make it easier for them to accomplish their tasks. Students will rely on their critical thinking skills to solve problems, and the higher their critical thinking skills, the more refined their computational thinking will be. In other words, students' computational thinking is effected by their critical thinking abilities.

The Effect of Problem-Solving Skills on Computational Thinking

Based on the results, it was observed that the effect of problem-solving skills (X_2) on computational thinking (Y) was not significant. The calculated Sig. value was 0,358, which was greater than the significance level of 0,05. Additionally, the calculated t value of 0,934 was less than the t-table value of 2,042. Therefore, it was concluded that the hypothesis regarding the effect of problem-solving skills on computational thinking (H_2) was not supported. In other words, the problem-solving skills of the accounting students did not have a significant impact on their computational thinking abilities.

This condition is not in line with the study conducted by (Harangus & Kátai, 2020), which indicates that problem-solving skills are related to computational thinking. The explanation is that there are several possible reasons for this discrepancy. One possibility is that the study only used the term "relationship," which means it did not demonstrate a direct effect between the two variables. Additionally, the difference could be attributed to the fact that the study was conducted in Romania, where the problem-solving skills of students may due to their backgrounds and surrounding environments.

2. F-Test

In this test, the F-test was used to determine whether all independent variables in the model had a significant collective or simultaneous effect on the dependent variable. The results of this test were shown in the ANOVA output, which included.

Table 9.
Results of the F-test

ANOVA[a]					
Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	86,334	2	43,167	10,067	,000[b]
Residual	128,636	30	4,288		
Total	214,970	32			

Dependent Variable: Computational Thinking
Predictors: (Constant), Problem Solving Skills, Critical Thinking Skills

The Effect of Critical Thinking Skills and Problem-Solving Skills on Computational Thinking

Based on the data above, it was observed that the significance value for the simultaneous effect of X_1 and X_2 on Y was 0,000 < 0,05, and the calculated F-value was 10,067 > the critical F-value of 3,30. Therefore, H_3 was accepted, indicating a positive simultaneous or collective effect of critical thinking skills and problem-solving skills on computational thinking. The results of the third hypothesis suggested that the higher the simultaneous effect of students' critical thinking skills and problem-solving skills, the better the computational thinking skills they exhibited. This implied that the students' critical thinking skills and problem-solving skills were well-developed, thus influencing their computational thinking abilities.

This is in line with the research conducted by (Dewi et al., 2021; Pratiwi & Akbar, 2022; Rahman, 2022; Sugiyarta, 2021), which shows that when both critical thinking skills and problem-solving skills are considered together or simultaneously, they have an impact on computational thinking. The findings of H1 indicate that critical thinking skills effect computational thinking, while the findings of H2 suggest that problem-solving skills do not effect computational thinking. However, when both variables are considered together or simultaneously, namely critical thinking skills and problem-solving skills, they have a positive effect on computational thinking. This difference occurs because while problem-solving skills alone do not effect computational thinking, when combined with critical thinking skills and applied simultaneously, they do have an impact on computational thinking.

Furthermore, this finding is of significant importance in understanding the factors influencing the computational thinking of accounting students, which have been discussed in this research, namely critical thinking skills and problem-solving abilities. The novelty of this study lies in its application to accounting students in vocational high school in Malang City, where, based on the phenomenon of the computational thinking gap, research is typically conducted by computer science students, and studies on computational thinking are often limited to developed countries. Therefore, the significance of this research lies in its implementation in a developing country, as in the case of Indonesia.

CONCLUSION

Based on the results and discussions presented in this research, the following conclusions were drawn. (1) Critical thinking skills had a significant positive effect on the computational thinking of accounting students in Malang City. This indicated that as students' critical thinking skills improved, their computational thinking also increased; (2) Problem-solving abilities did not have a significant effect on the computational thinking of accounting students in Malang City; (3) Critical thinking skills and problem-solving abilities had a simultaneous or joint effect on the computational thinking of accounting students in Kota Malang.

Furthermore, this research had several limitations: (1) The research was limited to only four vocational high school in Malang City as the study's object. This restricted the scope and may not fully represent all accounting students in Kota Malang. (2) The obtained research sample was insufficient to adequately represent accounting students in Malang City. (3) The research employed an online questionnaire, and the researchers could not control the filling process, which may have led to respondents providing answers that do not accurately reflect their actual conditions.

Based on the results, discussions, and conclusions of the research, several suggestions or implications for future studies were proposed: (1) Future research should aim to increase the sample size to enhance the generalizability of the study's findings. (2) During the distribution of questionnaires, researchers should implement measures to control respondents' filling process. Ensuring that respondents answer the statements accurately and carefully will lead to more reliable and reflective outcomes. (3) Subsequent researchers could consider expanding the scope of the study by introducing new variables, both independent and potentially including moderating or intervening variables.

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