Do English Proficiency and Digital Competence Promote Academic Achievement? The Mediating Role of Critical Thinking Skills

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Abstract

English proficiency and digital competence have become two essential skills in the academic world amidst the current era of globalization and digitalization. Students with strong English language skills and adequate digital competence are expected to perform better academically. Additionally, critical thinking skills are regarded as a key factor in enhancing analytical abilities and problem-solving related to academic achievement. This study focuses on the impact of English proficiency and digital competence on students' academic achievement, with critical thinking skills as a mediating variable. The research employs a quantitative approach using a survey method and Structural Equation Modeling-Partial Least Squares (SEM-PLS) data analysis to examine the relationships between the variables. A purposive sampling technique was applied to select students meeting specific criteria, resulting in a sample of 122 students from Malang, Indonesia. Data were collected through an online questionnaire designed to measure English proficiency, digital competence, critical thinking skills, and academic achievement. The results show that both English proficiency and digital competence significantly influence academic performance, directly and through the mediating role of critical thinking skills. The key findings suggest that students who possess higher levels of these competencies exhibit stronger critical thinking abilities, which in turn positively affects their academic outcomes. The implications of this study are globally relevant, as they highlight the importance of integrating English language learning, digital literacy, and critical thinking into educational curricula to improve academic success. Educational institutions and policymakers can utilize these insights to better prepare students for the challenges of an increasingly digital and interconnected world.

Corresponding Author: Suhartono, suhartono.unpkdr@gmail.com

1. Introduction

In the current era of globalization and digitalization, English proficiency and digital competence have become two essential skills that significantly influence students' academic success. English, as an international language, provides access to a broader range of scientific resources, academic publications, and global connections within the education sector. Digital competence, on the other hand, encompasses students' abilities to effectively use information and communication technology to support learning processes, access digital materials, and collaborate online. Research by (Ocvita et al., 2023) indicates that students with strong digital competence tend to perform better academically because they are able to use technology for independent learning, organizing information, and boosting academic productivity. Furthermore, critical thinking skills also play a crucial role in academic performance as these skills enable students to analyze information deeply, evaluate arguments, and develop creative solutions to complex problems.

On the international stage, English proficiency and digital competence are prioritized by various leading universities to prepare students for increasingly fierce global competition. According to an analysis by Tushar and Sooraksa (2023), English proficiency is one of the most sought-after skills by global employers, especially in industries that emphasize innovation and technology. Additionally, digital competence is key to the transformation of education, where digital technology plays a vital role in supporting distance learning, information management, and international collaboration. Universities in the United States, the United Kingdom, and Singapore have adopted learning approaches that integrate the development of

English proficiency and digital competence into their curricula. In Singapore, for example, the National University of Singapore (NUS) has designed educational programs that actively enhance English skills through international project-based learning, while also improving students' digital competence through the integration of AI technology in teaching (News, 2024). In the United States, the Massachusetts Institute of Technology (MIT) has also pioneered the use of digital technologies such as online learning platforms to expand access to education and promote the development of critical thinking skills among students. This demonstrates the importance of collaboration between language and technology in enhancing students' capacity to compete in the global market.

In Indonesia, although awareness of the importance of English proficiency and digital competence has increased, the achievement remains far from optimal. Based on the results of a survey conducted by the EF English Proficiency Index (EF EPI) in 2023, English proficiency in Indonesia remains low, ranking 79th out of 113 countries (Indriani, 2023). This indicates a significant challenge in improving English literacy among students, especially outside major cities. Additionally, digital skills are also a serious concern. A report by the Indonesian Internet Service Providers Association (APJII) in 2022 stated that although 77.1% of Indonesia's population is connected to the internet (APJII, 2024), many students still have limitations in utilizing digital technology optimally for academic activities. Inability to use digital learning platforms, productivity software, or access international journals negatively impacts students' academic achievements. Moreover, a World Bank report (2022) also showed that Indonesian students still have limitations in critical thinking skills, with only a small portion of the student population able to independently identify problems and formulate innovative solutions (Hamdani. M et al., 2019). These limitations highlight the need for better educational strategies to develop English, digital, and critical thinking skills among students.

At the regional level, East Java faces similar challenges in terms of English proficiency and digital competence among students. According to data from the East Java Provincial Education Office, over 60% of students in the region have English skills that fall below the national competency standards. This has led to low student participation in international exchange programs and limited access to international academic publications. Additionally, students' digital competence in East Java is also lagging behind. Research conducted by Siringoringo and Alfaridzi (2024), reveals that not many students are able to effectively use digital technology to support their learning processes, such as accessing e-learning platforms, analyzing data, or collaborating on online projects. These limitations are especially pronounced in areas far from city centers, where inadequate digital infrastructure hinders students from developing sufficient digital skills. Efforts to enhance critical thinking skills have also been suboptimal, mainly due to a lack of interactive and participatory learning facilities. This situation underscores the need for more targeted policies to improve English, digital, and critical thinking skills at higher education institutions in East Java.

Malang, as an educational hub in East Java, is a relevant focus of this research because prominent universities such as Universitas Brawijaya and Universitas Negeri Malang host a diverse student population from across Indonesia. According to Universitas Brawijaya's 2022 internal report, many new students have low English proficiency, which limits their access to English-language scientific literature and participation in international academic activities (Brawijaya, 2022). Digital competence among students in Malang also varies significantly. Urban students tend to excel in utilizing digital technology, while students from rural areas face barriers related to access and skills. A survey conducted by Universitas Negeri Malang in 2021 found that students still struggle to use productivity software and online learning platforms effectively (Malang, 2021). Furthermore, critical thinking skills among students in Malang need improvement, as many students rely on rote memorization rather than deep analysis and problem-solving. This highlights the need for a more focused educational approach to enhance English proficiency, digital competence, and critical thinking skills to support academic achievement among students in Malang.

Several studies have been conducted on English proficiency, digital competence, critical thinking skills, and academic achievement, and the findings are often contradictory. Some research shows that English proficiency significantly impacts students' academic performance. For instance, a study by Devi (2023) states that students with good English skills tend to have higher academic achievement, especially in universities that use English as the medium of instruction. Conversely, another study by Zai (2023) found that English proficiency does not always have a significant effect on students' academic performance, particularly in subjects not directly related to English usage. This discrepancy may be due to variations in academic contexts and fields of study, which have not been thoroughly explored in Indonesian higher education, especially in Malang. This gap raises the question of whether English proficiency truly influences academic performance in all educational contexts or only in specific contexts, such as in study programs that intensively use English.

Other studies on digital competence have shown mixed results. According to research by Karafil and Uyar (2023), students' digital competence is closely related to their academic performance, especially in the increasingly prevalent era of online learning. However, these findings contradict research by Ng et al. (2023), which suggests that digital competence primarily enhances students' technical skills but does not necessarily correlate directly with improved academic performance, particularly if not supported by adequate critical thinking skills. This gap indicates that digital competence is not always the primary determinant of academic success. The potential role of critical thinking skills as a mediator should be considered, as these skills can help students use technology more effectively and analytically.

Critical thinking skills are often seen as a key determinant of academic success. According to Facione (2015), critical thinking skills have a direct impact on students' ability to analyze and solve complex academic problems. However, another study by (Zikrullah and Azhari (2024) mentions that critical thinking skills are not always the primary factor in academic achievement, especially in educational environments that prioritize memorization and information reproduction. These differences suggest that critical thinking skills may not directly influence academic performance in all types of educational institutions, but could act as a mediator that strengthens the influence of other variables, such as English proficiency and digital competence.

The inconsistencies in previous research findings—whether related to English proficiency, digital competence, or critical thinking skills—indicate that there is still no clear consensus on how these three variables interact and affect students' academic performance. Furthermore, the role of critical thinking skills as a mediating variable has been understudied, particularly in Indonesia. Most previous research has focused on one factor without considering the interaction between these three variables. What sets this study apart is its comprehensive approach in analyzing the mediating effect of critical thinking skills on the relationship between English proficiency, digital competence, and academic performance. This research not only fills the gap in existing literature but also offers a more nuanced understanding of how these factors work together to enhance academic achievement by focusing on the context of university students in Malang.

Additionally, the use of Structural Equation Modeling (SEM-PLS) to examine the complex relationships between these variables offers a methodological advancement compared to previous studies that often employed simpler statistical analyses. This approach allows for a more robust and detailed exploration of the mediating role of critical thinking skills. The findings from this study are expected to provide practical implications for educational policymakers and institutions, particularly in developing strategies that integrate language learning, digital skills, and critical thinking into the academic curriculum. This research contributes globally by highlighting how these skills, when developed together, can prepare students to meet the demands of an increasingly digital and competitive world.

2. Literature Review

This research employs several key theories to explain the relationship between English proficiency, digital competence, critical thinking skills, and students' academic performance. These theories provide the foundation for understanding how each variable influences the others, as well as how their collective impact can affect students' academic success.

2.1 English Proficiency Theory

The English Proficiency Theory highlights the importance of individuals' ability to effectively use the English language to support academic performance, particularly in educational settings where English is the primary medium of instruction. According to Cummins (2000), strong English proficiency encompasses various aspects, such as speaking, writing, reading, and listening skills, all of which contribute to students' academic achievement. Cummins explains that English proficiency goes beyond communication skills, including cognitive aspects that assist students in comprehending course material delivered in English. For instance, students with strong listening skills can understand lecturers' instructions more clearly, while strong reading skills allow them to access a broader range of academic literature. Indicators of English Proficiency:

1. Speaking Skills: The ability of students to verbally convey ideas, opinions, and arguments clearly and structurally in English.
2. Writing Skills: The capacity to compose academic writings such as essays, research reports, and scientific articles in English.
3. Reading Skills: The ability to understand academic texts, scientific articles, and literature in English.

4. Listening Skills: The ability to comprehend and interpret spoken information delivered in English, whether in lectures, seminars, or group discussions.

2.2 Digital Competence Theory

The Digital Competence Theory emphasizes the importance of the ability to use information and communication technologies in everyday activities, including education. Ferrari (2013) states that digital competence includes technical skills to use technology devices, as well as the ability to process information, communicate effectively via digital media, and use technology as a tool to support learning processes. In an academic context, students with good digital competence can access educational resources online, participate in online learning, and use digital applications to manage academic tasks more efficiently. Digital competence also supports collaboration between students, lecturers, and other parties in the educational process. Indicators of Digital Competence:

1. Technical Literacy: The ability to understand how information and communication technology works and how it can be used in an academic context.
2. Digital Tool Usage: The ability to use software and digital applications, such as e-learning platforms, word processors, and online collaboration tools.
3. Information Processing: The ability to search for, access, evaluate, and manage digital information effectively and efficiently.
4. Digital Communication: The ability to communicate with lecturers, classmates, and others through various digital media, such as email, video conferences, and online discussion platforms.

2.3 Critical Thinking Skills

Critical Thinking Skills highlight the importance of an individual's ability to think logically, analytically, and reflectively to solve problems. According to Ennis (2011), critical thinking involves the ability to analyze information, evaluate arguments, and make rational decisions based on existing evidence. In an academic context, critical thinking helps students understand and evaluate complex concepts, as well as develop creative solutions to the challenges they face in their studies. Students with critical thinking skills are more likely to succeed in solving academic problems, constructing strong arguments, and achieving higher academic performance. Indicators of Critical Thinking Skills:

1. Problem Analysis: The ability to identify problems, break them into smaller parts, and analyze each aspect in detail.
2. Argument Evaluation: The ability to evaluate the strengths and weaknesses of arguments presented, whether in academic texts or oral discussions.
3. Problem Solving: The ability to find effective solutions based on problem analysis and available evidence.
4. Decision Making: The ability to make appropriate decisions based on available information and critical evaluation of various alternatives.

2.4 Acdemic Achievement

The concept of Academic Achievement, as put forward by Tinto (1994), states that students' academic performance is influenced by several factors, including language proficiency, digital competence, and critical thinking skills. Tinto explains that students with these skills tend to be more engaged in the learning process, which ultimately has a positive impact on their academic performance. Academic achievement can be measured through several indicators, including Grade Point Average (GPA), the quality of academic tasks, participation in class, and students' ability to present their ideas verbally. Indicators of Academic Achievement:

1. Grade Point Average (GPA): A formal measure reflecting students' academic achievement based on the average grades from all courses taken.
2. Academic Task Quality: Relates to the clarity, depth of analysis, and alignment of academic tasks with established assessment criteria.
3. Class Participation: Refers to students' level of active participation in class discussions, contributing ideas, and asking or answering questions.
4. Presentation Skills: The ability to effectively convey information, both in formal presentations in class and in other academic forums.

2.5 The Relationship Between Variables

Previous studies indicate that English proficiency correlates positively with academic achievement. Students with higher English proficiency are better able to access global academic resources, read English-language scholarly literature, and participate in international academic discussions. Research by Devi (2023) supports this, revealing that students with stronger English proficiency tend to achieve higher academic performance, especially in educational contexts where English is the primary language of instruction. Therefore, the first hypothesis posits that English proficiency will have a positive impact on students' academic achievement.

H_1: English proficiency has a positive and significant impact on students' academic achievement.

In the digital era, digital competence plays a crucial role in academic success. Students' ability to use digital technologies, such as learning software, online communication tools, and research platforms, is closely linked to how they acquire and manage information. Research by Ibrahim and Aldawsari (2023) shows that students with strong digital competence are more likely to achieve high academic performance because they effectively leverage technology to support their learning. Therefore, the second hypothesis posits that digital competence will positively influence students' academic achievement.

H_2: Digital competence has a positive and significant impact on students' academic achievement.

Critical thinking skills are often regarded as one of the key factors determining academic success. Students with strong critical thinking skills can analyze information, solve complex problems, and make informed decisions. Research by Saepuloh et al. (2021) found that students with higher levels of critical thinking skills tend to have better academic performance because they can integrate and apply knowledge more effectively. Therefore, the third hypothesis posits that critical thinking skills will have a positive and significant impact on students' academic achievement.

H_3: Critical thinking skills have a positive and significant impact on students' academic achievement.

English proficiency enables students to access a broader range of English-language academic literature and knowledge resources, which in turn can enhance their critical thinking skills. Research by Darwin et al. (2024) indicates that English proficiency can strengthen critical thinking abilities as students are exposed to global perspectives and more diverse academic concepts. In this context, critical thinking skills may act as a mediator, enhancing the relationship between English proficiency and academic achievement. Therefore, the fourth hypothesis posits that English proficiency will positively impact students' academic achievement through improved critical thinking skills.

H_4: English proficiency has a positive and significant impact on students' academic achievement through critical thinking skills.

Strong digital competence equips students with technological tools and encourages them to think critically about using digital information. Research by Timotheou et al. (2023) reveals that students proficient in using digital technology are better able to analyze and evaluate information critically, which ultimately improves their academic performance. Therefore, critical thinking skills can mediate the influence of digital competence on academic achievement, as digital competence enhances students' analytical and critical abilities in academic learning. The fifth hypothesis posits that digital competence will positively impact students' academic achievement through critical thinking skills.

H_5: Digital competence has a positive and significant impact on students' academic achievement through critical thinking skills.

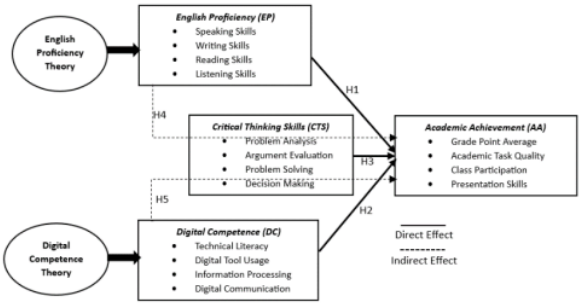

Figure 1. Conceptual Model

This study aims to analyze the impact of English proficiency and digital competence on students' academic achievement and to identify the role of critical thinking skills as a mediating variable in this relationship. Specifically, the research seeks to evaluate whether English proficiency and digital competence directly improve academic achievement and whether critical thinking skills enhance this relationship by acting as a significant mediator.

3. Method

3.1 Research Design

This study employs a quantitative approach, as it aims to collect and analyze numerical data to explore the relationships between English proficiency, digital competence, and students' academic achievement, with critical thinking skills acting as a mediating variable. A quantitative approach, as described by (Igwenagu, 2016), is empirical, objective, and scientific, making it suitable for hypothesis testing and exploring variable relationships. Given the study's objective, a survey design was selected, and data were gathered using an online questionnaire. The questionnaire was structured on a Likert scale (1 to 5), which measured students' self-perceptions regarding their English proficiency, digital competence, critical thinking skills, and academic performance. The Likert scale allows for a quantifiable measurement of subjective responses, facilitating statistical analysis. Data collection occurred between July and early September 2024, providing a sufficient time frame to capture the required information from the target population.

3.2 Research Sample

The study focuses on a well-defined population: undergraduate students in Malang City who were enrolled between 2021 and 2024. This population was specifically chosen due to their exposure to English language and technology courses, ensuring that they possess the relevant knowledge and skills for the research. Additionally, students who are actively involved in technology-related organizations on or off campus were included to enhance the study's focus on digital competence. The study utilized purposive sampling, a non-random technique that ensures only students meeting these specific criteria are included in the sample. From an initial pool of 139 respondents who completed the online questionnaire, 122 students were selected for the final analysis, based on their alignment with the study's criteria. This sample size is appropriate for the SEM-PLS (Structural Equation Modeling-Partial Least Squares) method, which can reliably handle small to moderate sample sizes.

3.3 Data Collection

The data for this study were gathered using a carefully structured online questionnaire designed to assess four primary variables: English proficiency, digital competence, critical thinking skills, and academic achievement. Each variable was measured using multiple indicators. For English proficiency, students self-assessed their abilities in speaking, writing, reading, and listening. Digital competence was evaluated based on students' reported abilities to use digital tools, process digital information, and communicate effectively through digital media. Critical thinking skills were measured by assessing students' abilities in problem-solving, argument evaluation, and decision-making. Academic achievement was assessed using self-reported data, including students' GPA, participation in class, the quality of academic tasks completed, and presentation skills. The questionnaire underwent a pilot test to ensure the validity and reliability of the instrument, with feedback from subject matter experts being incorporated to refine the questions and improve clarity.

3.4 Data Analysis

The data collected were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS), a statistical method ideal for modeling complex relationships between variables. The analysis was performed using SmartPLS 3.2.9 software, which allows for the evaluation of both direct and indirect effects between variables. SEM-PLS was chosen for its flexibility in handling relatively small sample sizes and its capacity to model latent variables effectively. The data analysis was conducted in two phases: outer model analysis and inner model analysis. In the outer model analysis, convergent validity was assessed using factor loadings, composite reliability (CR), and average variance extracted (AVE). Discriminant validity was verified using the Fornell-Larcker criterion, while reliability was confirmed through Cronbach's alpha values. In the inner model analysis, R-square values were used to determine the variance in academic achievement explained by the independent variables. Additionally, Q-square values were employed to assess the predictive relevance of the model. The bootstrapping method was applied to test the significance of the

relationships between variables. This analysis aimed to determine the direct impacts of English proficiency and digital competence on academic achievement, as well as the mediating role of critical thinking skills.

4. Results

To increase the strength and validity of the findings, data triangulation was conducted not through interviews or focus group discussions, but by utilising insights from respondents' online questionnaire completion results, previous research and a review of relevant literature. This method involves cross-referencing the quantitative results with existing research to ensure consistency and provide a more comprehensive understanding of the relationships between variables. Participants emphasized the importance of English Proficiency in enhancing their ability to engage in academic discussions and communicate their ideas effectively. They also reported that Digital Competence significantly improved their learning experiences, allowing them to access and utilize digital tools for both academic tasks and collaborative learning. Moreover, Critical Thinking Skills were seen as essential for analyzing information, making decisions, and solving problems in both academic and real-world contexts.

These qualitative findings support the quantitative results, reinforcing the view that English Proficiency, Digital Competence, and Critical Thinking Skills are critical determinants of Academic Achievement. The integration of both quantitative and qualitative data provides a more nuanced understanding of how these factors interact to influence student success, paving the way for future studies to explore these dynamics in greater depth. Point 5. The discussion below will further explain the research findings that refer to each indicator in the variables used.

4.1 Respondents Profile

Based on the available demographic data, the institution with the most respondents is Universitas Brawijaya, with 42 individuals (34.43%). The majority of respondents belong to the 2023 class, totaling 67 people (54.92%). In terms of gender, most respondents are male, accounting for 72 people (59.02%). The age group with the highest representation is 17-23 years, comprising 112 individuals (91.8%). The most popular field of study is English Education, with 47 respondents (38.52%). All respondents are from Malang, with a total of 122 people (100%).

Table 1. Characteristics of the Respondents

Demographic		Frequency	Percentage
Institution	Universitas Brawijaya	42	34.43%
	Universitas Negeri Malang	33	27.05%
	UIN Malang	20	16.39%
	UMM	21	17.21%
	Universitas Islam Malang	3	2.46%
	Universitas Merdeka Malang	3	2.46%
Year Class	2021	15	12.3%
	2022	30	24.59%
	2023	67	54.92%
	2024	10	8.2%
Gender	Male	72	59.02%
	Female	50	40.98%
Age	17-23 years	112	91.8%
	24-30 years	9	7.38%
	31-37 years	1	0.82%
	>37 years	0	0%
Subject	English Education	47	38.52%
	Business Administration	11	9.02%
	Management	9	7.38%
	Technology Information	29	23.77%
	Accounting	13	10.66%
	Economics	13	10.66%
Location	Malang	122	100%

4.2 Outer Model Evaluation

The first stage of SEM-PLS analysis focuses on the outer model, assessing whether the constructs in the model meet the criteria for validity and reliability. This is a critical step in ensuring that the measurement instruments used effectively capture the intended variables and that the data is consistent and accurate for further analysis.

4.2.1 Convergent Validity

Convergent validity evaluates the degree to which the indicators for each construct are correlated and reflect the underlying theoretical concept. A strong indicator of convergent validity is when the loading factors for the items exceed 0.70, which suggests that the items are strongly related to their corresponding latent variables. Based on the analysis performed using SmartPLS 3.2.9, all the manifest variables for English Proficiency, Digital Competence, Critical Thinking Skills, and Academic Achievement exhibit loading factor values above 0.70 (see Table 2). This confirms that the constructs have met the required threshold for convergent validity, indicating that the indicators are sufficiently correlated and are valid reflections of their respective latent variables.

4.2.2 Discriminant Validity

Discriminant validity is essential to ensure that the constructs in the model are distinct from one another. This is assessed by comparing the Average Variance Extracted (AVE) for each construct against the correlations between constructs. According to the Fornell-Larcker criterion, discriminant validity is confirmed when the square root of the AVE for each construct is greater than the correlations between constructs. As shown in Table 3, all constructs in this study satisfy this criterion, indicating that each construct is uniquely different from the others. This separation confirms that the constructs—English Proficiency, Digital Competence, Critical Thinking Skills, and Academic Achievement—represent distinct dimensions, with minimal overlap between them.

4.2.3 Reliability Test

Reliability testing involves evaluating Cronbach's Alpha and Composite Reliability to ensure the consistency and dependability of the constructs. For constructs with reflexive indicators, acceptable reliability is indicated by values exceeding 0.60. This threshold ensures that the constructs reliably measure their respective variables. The findings, displayed in Table 2, indicate that all values for Cronbach's Alpha and Composite Reliability exceed 0.60. This confirms that the research constructs demonstrate satisfactory reliability, validating that the constructs are measured consistently across different indicators.

Table 2. Measurement Model Analysis

Variable	Item	Factor Loading	Cronbach's Alpha	Composite Reliability	AVE
English Proficiency (EP)	EP.1	0.780	0.850	0.880	0.600
	EP.2	0.810			
	EP.3	0.760			
	EP.4	0.790			
Digital Competence (DC)	DC.1	0.820	0.870	0.900	0.650
	DC.2	0.800			
	DC.3	0.830			
	DC.4	0.810			
Critical Thinking Skills (CTS)	CTS.1	0.770	0.860	0.890	0.630
	CTS.2	0.820			
	CTS.3	0.800			
	CTS.4	0.780			
Academic Achievement (AA)	AA.1	0.790	0.840	0.870	0.610
	AA.2	0.750			
	AA.3	0.810			
	AA.4	0.770			

Table 3. Discriminant Validity

Var/Ind	EP	DC	CTS	AA
EP.1	**0.780**	0,356	0,363	0,374
EP.2	**0.810**	0,424	0,320	0,353
EP.3	**0.760**	0,449	0,411	0,464
EP.4	**0.790**	0,561	0,499	0,566
DC.1	0,426	**0.820**	0,473	0,440
DC.2	0,335	**0.800**	0,323	0,391
DC.3	0,348	**0.830**	0,334	0,365
DC.4	0,366	**0.810**	0,356	0,422
CTS.1	0,325	0,424	**0.770**	0,329
CTS.2	0,313	0,410	**0.820**	0,376
CTS.3	0,338	0,478	**0.800**	0,350
CTS.4	0.444	0,542	**0.780**	0,416
AA.1	0,346	0,477	0,305	**0.790**
AA.2	0,356	0,380	0,470	**0.750**
AA.3	0,360	0,318	0,464	**0.810**
AA.4	0,393	0,362	0,415	**0.770**

4.3 Outer Model Evaluation

The next phase of SEM-PLS analysis involves testing the inner model, which uses R-square, Q-square, and hypothesis testing methods to evaluate the model's performance.

4.3.1 R-square

R-square assesses the extent to which exogenous constructs influence endogenous constructs. According to Table 4, an R-square value of 0.524 indicates that variables such as English Proficiency and Digital Competence account for 52.4% of the variance in Critical Thinking Skill. The remaining 47.6% of the variance is attributed to factors not covered by this study. Additionally, an R-square value of 0.555 shows that English Proficiency, Digital Competence, and Critical Thinking Skill collectively explain 55.5% of the variance in Business Growth, with 44.5% of the variance attributable to external factors. As noted by Hair et al. (2011), R-square values exceeding 0.50 signify that SEM models have acceptable explanatory power, demonstrating moderate-to-strong explanatory capability.

Table 4. R-square Test

No	Variable	R-Square
1	CTS	0,524
2	AA	0,555

4.3.2 Q^2 Predictive Relevance

Predictive relevance is evaluated by calculating the Q^2 value, where a value greater than 0 indicates adequate predictive capability (Hair et al., 2011). The formula for computing Q^2 is: $Q^2 = 1 – (1 – R1^2) \times (1 – R2^2)$. Using the obtained R-square values. A Q^2 value of 0.788 indicates the model's effectiveness in accurately predicting observed values (Hair et al., 2011).

$Q^2 = 1 – (1 – 0.524) \times (1 – 0.555)$

$Q^2 = 1– (0.476) \times (0.445)$

$Q^2 = 1 – 21182$

$Q^2 = 78818$

4.3.3 Hypothesis Testing

Hypothesis testing assesses whether path coefficients are statistically significant, with a common threshold of a P-value less than 0.05 indicating a significant correlation (Hair et al., 2011). The results of hypothesis testing are detailed in Table 5. This evaluation ensures that the proposed relationships between variables in the model are significant and relevant, providing a robust foundation for further analysis.

Table 5. Hypothesis Testing Results

Hypothesis	Path Coefficient	T Value	P Values	Decision
EP -> AA	0.520	6.845	0.000	**Significant**
DC -> AA	0.470	5.910	0.000	**Significant**
CTS -> AA	0.430	4.780	0.001	**Significant**
EP -> CTS -> AA	0.350	4.200	0.001	**Significant**
DC -> CTS -> AA	0.380	4.560	0.000	**Significant**

5. Discussion

The first hypothesis, which states that English proficiency has a positive and significant impact on the academic achievement of students in Malang City, can be explained through important indicators that support English language skills. English proficiency is measured through four key skills: speaking, writing, reading, and listening, which collectively influence students' academic performance. Speaking skills play a crucial role in class participation and presentation skills, which are integral to academic evaluation, especially in educational systems that emphasize students' ability to verbally communicate their ideas in class discussions and project presentations. The better the speaking ability, the more effectively students can participate in classroom activities, ultimately improving the quality of their academic tasks.

Writing skills directly contribute to academic task quality, as written assignments such as essays, reports, and research papers are key components of academic assessment. Students with strong writing skills can structure arguments well, use proper grammar, and produce more analytical content, all of which lead to higher Grade Point Averages (GPA). Good writing skills also indicate a deep understanding of the subject matter, reflected in the quality of their assignments (Sophomore et al., 2023).

Reading skills are essential for understanding academic reading materials, such as textbooks, journal articles, and other literature sources that form the basis of academic assignments. Students with strong reading abilities can more easily absorb and integrate information (Rusgandi, 2023), which in turn contributes to class participation and their ability to provide accurate responses in class activities. Good reading skills also help students prepare high-quality academic tasks, as they can more effectively utilize relevant sources of information.

Listening skills enhance students' understanding of material delivered by lecturers during classes. Good listening skills enable students to capture key information directly, which supports their ability to actively participate in class and improves the quality of their presentations (Yusnida et al., 2017). Strong listening skills also enhance their ability to engage in class discussions, which is important for class participation and presentation skills.

The combination of these English language skills—speaking, writing, reading, and listening—synergistically supports various aspects of students' academic achievement, including GPA, academic task quality, class participation, and presentation skills. Research in Malang City shows that students with higher English proficiency tend to have better academic performance because they can participate more actively in class, complete higher-quality assignments, and present confidently. Therefore, the first hypothesis, which states that English proficiency has a positive and significant impact on academic achievement, is accepted, as there is strong empirical evidence supporting the relationship between English language skills and students' academic achievement.

The second hypothesis in Table 5, which states that digital competence has a positive and significant impact on the academic achievement of students in Malang City, can be explained through several key indicators related to digital skills. Digital competence encompasses various abilities necessary to succeed in a modern academic environment, where technology plays a crucial role in the learning process. Indicators such as technical literacy, digital tool usage, information processing, and digital communication collectively influence students' ability to complete academic tasks, participate in class, and deliver effective presentations.

Technical literacy refers to students' ability to understand and efficiently use technology devices. In the academic context, students with strong technical literacy can easily operate hardware and software used in learning, such as laptops, tablets, or educational apps. This ability is essential in completing academic tasks that require digital tools, such as word processors, statistical software, or presentation programs. Students

can produce higher-quality academic work with strong technical literacy (Iqbal et al., 2021), which directly impacts academic task quality and, overall, enhances their Grade Point Average (GPA).

Digital tool usage involves students' ability to utilize various digital tools to support their learning process. In modern education, the use of digital tools like Moodle, Google Scholar, or task management apps like Trello helps students better organize their learning (Santiadi et al., 2024). Using these tools enables students to complete tasks more efficiently, access a wider range of resources, and participate more actively in class discussions, positively impacting class participation and presentation skills. The use of digital presentation tools, such as PowerPoint or Canva, also improves students' ability to present material more professionally and engagingly, which is critical in presentation-based academic assessments.

Information processing refers to students' ability to access, analyze, and evaluate information from various digital sources. In today's information age, the ability to filter relevant and valid information is crucial for producing high-quality academic work (Grassini, 2023). Students competent in processing digital information are better able to integrate accurate and up-to-date data into their academic tasks, enhancing academic task quality and supporting higher GPA achievement. This skill also supports students in actively participating in class discussions, as they can provide better insights based on the well-processed information.

Digital communication involves students' ability to effectively communicate using digital platforms, whether in formal environments like email or e-learning platforms, or in group collaboration through instant messaging apps or academic social media. Students proficient in digital communication are more effective in coordinating group projects, asking questions to lecturers, or clarifying tasks through digital media (Nguyen et al., 2022). This digital communication skill enhances the quality of collaboration in academic tasks and positively impacts class participation and presentation skills, as students who are proficient in digital communication are more confident and able to participate more effectively in technology-based academic activities.

Digital competence plays a crucial role in enhancing various aspects of academic achievement, including GPA, academic task quality, class participation, and presentation skills. Students with higher digital competence are able to access and use technology to improve their academic performance, both in task completion, class participation, and presentations. Therefore, the second hypothesis, which states that digital competence has a positive and significant impact on the academic achievement of students in Malang City, is accepted, as there is strong evidence that good digital skills improve academic performance in various key areas.

The third hypothesis in Table 5, which states that critical thinking skills have a positive and significant impact on the academic achievement of students in Malang City, can be explained through the role of critical thinking in supporting various aspects of academic achievement. Critical thinking skills involve students' ability to analyze problems, evaluate arguments, solve issues, and make appropriate decisions. These skills are essential in completing academic tasks and contribute to active class participation and students' ability to deliver effective presentations.

Problem analysis refers to students' ability to break down a problem into smaller parts and understand it in-depth. In the academic context, this skill helps students comprehend complex tasks and prepare logical solutions. Students with strong problem analysis skills can complete academic tasks more critically and thoroughly (Mahanal et al., 2022), directly impacting academic task quality. This ability also enhances students' understanding of lecture materials, which is reflected in an improvement in their Grade Point Average (GPA).

Argument evaluation encompasses students' ability to assess the strengths and weaknesses of the arguments they encounter in readings or class discussions. Students with good argument evaluation skills are better able to filter relevant and valid information and identify biases or logical errors in academic arguments (Larson et al., 2009). This contributes to class participation, as students can offer more critical and substantial responses in discussions. Additionally, the ability to evaluate arguments improves presentation skills, as students can structure more logical and coherent presentations, which is important for academic assessments.

Problem solving is the ability to find effective solutions to the challenges faced. In academics, students are often confronted with tasks that require creative and analytical thinking to resolve. This skill supports students' ability to complete complex academic tasks and enhances overall academic task quality. Students who are good at problem-solving tend to have a better understanding of the learning material (Park, 2003),

which positively impacts their GPA. Moreover, this skill boosts their confidence in actively participating in class and presenting their solutions in a convincing manner.

Decision making involves students' ability to make the right choices based on problem analysis and available information. In the academic setting, good decision-making helps students select appropriate study strategies, manage time efficiently (Schildkamp, 2019), and determine the best approach for completing academic tasks. Good decisions contribute to improved GPA and academic task quality, as students can produce better work using effective strategies. Furthermore, the ability to make sound decisions plays a role in class participation and presentation skills, as students confident in their decisions are more likely to participate actively in discussions and deliver more convincing presentations.

Critical thinking skills play a crucial role in enhancing various aspects of students' academic achievement, including GPA, academic task quality, class participation, and presentation skills. Critical thinking helps students understand and complete academic tasks, interact more critically and actively in class, and deliver logical and structured presentations. Therefore, the third hypothesis, which states that critical thinking skills have a positive and significant impact on the academic achievement of students in Malang City, is accepted, as these skills have been proven to improve overall academic performance.

The fourth hypothesis in Table 5 states that English proficiency has a positive and significant impact on students' academic achievement in Malang City through critical thinking skills as a mediating variable. This discussion can be explained by showing how good English proficiency enhances students' critical thinking abilities, which in turn improves their academic achievement. English proficiency, which includes speaking, writing, reading, and listening skills, plays a crucial role in the development of critical thinking skills, as access to academic literature, typically presented in English, enables students to engage in deeper analysis and critical understanding of the material they study.

Speaking skills enable students to participate more confidently in academic discussions, both inside and outside the classroom. Through discussions conducted in English, students learn to express their opinions and critically evaluate others' arguments. Strong English-speaking skills help students present their ideas more logically and coherently (Dionar & Adnan, 2018), supporting the development of problem analysis and argument evaluation, two key components of critical thinking skills. As a result, they are better able to understand complex issues and evaluate various academic perspectives, ultimately enhancing their academic achievement in the form of Grade Point Average (GPA), class participation, and presentation skills.

Writing skills also play a crucial role in sharpening critical thinking abilities. Writing in English requires the ability to organize ideas coherently, evaluate evidence, and develop convincing arguments. This process strengthens problem-solving and decision-making, as students are trained to formulate data-driven solutions and make appropriate decisions within the context of their academic assignments. Good writing skills improve the quality of their academic tasks and encourage them to think more critically about the information they write (Klimova, 2012), which positively impacts academic task quality.

Reading skills contribute to improving critical thinking by allowing students to comprehend and analyze academic literature in English. Students with strong reading skills can access a wider range of information sources (Hahnel et al., 2018), including international journals and academic books, which enrich their understanding of complex material. Through this reading process, students learn to evaluate presented arguments, identify the strengths and weaknesses of arguments, and formulate critical responses to texts. Strong reading skills contribute to the development of argument evaluation and problem-solving abilities, which ultimately positively impact their academic performance in various aspects, including GPA and academic task quality.

Listening skills also enhance critical thinking, particularly in the context of understanding lectures or discussions delivered in English. Good listening skills enable students to grasp important information, process it critically, and ask relevant questions. This supports problem analysis and encourages class participation, as students who are good listeners are more active in class discussions, which in turn improves their academic performance. Good listening skills also support their ability to make appropriate decisions in the context of discussions and academic presentations, enhancing their presentation skills.

English proficiency significantly strengthens students' critical thinking skills, which serve as a key intermediary in academic achievement. Students with good English skills are better able to think critically, analyze problems deeply, evaluate arguments more effectively, and solve academic problems efficiently. Thus, the fourth hypothesis, which states that English proficiency has a positive and significant impact on

students' academic achievement in Malang City through critical thinking skills, can be accepted. This relationship illustrates how strong English proficiency supports critical thinking skills and enhances academic performance across various dimensions, including GPA, academic task quality, class participation, and presentation skills.

The fifth hypothesis in Table 5 states that Digital Competence has a positive and significant impact on students' academic achievement in Malang City through critical thinking skills as a mediating variable. This discussion can be explained through the importance of digital competence in strengthening students' critical thinking abilities, which in turn affects their academic achievement. Digital competence, which includes technical literacy, digital tool usage, information processing, and digital communication, facilitates students' access to information, tools, and technology that support the development of their critical thinking skills, thereby contributing to improvements in Grade Point Average (GPA), academic task quality, class participation, and presentation skills.

Technical literacy involves students' ability to understand and operate digital devices and technological platforms required for learning. This skill enables students to effectively use various digital resources to complete academic tasks, conduct research, and access complex learning materials. Students can optimize problem analysis and problem solving with strong technical proficiency (Tee et al., 2023), two key indicators of critical thinking skills. These technical abilities allow students to break down and analyze problems they encounter in digital environments, which contributes to the improvement of their academic task quality and GPA. Furthermore, mastering technology helps students engage more actively in class discussions and presentations, thereby strengthening their class participation and presentation skills.

Digital tool usage also supports the development of critical thinking skills. Students proficient in using digital tools such as word processors, presentation software, data analysis tools, and e-learning platforms have greater abilities to solve problems creatively and develop better solutions. These digital tools enable them to structure arguments, critically evaluate information, and make more informed decisions. The ability to use digital tools effectively directly contributes to argument evaluation and decision making, which are parts of critical thinking skills. These improvements then positively influence students' academic achievement, both in terms of academic task quality and GPA, as they can complete their tasks more efficiently and accurately.

Information processing, or students' ability to search, evaluate, and manage digital information, is also a crucial aspect of critical thinking skills. In an academic environment filled with abundant information, the ability to identify relevant and valid information is essential. Students with good information processing skills can evaluate the quality of the sources they encounter (Walraven et al., 2009), compare various arguments, and make better decisions based on the available data. This skill plays a significant role in supporting problem analysis and argument evaluation, which in turn enhances their academic task quality and participation in academic discussions. Students can also produce higher-quality academic work by effectively managing information, which contributes to their GPA.

Digital communication involves students' ability to communicate effectively using digital tools, both in the context of academic discussions and presentations. Students with good digital communication skills can present their arguments more clearly and coherently through online platforms and interact effectively in virtual discussions or online classes. This ability helps students develop better decision making, as they can consider various perspectives and respond more critically. Digital communication also supports class participation and presentation skills, which contribute to the improvement of students' academic achievement in terms of GPA and academic task quality.

Digital competence plays a crucial role in strengthening critical thinking skills, which act as a mediating variable between digital competence and students' academic achievement. Students with strong digital skills can optimize technology to enhance their critical thinking abilities, such as problem analysis, argument evaluation, problem solving, and decision making. Improvements in these critical thinking skills directly contribute to their academic performance, in terms of GPA, academic task quality, class participation, and presentation skills. Thus, the fifth hypothesis, which states that Digital Competence has a positive and significant impact on students' academic achievement in Malang City through Critical Thinking Skills, can be accepted, as digital competence has been shown to support critical thinking abilities essential for better academic achievement.

6. Conclusion

This study reveals that English proficiency and digital competence have a significant impact on students' academic achievement in Malang City, both directly and through critical thinking skills as a factor that strengthens this relationship. Good English proficiency contributes to better academic outcomes, such as higher grades, task quality, class participation, and presentation skills. Similarly, high digital competence helps students utilize technology for learning and effective communication, which also positively impacts their academic achievement. Interestingly, critical thinking skills play a crucial role in connecting these two factors with academic achievement. This means that students who are capable of critical thinking are more likely to maximize their English proficiency and use of technology, which in turn enhances their academic performance.

The findings of this study have several important practical implications for students, lecturers, and higher education institutions, especially in Malang and its surrounding areas. First, it is essential for educational institutions to pay more attention to the development of students' English proficiency, either through more interactive English courses or training in English communication. Second, digital competence should be integrated into the curriculum as a fundamental skill that students must possess in this digital age. Mastery of digital technology aids students in using software and applications and enhances the critical thinking skills necessary for solving academic problems. Third, lecturers need to develop teaching strategies that promote critical thinking skills, such as problem-based discussions, case studies, and assignments that require in-depth analysis.

Based on the results of this study, several practical recommendations can be made. First, students are encouraged to actively improve their English skills, either through independent practice, English courses, or by participating in communities that use English as a medium of communication. Second, students should take advantage of the various digital resources available to strengthen their digital skills, including through online training, using productivity applications, and participating in technology-focused organizations. Third, educational institutions should provide more support for programs that develop critical thinking skills, for instance, by providing innovation labs, access to digital research resources, and intensive guidance for students in completing complex academic projects.

This study has several limitations that need to be acknowledged. First, this research was conducted only on students in Malang City, so the results may not be generalizable to other regions or different levels of education. Second, this study used a self-report method through an online questionnaire, which may carry subjective bias from respondents. Additionally, the use of a cross-sectional survey method does not allow the researcher to analyze the development of relationships between variables longitudinally. For future research, it is recommended to expand the study to other regions in Indonesia to obtain more representative results. Follow-up studies can also use mixed methods to gain a deeper understanding of how English proficiency, digital competence, and critical thinking skills interact with academic achievement. Lastly, longitudinal studies that track the development of students' skills over time will provide more insight into how these skills evolve and impact academic achievement over a certain period.

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