

EXPLORING THE RELATIONSHIP BETWEEN ARTIFICIAL INTELLIGENCE DEPENDENCE AND CRITICAL THINKING SKILLS OF UNDERGRADUATE STUDENTS AT LAGUNA UNIVERSITY

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Abstract

This research investigates the relationship between artificial intelligence dependence and the critical thinking skills of undergraduate students at Laguna University. It proves the question of how much students in higher education rely on AI tools like Google Gemini and CiCi in performing academic tasks and how this reliance influences or affects their critical thinking along various dimensions, such as analytical reasoning, problem-solving, decision-making, logical arguments, and communication. The rationale behind this study lies in the increasing integration of AI into education, which provides both opportunities for improved learning and risks regarding reduced critical thinking and academic integrity. This study used a quantitative research design, specifically descriptive, correlational, and regression analyses based on data from the survey questionnaire conducted on 400 purposively sampled undergraduate students. The research was conducted during the 2024–2025 academic year at Laguna University. The survey measured the level of dependence on AI and assessed how far students felt the use of AI influenced different dimensions of their critical thinking skills. It endeavored to find how strong and significant the relationship is between dependence on AI and the development of critical thinking.

Findings indicate that students generally show a neutral level of AI dependence, using AI tools moderately for support in academic work without allowing it to replace their thinking processes. The overall perception is that AI assists in communication and problem-solving more positively than other critical thinking components, such as analytical reasoning, decision-making, and logical argumentation, which showed moderate influence. Of importance, the study found a significant positive relationship between reliance on AI and some critical thinking skills, such that the responsible use of AI tools actually strengthens the reasoning-and-problem-solving powers of students without undermining their independent cognitive capabilities. In other words, this study balances AI usage with active engagement in critical thinking to avoid over-reliance that may be detrimental to intellectual growth. Therefore, it requires educational policies and curricula that shall ensure AI literacy without compromising those cognitive skills crucial for academic success and professional competency. It discusses ethical issues relevant to academic integrity and responsible uses of AI as part and parcel of

ensuring maximum benefits of technology in education. Overall, this study contributes to a better understanding of how AI can be appropriately integrated into higher education in a way that supports students' academic effort while fostering critical and independent thinking. It suggests the integration of training on ethical uses of AI with ongoing monitoring to ensure that AI supports, rather than detracts from, the development of critical thinking in undergraduate education. Future research may develop greater participant diversity and begin to explore longitudinal effects of dependence on AI on cognitive skills across academic careers.

Keywords: Artificial Intelligence, Critical Thinking Skills, Analytical Reasoning Skill, Problem-Solving Skills, Decision-Making Skills, Logical Arguments, Communication Skills

1. Introduction

Artificial Intelligence (AI) is a technology that allows computer systems to simulate human learning, problem-solving, and decision-making. By analyzing large datasets, AI identifies patterns that enable it to perform complex tasks, including language translation, data analysis, and content generation. This technology has rapidly reshaped education, with tools like chatbots, intelligent tutors, and platforms such as Google Gemini and CiCi being widely used by students. On the other hand, AI offers significant benefits, including enhanced productivity and immediate access to information, which can be invaluable for students navigating heavy academic workloads. Research supports this, showing that AI can improve learning opportunities, academic outcomes, and student engagement (Vieriu & Petrea, 2025; Ouyang & Jiao, 2021).

Students are increasingly being exposed to AI-based tools in the classroom that are meant to support learning and productivity. The growing availability of smart systems is reflected in shared AI platforms such as Cici and Google Gemini. Cici provides conversational AI support for answering queries and expediting tasks, while Google Gemini is an advanced AI model designed to aid in research, problem-solving, and content creation. Among other things, these technologies give students new ways to get information, generate ideas, and better complete their academic responsibilities.

However, there are positive and negative effects to integrating AI in education. Positively, AI improves learning efficiency by offering individualized learning support, rapid access to knowledge, and help with challenging problem-solving. Better research skills and timesaving, stress-relieving productivity tools are advantageous to students. The drawbacks of AI include the potential to increase academic dependence, diminish critical thinking, and promote plagiarism or improper use of automated results. If students are not adequately guided, the ease of creating content can also reduce their originality and creativity.

Regardless of these advancements, there is a gap in the literature regarding the true impacts of AI tools on students' academic performance, study behaviors, and learning experience. Although earlier literature has generally discussed the benefits and limitations of AI, limited literature has explicitly examined how tools such as Google Gemini and Cici influence students' behavior, motivation, and abilities in learning situations.

To recognize this, the importance of the issue is in solving how AI affects students positively and negatively. Students can learn how to balance the application of AI in

maximizing its benefits while reducing its risks. Moreover, this research can contribute to the formulation of guidelines and practices that ensure responsible and ethical use of AI in education in a manner that technology complements and not thwarts human learning and intellectual development.

1.1. Research Problems

This study intends to assess the artificial intelligence reliance on the critical thinking skills of selected students in Laguna University.

Specifically, it seeks to learn about the following;

How does AI dependence influence the development and application of students' critical thinking skills in terms of:

- 1.1. analytical reasoning
- 1.2. problem-solving
- 1.3. decision-making
- 1.4. logical arguments; and
- 1.5. communication

What is the extent of AI dependence among undergraduate students at Laguna University?

Is there a significant relationship between AI reliance on the critical thinking skills of selected students in Laguna University?

Based on the findings of the study, what action plan can be proposed to strike a balance between the positive and the negative impact of artificial intelligence on the critical thinking skills of the selected students in Laguna University.

2. Literature Review

Studies in higher education show that analytical reasoning develops through an active engagement with learning tasks; for example, problem-solving, argument analysis, and reflective inquiry. When given opportunities to analyze complex information on their own, students tend to demonstrate stronger critical thinking outcomes. According to Walter (2024) who explains that if students do not comply with reading the basic context of a material of a lesson before using AI, then it does not encourage students to criticize the output of the AI results they get. Therefore, it can have a negative impact on students' critical thinking abilities.

This is because these technologies promise to revolutionize research and education by streamlining repetitive tasks, aiding in data interpretation, and pioneering new learning and assessment methods (George & Wooden, 2023; Song & Xiong, 2021; Zhai & Wibowo, 2023). However, there are concerns about the potential negative impact of its widespread use on cognitive abilities, particularly in academic writing (Liu et al., 2023). Research and education fundamentally rely on evidence, decision-making, critical thinking, and analytical thinking are crucial for thoroughly analyzing and evaluating the quality of information found in existing literature studies (Hanim et al., 2020).

Problem-solving remains a central element of critical thinking, requiring students to analyze information, generate solutions, evaluate alternatives, and apply logical reasoning. Recent research emphasizes that effective problem-solving in higher education relies on deliberate cognitive engagement rather than automated or surface-level responses (Kirschner & Hendrick, 2020). As university students increasingly incorporate digital tools into their academic routines, scholars have begun examining how artificial intelligence (AI) influences their

cognitive processes, particularly in relation to independent problem-solving.

Baidoo-Anu and Owusu Ansah (2023) warn that reliance on AI may be developing students in universities to be less analytically persistent since most accept the solutions from AI without scrutinizing their reasoning. This can weaken the acquisition of vital problem-solving skills such as hypothesis testing, logical evaluation, and independent decision-making.

Artificial Intelligence (AI) has emerged as a transformative technology with the potential to revolutionize decision-making across various domains. AI relies on algorithms that compute calculations on large data sets and automate decision-making based on predefined rules and goals. According to Lindebaum et al. (2020), AI has been applied in many different domains and numerous terms are used to describe AI based systems for decision making. AI techniques employed in decision making can be categorized into different types. Rules-based systems utilize predefined rules to make decisions based on specific conditions and actions. The expert system, on the other hand, relies on expert knowledge to emulate human-decision making processes.

Logical argumentation requires evaluating evidence, recognizing fallacies, and constructing coherent reasoning. One risk of AI use in this area is automation bias, where individuals accept AI-generated outputs without critique (Parasuraman & Riley, 1997). Cummings (2024) warned that such bias undermines independent reasoning and may produce weak arguments.

According to Nicoleta Valentina Florea & Gabriel Croitoru, 2025. People spend most of their time communicating, whether at work, at the market, at school, or at home. At school, students must possess communication skills that enable them to participate and to bond a relationship to create strong alliances. AI is an essential tool for automating and optimizing communication processes. AI technologies, such as virtual assistants, chat bots, and adaptive learning platforms, offer innovative solutions for enhancing communication skills. These tools enable personalized learning experiences by tailoring content and feedback to individual needs. Providing real-time assessments and facilitating scalable solutions.

In summary, Artificial Intelligence (AI) has been a revolutionary power in various industries, ranging from education and research to business and healthcare, by improving efficiency, problem-solving, and decision-making with data. In higher education, its most valuable contribution is that it can aid in building analytical reasoning, which is the core of critical thinking that allows the ability to analyze information, assess evidence, and make decisions. Analytical thinking is most crucial for applications like financial analysis, research in academics, and decision-making in complicated situations, thus it is a talent that students need to develop in order to be successful academically as well as professionally.

AI-powered systems, such as generative models and dialogue-based platforms, provide distinct benefits by streamlining repetitive tasks, offering immediate feedback, customizing learning experiences, and ensuring accessibility around the clock (George & Wooden, 2023; Pokkakillath & Suleri, 2023; Song & Xiong, 2021; Zhai & Wibowo, 2023). These capabilities have the potential to enhance students' engagement, support research writing, and expand opportunities for individualized learning. By replicating some of the characteristics of human teaching and providing adaptive guidance, AI can assist students in deepening their grasp of difficult ideas and enhancing their educational achievements.

Despite the benefits of this type of use, increasing amounts of research suggest concerns about overreliance on AI in education. Walter (2024) points out that if students don't read and understand the simple context of course materials prior to using AI, then they are less likely to question or criticize the information presented by these systems. Such passiveness can actually hamper their skills in independent thinking and critical assessment of knowledge, eroding the very skills that AI is designed to augment. Equally, Grassini (2023) points out that although AI-written text can successfully mimic human composition, overdependence on such programs tends to decrease students' critical and analytical thinking, diminish their imagination, and even promote academic fraud.

Such threats are noted by other researchers who identify possible adverse effects of the use of AI. Liu et al. (2023) contend that prevalent use of AI may undermine intellectual capacities, especially in academic writing, while Krullaars et al. (2023) and Iskender (2023) report the risk of reduced higher-order thinking and problem-solving capacity. Other challenges involve compromised judgment and reasoning skills (Pokkakillath & Suleri, 2023), vulnerability to errors or hallucinations produced by AI (Hatem et al., 2023), higher risks of plagiarism (De Angelis et al., 2023), and potential bias or unfairness in automated systems (Mbalaka, 2023). Together, these problems acknowledge the paradox of AI within education: it provides learning-improving tools while, at the same time, risking the decline of the core competencies of autonomous thinking and analytical reasoning if abused.

Therefore, the application of AI in education should be done with equilibrium and caution. AI should not substitute close reading of scholarly work but as an adjunct tool that supports, and never displaces, human intellect. Academia and teachers need to ensure students read, assess, and critique work independently prior to using AI tools. By presenting AI as a helper and not a decision-maker, one can do justice to its strengths—efficiency, accessibility, and customized learning—without compromising essential skills like analytical thinking, critical thinking, and academic integrity.

In short, AI has the great possibilities of changing education and research. But its function needs to be exercised cautiously. If AI is properly used, it can complement students' learning through guidance and support. Destructive dependence poses a risk to their cognitive development. The challenge for teachers and learners alike is to find a balance where AI complements rather than subtracts from the acquisition of critical and analytical skills that remain indispensable in academic and professional environments.

3. Methodology

3.1. Research Design

This study will utilize a quantitative research design to investigate the relationship between AI dependence and critical thinking skills among selected students at Laguna University. The methodology is structured to employ a combination of descriptive, correlational, and regression analyses to provide a robust framework for data collection and interpretation.

The descriptive research component will serve to efficiently characterize the population by gathering comprehensive data on students' behavior, insights, and patterns of AI tool application. This approach is instrumental in providing an accurate, objective summary of the current situation.

Furthermore, a correlational research method will be used to show the direction and strength of the statistical relationship between AI dependence and students' critical thinking skills. This will enable the researchers to identify a significant association between the two variables.

Finally, regression analysis will be used to determine the predictive power of AI dependence on critical thinking skills. This advanced statistical method will allow for a deeper understanding of how an increase in AI reliance may influence intellectual development, providing a robust basis for the study's conclusions.

3.2. Research Locale

This research was carried out at Laguna University (LU), a government higher education institution located in Barangay Bubukal, Santa Cruz, Laguna, Philippines. The university was founded in 2006 by the Provincial Government of Laguna and was established with the mission of making accessible and quality tertiary education to students, particularly from the province and nearby places. LU has since gained a reputation for academic excellence, character formation, and community service.

All the department programs provide students with the skills and abilities needed for professional achievement. With the increasing use of technology in academic and professional environments. The university also facilitates technology-driven learning and research activities, with a conducive environment to study the impact of AI dependence on students' critical thinking abilities. Its cutting-edge facilities, accessible learning resources, and being inclusive of innovation further make Laguna University a proper place for carrying out this study.

3.3. Research Population

This study focuses on selected students from Laguna University who are exposed to the use of artificial intelligence in their academic tasks. These students were chosen to assess how reliance on AI (Artificial Intelligence) may affect their critical thinking skills.

RESPONDENTS	FREQUENCY	PERCENTAGE	SAMPLE
BAComm	284	5%	20
BA Psych	263	5%	20
BS Psych	287	5%	20
BSA	176	3%	12
BSAIS	354	6%	24
BSEntrep	867	16%	64
BSTM	549	10%	40
BSCS- DS	397	7%	28
BSIT- BA	426	8%	32
BSIT- SD	578	11%	44
BSME	530	10%	40
BEED	219	4%	16
BPEd	143	3%	12

BSED- English	199	4%	16
BSED- Mathematics	76	1%	4
BSED- Science	101	2%	8
TOTAL	5,449	100%	400

3.4. Research Instrument

The primary instrument used in this study was a survey questionnaire to gather quantitative data on artificial intelligence reliance on the critical thinking skills of selected students at Laguna University. Furthermore, a Likert scale was used to determine the impact of AI reliance on the critical thinking skills of the respondents. Additionally, the survey will use a printed questionnaire.

POINTS	DESCRIPTIVE EQUIVALENT	SCALE
4	3.51 – 4.00	Highly Dependent
3	2.51 – 3.50	Dependent
2	1.51 – 2.50	Moderately Dependent
1	1.00 – 1.50	Not Dependent

3.5. Data Gathering Procedure

This study will exercise a quantitative research design to investigate the impact of artificial intelligence reliance on the critical thinking of selected students at Laguna University. This study was conducted during the semester of the academic year 2024-2025. To ensure the reliability and consistency of the findings, the data collected will be carefully planned and executed.

The instrument for data collection will be a survey questionnaire and was conducted by giving the respondents a printed questionnaire with the first-year to fourth-year students at Laguna University. A comprehensive investigation of related literature to collect data on the study, including articles, academic data, and other sources. Pursuing this topic, questions, and objectives have been identified.

To better serve its intended respondents, the researchers invested time and energy into creating a survey questionnaire. The survey's questions were made especially to address specific problems addressed by the study. The researchers waited for the research adviser's approval before distributing the survey questionnaires. Following approval, the researcher requested consent from Laguna University's randomly chosen first- to fourth-year students in order to gather data through providing survey questionnaires to study participants using the provided printed questionnaire.

This allowed the researchers to get the information they needed. After that, the responses from the given questionnaire were obtained for the purpose of counting, tabulating, analyzing, and interpreting the collected data.

3.6. Statistical Treatment of Data

The data collected from the standardized questionnaire will be treated and analyzed using a combination of descriptive, correlational, and regression analyses to effectively address the research objectives. The statistical analysis will be performed using a professional statistical

software package such as SPSS or R.

The initial phase of analysis will involve Descriptive statistics, which are essential for characterizing the study's sample and providing a clear overview of the data. Mean was used to ascertain the respondents' level of agreement regarding the positive and negative effects of AI reliance on their specific skills.

Mean

The mean provides a measure of central tendency that shows the average level of perceived impact of AI reliance on students' critical thinking skills.

Formula:

$$\bar{x} = (\Sigma x) / n$$

Where:

$\bar{x}$: sample mean

Σx : sum of all values

n: number of values

The second phase will involve correlational analysis to examine the relationship between the study's key variables. To examine the relationship between AI dependence and critical thinking skills, a Pearson Product-Moment Correlation Coefficient (r) was computed. This coefficient determined the strength and direction of the linear relationship between these two variables. The formula for the Pearson r is:

$$r = \frac{N \Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[N \Sigma X^2 - (\Sigma X)^2][N \Sigma Y^2 - (\Sigma Y)^2]}}$$

Formula:

Where:

r: Pearson correlation coefficient (the result)

N: Number of data points (pairs of X and Y values)

X: Individual data points of the first variable.

Y: Individual data points of the second variable.

ΣXY : Sum of the products of corresponding X and Y values.

ΣX : Sum of all X values.

ΣY : Sum of all Y values.

ΣX^2 : Sum of the squares of all X values.

ΣY^2 : Sum of the squares of all Y values.

The formula for the Pearson Product-Moment Correlation Coefficient is shown above in two equivalent forms. The variables represent the number of data points, individual data points, sums, sums of squares, and means of the two variables being correlated.

Table 3: The Statistical Value of Pearson r-correlation

Value	Interpretation
0.00 - 0.10	Negligible correlation
0.11 - 0.30	Weak correlation
0.31 - 0.50	Moderate correlation
0.51 - 0.70	Strong correlation
0.71 - 0.90	Very Strong correlation

0.91 - 1.00	Perfect correlation
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After the correlation coefficients are computed, the algebraic signs, either positive or negative, were interpreted as follows:

(+) = Direct relationship which indicates a parallel increase or decrease in values. The variables follow the same rhythm or direction of movements.

(-) = Inverse relationship where the variables move in opposite directions. When one increases in value, the other variable decreases.

The final phase will incorporate Regression analysis to predict the influence of AI dependence on critical thinking skills. This procedure is crucial for moving beyond a simple association and establishing a predictive model.

The regression analysis will yield a coefficient of determination (R^2), which will quantify the proportion of the variance in critical thinking skills that can be explained by AI dependence. The significance of the model will be assessed using an F-test, while the individual predictive power of the independent variable will be evaluated using a t-test. These analyses will provide a strong, evidence-based foundation for the study's conclusions.

4. Results and Discussions

Influence of Artificial Intelligence on the Development of Critical Thinking Skills Among Students at Laguna University

To determine the students' level of AI dependency and its influence on their critical thinking skills in terms of analytical reasoning, problem-solving, decision-making, logical arguments, and communication.

Table 4

Influence of AI dependence on the development and application of students' critical thinking skills in terms of Analytical Reasoning

Statement	Mean	SD	Remarks
1. I find that AI tools limit my ability to think analytically on my own.	3.20	1.01	Dependent
2. Using AI tools helps me understand and analyze complex academic concepts.	3.26	1.00	Dependent
3. I tend to trust Artificial Intelligence tools more than my own reasoning when analyzing concepts.	2.59	1.03	Dependent
4. I accept AI-generated information without critically evaluating it.	2.41	1.04	Moderately Dependent
Overall	2.86	1.02	Dependent

Legend: *3.51-4.00 Highly Dependent, 2.51-3.50 Dependent, 1.51-2.50 Moderately Dependent, 1.00-1.50 Not Dependent

Table 4 shows the level of analytical reasoning among undergraduate students in Laguna University. The results show that there is a dependent level with a mean of 2.86 and standard deviation of 1.02, implying that students tend to make use of the AI systems quite often during analytical thinking activities.

"Using AI tools helps me understand and analyze complex academic concepts" scored the highest mean of 3.26, implying that students see AI as a useful aid in simplifying tough concepts and assisting in comprehension. This implies that AI is working as a cognitive aid and

assisting students in efficiently processing tough information.

However, the response ‘I find that AI tools limit my ability to think analytically on my own’ also scored a fairly high mean of 3.20. It can thus be inferred that the students are well-aware that if they rely on AI too much, they may start losing confidence in their own analytical abilities.

In addition, the students tended to believe the results from AI more than their own thinking ($M=2.59$) and showed more reliance on AI when it comes to analytical tasks. Although the score obtained for trusting AI-produced information without careful evaluation (2.41) was lower, it still indicates a lack of questioning of the information provided by AI.

The implication of the results is that while AI tools facilitate understanding and analysis, being overly reliant on them might affect the ability of the students to function independently in analyzing and critically evaluating information. This emphasizes the need to promote the balanced use of AI tools in the learning environment. As observed, this is consistent with a study among Chan and Hu (2023), observing that while learning aided by AI can increase learners' understanding of a complex concept, it may also limit their involvement in deep-level analytical thinking when they over-rely on it. They underscored that teachers must teach learners to use these tools wisely to enhance their thinking abilities.

Table 5

Influence of AI dependence on the development and application of students' critical thinking skills in terms of Problem-Solving

Statement	Mean	SD	Remarks
1. AI has improved how I approach problem-solving tasks.	3.00	1.02	Dependent
2. I compare my own answers to AI responses to see where I went wrong.	3.23	1.02	Dependent
3. Reliance on Artificial Intelligence tools limits my ability to think of multiple solutions.	2.95	1.05	Dependent
4. I skip the process of trial and error because Artificial Intelligence tools provide ready made answers.	2.56	1.04	Dependent
Overall	2.93	1.03	Dependent

Legend: *3.51-4.00 Highly Dependent, 2.51-3.50 Dependent, 1.51-2.50 Moderately Dependent, 1.00-1.50 Not Dependent

Table 5 shows the level of problem-solving skills among undergraduate students of Laguna University. The result shows an overall mean of 2.93 ± 1.03 standard deviation, which falls under the “Dependent” category. Thus, this would mean that students highly depend on AI tools to conduct problem-solving tasks.

Among the statements, the highest mean of 3.23 has been obtained from "I compare my own answers to AI responses to see where I went wrong", which would mean that most students take AI as a reference or feedback rehearsal tool to check and improve their solutions. This reflects a constructive use of AI in the sense that the students engage in reflective learning by identifying mistakes and refining their understanding.

The statement "AI improved the ways I approach problem-solving tasks" also received a high mean of 3.00, indicating that students consider AI beneficial in shaping how they go about

their problem-solving tasks. This therefore suggests that AI can support learning by providing guidance and alternative approaches to solving problems.

However, the results also point out some possible negative impacts of dependence on AI. The item “Reliance on Artificial Intelligence tools limits my ability to think of multiple solutions” reached an average of 2.95, indicating that too great a reliance on AI might reduce the ability of students to seek various solution paths. Similarly, the act of skipping the process of trial and error because AI gives them answers, already made, at a mean of 2.56 suggests that some students could be passing up invaluable learning opportunities crucial for building problem-solving acumen.

Overall, the findings suggest that while AI tools can facilitate efficiency and provide useful feedback in solving problems, overdependence might weaken the ability of students to engage in exploratory thinking and independent reasoning. Therefore, balanced and guided use of AI is required in ways that would ensure that it supports rather than replaces the development of critical thinking in students. These findings are supported by Holmes et al. (2022), who noted that AI-based educational tools can enhance problem-solving performance through the possibility of immediate feedback and structured guidance. At the same time, however, the authors gave warning that overreliance on AI-generated solutions may limit learners in developing flexible problem-solving strategies through trial-and-error processes.

Table 6

Influence of AI dependence on the development and application of students’ critical thinking skills in terms of Decision-Making

Statement	Mean	SD	Remarks
1. Artificial Intelligence tools use has reduced my confidence in making independent decisions.	2.91	2.24	Dependent
2. I rely on Artificial Intelligence tools when deciding which sources or materials to trust.	2.75	1.09	Dependent
3. I use AI whenever I have doubts about what to do.	2.92	1.06	Dependent
4. I think the AI's decision is more reliable and effective to apply.	2.48	0.97	Moderately Dependent
Overall	2.76	1.34	Dependent

Legend: *3.51-4.00 Highly Dependent, 2.51-3.50 Dependent, 1.51-2.50 Moderately Dependent, .00-1.50 Not Dependent

Table 6 shows the level of decision making among undergraduate students of Laguna University. The overall mean score, interpreted as Dependent, was 2.76, which showed that students basically depended on AI tools in making decisions rather than making their own.

Results here showed that many students have a feeling of being less confident in making independent decisions because of AI use. This will mean that frequent reliance on AI may reduce their ability to trust their judgment. Other students tend to depend on AI when choosing which sources or materials to believe, and this also reflects how strong of a role AI plays in guiding them to evaluate information. Students commonly use AI when they are not sure what action to take. This, too, reflects habits formed in relying on AI rather than critical analysis themselves. Because students consider AI decisions to be reliable and effective, this, in turn, simply reinforces their dependence on AI tools.

Overall, the table shows that despite AI serving to support decision-making, too strong a reliance on it may be having a negative impact on the critical thinking skills of students. Instead of an active analysis of options and informed choices, the student becomes a passive decision-maker who bases choices on the suggestions brought about by AI.

This result is supported by Buçinca et al. (2021), who found that overreliance on AI systems reduces cognitive effort and critical thinking by its users. Their study explains that if the user continuously follows recommendations made by the AI without questions, independent reasoning or reflective decision-making would be less likely to take place.

Table 7

Influence of AI dependence on the development and application of students' critical thinking skills in terms of Logical Arguments

Statement	Mean	SD	Remarks
1. Relying on AI has made it easier for me to build arguments based on facts.	2.88	1.06	Dependent
2. Artificial Intelligence tools help me construct well organized and logical arguments.	3.07	1.04	Dependent
3. Using AI has enhanced my ability to reason out why things happen.	2.80	1.04	Dependent
4. I rely too much on AI to formulate arguments instead of thinking critically.	2.59	1.05	Dependent
Overall	2.83	1.05	Dependent

Legend: *3.51-4.00 Highly Dependent, 2.51-3.50 Dependent, 1.51-2.50 Moderately Dependent, .00-1.50 Not Dependent

Table 7 shows the level of logical argument skills among undergraduate students at Laguna University. The overall Mean of 2.83, interpreted as Dependent, shows that students mostly turn to AI resources while making logical arguments rather than just depending on their own logic.

From the data, the students agree that using AI makes it easier for them to build an argument on fact ($M=2.88$). This indicates that AI assistance is beneficial for the students to collect facts and justify the points they want to convey. A mean score of 3.07 indicates that AI helps me think about organizing my ideas and develop logical and sound arguments. This indicates that the use of AI tool is beneficial for the students to design the format and pattern of the argument. Also, the students agree that AI has increased the way I can explain why phenomena occur ($M=2.80$). This indicates that students use the AI tool to understand the rationale between the events. However, the results also indicate that the students agree that they rely on AI too much while developing an argument instead of using my own critical thinking ($M=2.59$). This indicates that the students might rely on the AI tool for the development of the argument.

In general, it appeared that from the table above, although technology enhances the abilities of students in organizing information as well as in constructing logical arguments, overreliance on the technology may hinder independence in critical thinking.

This was supported by Kasneci et al. (2023), where the authors introduced the point that AI can help students improve reasoning and argumentation by organizing and furnishing

appropriate information. Nonetheless, the authors argued that over-reliance on AI might lead to less engagement by students in the processing of critical thinking and logical reasoning.

Table 8

Influence of AI dependence on the development and application of students' critical thinking skills in terms of Communication

Statement	Mean	SD	Remarks
1. AI tools assist me in improving grammar, clarity, and written outputs	3.31	1.00	Dependent
2. I rely on Artificial Intelligence tools to enhance my ability to communicate ideas effectively.	3.00	1.06	Dependent
3. AI has improved how I express my thoughts through words.	3.05	1.07	Dependent
4. Relying on Artificial Intelligence tools makes it harder for me to express ideas naturally without their assistance.	2.70	1.04	Dependent
Overall	3.01	1.04	Dependent

Legend: *3.51-4.00 Highly Dependent, 2.51-3.50 Dependent, 1.51-2.50 Moderately Dependent, .00-1.50 Not Dependent

Table 8 shows the level of communication skills in using AI tools among undergraduate students of Laguna University. A total mean score of 3.01, categorized as Dependent, shows that students tend to rely on AI to augment and enhance their communication skills.

The findings indicate that there is an agreement that AI applications improve the clarity and grammar of language outputs ($M = 3.31$), indicating that AI is utilized significantly in polishing language skills. Moreover, there is an agreement that AI applications are used by the participants to improve their personal ability to communicate their ideas effectively ($M = 3.00$). Furthermore, there is an agreement that AI applications have improved the manner in which they are able to convey their thoughts using words ($M = 3.05$). Additionally, there is an agreement that over-reliance on AI applications affects their ability to express their ideas naturally without AI applications' help ($M = 2.70$).

In general, the results suggest that, although the AI technology has made significant contributions to the communication skills of the students, over-reliance on the technology may impact the potential for the students to communicate on their own. This may impinge upon the possibility for the students to develop effective communication skills.

These findings are supported by Zhai (2022), which concluded that the use of AI-based writing assistance can help improve the written communication skills of students in grammar, organization, and clarity. Yet, at the same time, the study observed that the overuse of AI-based assistance might limit the opportunities for students to acquire the skill of self-expression through the written form.

Table 9

Level of Artificial Intelligence Dependence of undergraduate students at Laguna University

Statement	Mean	SD	Remarks
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1. I rely on Artificial Intelligence tools for my academic tasks.	2.79	1.00	Dependent
2. I feel dependent on Artificial Intelligence tools to complete my assignments.	2.67	1.04	Dependent
3. I use Artificial Intelligence tools to generate ideas instead of brainstorming on my own.	2.84	1.03	Dependent
4. Artificial Intelligence tools save my time and effort in my studies.	3.15	1.01	Dependent
5. Without Artificial Intelligence tools, I find it difficult to accomplish some academic requirements.	2.76	1.09	Dependent
Overall	2.80	1.01	Dependent

Legend: *3.51-4.00 Highly Dependent, 2.51-3.50 Dependent, 1.51-2.50 Moderately Dependent, .00-1.50 Not Dependent

Table 9 above shows the dependency on Artificial Intelligence among the undergraduate students at Laguna University. The mean dependency among the respondents is shown to be at a dependent state with a mean of 2.80 and a standard deviation of 1.01. This is depicted by the "Dependent" category according to the legend used in the table.

Among these indicators, the statement "Artificial Intelligence tools save my time and effort in my studies" had the highest mean score of 3.15. This implies that the respondents strongly feel that Artificial Intelligence has helped in enhancing productivity and efficiency. This clearly revealed that Artificial Intelligence tools are largely used in terms of productivity assistance related to studies.

Other statements also come under the "Dependent" category, and their means vary from 2.67 to 2.84. The result implied that not only do students use AI to accomplish some tasks, but they also use it to produce ideas rather than depending on their own brainstorming. In addition, it is clear that most respondents find it challenging to accomplish some tasks without the use of AI.

However, from the findings of this study that despite the evident benefits of using AI applications in terms of convenience and efficiency, there may exist some reservations regarding students' reliance thereon for the development of critical thinking skills. This observation is further supported by the research of Kasneci et al. (2023), in which the authors strongly emphasized that although AI systems like generative models are beneficial for cognitive engagement and learning abilities of students by increasing learning efficiency and assisting them in academic issues, excessive dependence on them can have a negative effect on the cognitive engagement and learning abilities of students.

Table 10
Overall Level of AI Dependence Among LU Undergraduate Students

Mean	SD	Verbal Interpretation
2.80	1.03	Dependent

Legend: *3.51-4.00 Highly Dependent, 2.51-3.50 Dependent, 1.51-2.50 Moderately Dependent, 1.00-1.50 Not Dependent

The table 10 show the summary of AI dependence among Laguna University undergraduate students is presented in Table 10. The table shows the overall mean score to be 2.80 with a standard deviation of 1.03, verbally interpreted as Dependent based on the given scale. This implies that generally, the undergraduate students in LU depend on AI tools in doing their academic work to a considerable extent.

The mean obtained seems to indicate that AI technologies are used at low levels by students as part of their learning process. This could be from using AI to generate ideas, to exploring advanced and complex concepts, to finishing assignments and completing academic tasks quickly and conveniently. However, while AI efficiency and accessibility are also concerns, the "Dependent" classification may mean that students use AI not simply as an accessory but rather as a common means to accomplish academic requirements.

A standard deviation of 1.03 means that there is a moderate dispersion among the students. This indicates that while there are many students who report similar levels of dependence on AI, there remains quite a variation in frequency and heaviness of use of AI among them. This could be where some students have low dependence with the belief that they use AI in very rare cases, but others use it more often for academic purposes. This variation also reflects the differences in learning habits, academic confidence, and familiarity with AI technologies.

The result, in general, suggests that AI has been deeply absorbed into the academic daily life routine of undergraduate students at LU. While this may also mean efficiency and task accomplishment, it has a dark side concerning students' capability for independently processing information, analyzing problems, and making scholarly judgments without technological mediation.

These findings are enforced by the literature available on the use of AI in institutions of higher learning. According to Baidoo-Anu and Owusu Ansah (2023), the increasing accessibility of AI tools has created avenues through which students are becoming increasingly reliant on the tool for their academic duties, mainly in writing assignments, solving problems, and retrieving information. They noted that while this would lead to increased efficiency in learning, students do end up with reduced practice in processes requiring deep thinking and analysis.

In addition, Grassini explained that AI systems are often perceived by students as reliable academic aids; hence, students will use them frequently and become more dependent on them. The study further pointed out that students might accept AI-generated outputs with little evaluation, hence limiting opportunities for deeper learning and intellectual effort. This observation agrees with the present result, in which students demonstrate a dependent level of AI use.

Kasneci et al. (2023) further emphasized that the overreliance on AI might have adverse effects on the development of higher-order cognitive abilities, including reasoning, evaluation, and making independent judgments. Students in their investigation who overrelied on AI tools were seen to be struggling to develop the generally required academic competencies, provided that guidance and regulation were not put into place.

From Table 10, the conclusion could be drawn that AI, while playing a considerably important and helpful role in supporting academic students' activities, needs to be used in a balanced and responsible way. Academic institutions should encourage their students in using AI as a learning aid, not instead of thinking independently, in order to ensure that at the same pace

as technology develops, critical thinking skills are still grown.

Table 11

Extent of Influence of AI Dependence to the Development and Application of Students' Critical Thinking Skills

Components	Mean	SD	Verbal Interpretation
Analytical Reasoning	2.86	1.02	Dependent
Problem-Solving	2.93	1.03	Dependent
Decision-Making	2.97	1.34	Dependent
Logical Arguments	2.83	1.05	Dependent
Communication	3.01	1.04	Dependent
Overall Mean	2.92	1.09	Dependent

Legend: *3.51-4.00 Highly Dependent, 2.51-3.50 Dependent, 1.51-2.50 Moderately Dependent, 1.00-1.50 Not Dependent

Table 11 presents the level of influence of AI dependence on the development and application of students' critical thinking skills. The table shows an average value of 2.92 with a standard deviation of 1.09, which is described as Dependent. This shows that the effect of AI on the development of critical thinking among the pupils is quite significant.

At an individual component level, communication scored the highest mean value of 3.01, indicating that students greatly utilize AI tools when organizing ideas, forming the pattern of their response, and communicating their ideas effectively in their educational activities. This indicates that students use AI tools to help them communicate their ideas effectively, especially in written form and discussions.

Decision-making ($M = 2.97$) and problem-solving ($M = 2.93$) are also dependent. It is clear that many learners rely on AI for assistance when encountering academic or related problems. While this may enable learners to come up with a solution faster, it may prevent the learner from critically thinking about different choices independently.

Correspondingly, analytical reasoning ($M = 2.86$) and logical argument ($M = 2.83$) also indicate a level of dependence, as students seem to employ AI to analyze data, offer explanations, and support argumentative positions. Although AI may assist students with comprehension and logical argument, excessive dependence could affect students' ability to critically evaluate evidence and construct an argument through personal judgment.

The values for the standard deviation are also moderate, ranging from 1.02 to 1.34, suggesting a certain degree of variation among the responses. This implies that, while there is a degree of consistency regarding the degree of dependence, there are still some differences on the impact of AI on the critical thinking skills of the students, with some students perhaps using it as a supplement or depending on it more heavily.

In general, the findings suggest that the use of AI dependency is one of the facets that influence the development of critical thinking skills among the undergraduate students of LU. As much as AI is useful for students, the overdependence on it may affect the students' ability to think independently and make decisions without the use of AI.

A study carried out by Zawacki-Richter et al. (2019) highlighted the use of AI in the education sector to improve the efficacy and efficiency of communication and academic production. However, the authors also suggested that overdependence on AI for constructing an argument and organizing ideas might reduce the involvement of students in logical reasoning and

argument development. This corresponds to the dependent findings noted in the current study related to logical arguments and communication.

Furthermore, Santos and Serpa (2020) clarified that the active mental processing required for critical thinking skills like analysis, critical thinking, and evaluation might not occur to the fullest extent when learners rely extensively on automated processes. The authors underscored that for students to benefit from learning through AI, they have to actively participate cognitively to promote the effective development of higher-order thinking skills. In general, these studies confirm the findings in Table 11 that the dependence on AI affects various aspects of critical thinking. Although it is an important help tool for academics, it is clear that an excessive use of AI could prevent individuals from critical analysis, problem-solving, effective decision-making, or logical reasoning on their own.

Table 12
Relationship Between AI Dependence and the Critical Thinking Skills of Selected LU Students

Indicator/s		Critical Thinking Components				
		Analytical Reasoning	Problem-Solving	Decision-Making	Logical Arguments	Communication
AI Dependence	Correlation (r)	0.649	0.597	0.525	0.613	0.599
	p-value	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
	Strength	Strong	Moderate	Moderate	Strong	Moderate
Analysis		Significance	Significance	Significance	Significance	Significance

Legend: p-value<0.05, significant note: 0.00-0.019 Very Weak, 0.20-0.39 Weak, 0.40-0.59 Moderate, 0.60-0.79 Strong, 0.80-1.00 Very Strong Relationship

Table 12 presents the relationship between AI reliance and the critical thinking skills of selected LU students including analysis and reasoning, problem-solving, decision-making, logical argumentation, and communication skills. The findings indicate that AI dependence is significantly related to all the above aspects of critical thinking, as shown by the p-values, which are all significantly smaller than 0.05, indicating that AI dependence is significantly associated with students' critical thinking skills.

From the perspective of dependence on the strength of AI, dependence is found to display a positive correlation ($r = 0.649$) with analytical reasoning and ($r = 0.613$) with logical arguments. Interpretation of the results indicates that the dependence on the use of AI applies to students who display improved analytical capabilities and the ability to form logical arguments. This might be due to the fact that AI applications offer structured explanations.

In contrast, problem-solving ($r = 0.597$), decision-making ($r = 0.525$), and communication ($r = 0.599$) are moderately positively related to AI dependence.

This shows that although there is some use of AI for development in these skills, they are not as strongly linked to using AI as skills like analytical reasoning and logical argumentation. These are skills which are at times reliant on individual judgment and creativity, and which are perhaps not adequately developed by using AI.

Taken holistically, the results indicate that LU students' dependence on AI is neither detrimental to their critical thinking skills, but rather, there is some correlation with increased

performance on most of the analysis and logic-related components.

The finding described in this study corroborates previous evidence which indicated that AI technologies have a role to play in cultivating higher-order thinking skills if implemented correctly. Luckin et al. (2016) argued that AI-facilitated learning technologies are useful for improving learners' analytical and critical thinking skills, as they are capable of offering learners instant feedback support. Thus, the very strong relationship noted between AI dependence and analytical reasoning skills can be justified.

Likewise, Qadir (2022) highlighted that AI technology can benefit students by helping them organize logical arguments and assess different viewpoints, hence the close link between AI use and the ability for logical argument. The AI technology used in chatbots or intelligent tutoring systems tends to mimic effective reasoning patterns among students.

The moderate correlations attained in terms of problem-solving and decision-making are validated through the study of Yang et al. (2023), whose observations concluded that while AI can assist a person in solving a problem by providing a solution or alternative, overdependence on it might lead to a decrease in self-directed cognitive struggles, an important aspect of deep-level learning. Therefore, a supportive aid, and not a replacement for human thinking, is what this tool offers.

From the point of communication, the moderate correlation confirms Zhai et al. (2021) in that AI writing and communication tools, though beneficial in regard to writing clarity and an organized writing flow, could restrict originality if used in excess. Therefore, though AI tools increase the efficiency of communication, students are required to engage actively in their own ideas' optimization. In conclusion, the results are consistent with a constructivist learning theory, which holds that tools such as AI can facilitate learning and improve cognitive development if the learners are actively involved. If AI is utilized properly by learners, it may aid in promoting critical thinking skills rather than detracting them from them.

5. Summary, Conclusions, and Recommendations

5.1. Summary of Findings

This research aims to determine the level of dependence on artificial intelligence (AI) among the undergraduate students of Laguna University and its effect on the development and use of their critical thinking skills. Based on findings, it can be deduced that the level of AI dependence among the respondents is generally dependent.

The overall graph of the scores related to dependence on AI portrays that the dependency is evident among students regarding using these tools not only for completing assignments and understanding subject-related content but also for organizing ideas. The graph illustrates that AI has become a staple among students rather than something that is used periodically. The difference among the scores also exemplifies that although most students possess a similar ratio of dependence, some individuals depend more on AI compared to others.

Concerning critical thinking skills, it was found that AI dependence has a significant effect on various cognitive skills such as analysis and problem-solving, decision-making, logical argumentation, and communication. This is because each part was found to fall in the dependent range, which means that the learners are highly dependent on AI in analyzing information, problem-solving in academic situations, decision-making, logical argumentation, and communication. Specifically, the highest dependence was found in communication.

Overall, the results show that despite the benefits brought by AI for academic assistance, the usage is constant for not just general academic purposes but for higher-order thinking tasks as well. This is indicative of the increasing importance that AI is acquiring in the realm of higher education and the need for emphasis on education aimed at the prudent use of

AI. It is necessary that AI acts as a complement and not a replacement in the development of the thinking abilities of individuals.

5.2. Conclusions

This study was conducted to explore the relationship between Artificial Intelligence (AI) dependence and critical thinking skills of selected undergraduate students at Laguna University. Based on the significant findings of the study, the researchers concluded the following:

1. The data indicated that the dependent level of AI usage among the Laguna University undergraduate students is achieved, as indicated by the overall mean of 2.80. This implies that the undergraduates often depend upon AI resources to aid them in their academic work, starting from idea generation to meeting the requirements and increasing their efficiency and performance. The data, however, indicated variability among the group, indicating that some of the undergraduates depend upon AI, while the rest have the ability to work alone when needed.
2. Findings revealed that dependence on AI affected every aspect of students' critical thinking abilities in a dependent to moderate manner. The use of AI was found to have a significant effect in the realm of communication and problem-solving, in which students perceived better expression, grammatical correction, and feedback provision to mend mistakes. However, analytical thinking, decision-making, and logical argumentation demonstrated moderate levels of influence, which indicated that although students benefited in comprehending and organizing ideas, relying on AI could result in reduced autonomous thinking, decisiveness, and engagement in analytical thinking.
3. The data showed that there was a significant relationship between AI use dependency and critical thinking skills on all the aspects that were analyzed. The results of the correlation test showed moderate to strong positive correlations, where analytical reasoning, problem-solving, and logical argumentation had strong correlations, while decision-making and communication had moderate correlations. The results imply that AI use dependency has a significant relationship with the development of critical thinking skills, and they prove that AI can have a significant impact on cognitive processes if used appropriately.

Lastly, from the results of the study, an action plan will be proposed to ensure a balance between the positive effects and the negative effects brought about by AI to the critical thinking abilities of the learners. The action plan will include creating awareness on the importance of AI literacy, encouraging critical thinking using AI materials, among others. Since the main aim of using AI is to assist in learning, it will help to ensure that critical thinking in the learners is not undermined but enhanced by AI. In closing, the importance of this research lies in the emphasis it places on the observation that the reliance on AI among students in Laguna University has a prominent yet complex effect on critical thinking skills. On one hand, the use of AI has proven to be beneficial in the learning process, communication skills, and solving problems, while on the other hand, proper usage should be exercised to maintain the critical thinking capabilities among the students due to the growing influence of AI in the learning environment.

5.3. Recommendations

In the light of the findings, the following are recommended:

1. **For the Laguna University Administration.** Laguna University encourages balanced AI integration by promoting the use of AI tools such as CiCi and Google Gemini for support but not as a replacement for critical thinking, with emphasis on independent analysis coupled with AI

support. The university needs to introduce training and workshops that enhance AI literacy among its students regarding the capabilities and limitations of AI, hence ensuring responsible and ethical use. Such reinforcement in the curriculum should be done through the enhancement of modules in areas such as analytical reasoning, problem-solving, decision-making, logical argumentation, and communication, this will complement the use of AI without undermining the development of cognitive skills. Furthermore, monitoring and supporting student engagement should be ensured through the establishment of mechanisms that promote the maintenance or enhancement of critical thinking amid the use of AI, addressing the current moderate dependence on AI observed among its students. Strategic integration of AI in educational contexts lets these tools elevate grammar, expression, and evaluative skills via interactive and problem-based learning activities. The instructors could use AI-driven applications for facilitating the development of critical communication and problem-solving competencies, ensuring that the students emerge as confident critical thinkers. Thoughtful use of available AI resources in curricula covering decision-making, communications, and reasoning exercises promotes an active engagement of students instead of passive reliance; hence, full benefits of AI are realized with deeper development of critical thinking, as partially supported by key findings in the present study.

2. **For the Students.** Students should be aware to balance the use of AI tools such as Google Gemini and Cici. Place them appropriately to facilitate research, writing, communication, and problem-solving efforts without reliance on them to such an extent that it would undermine a student's development of his or her critical thinking, analytical reasoning, and independent decision-making. Use AI as an enhancement and not a substitute. Students will, then, be able to think critically through AI outputs for deeper learning and intellectual growth. Brainstorming, trial and error, and reflective thinking, in concert with the use of AI, establish sound and analytical reasoning and judgment. Ethically and responsibly speaking, academic integrity is to be recognized, and plagiarism avoided. AI does contribute significantly with added value by way of better grammar and clarity and more effective communication, which students can embrace to enhance their writing but must continue to express naturally. Seeking educational guidance on integrating AI will support students in supplementing and not diminishing critical thinking. For instance, Google Gemini enables personalized learning, lesson planning, brainstorming of ideas, and exam preparations in real time and engenders interactive learning experiences, which might heighten student engagement if properly used. In conclusion, thoughtful use of AI tools has the potential to optimize academic benefits while preserving key cognitive skills.
3. **For the Future Researcher.** They need to further diversify the participants through multi-university and interdisciplinary studies that can provide more generalizable results. Longitudinal studies are called for to examine how AI dependence impacts students' critical thinking skills over the span of their academic careers. Researchers should also attempt to design and test educational interventions that could strike an optimal balance between AI use and enhancement of critical cognitive skills. Moreover, individual impacts of specific AI tools and features need to be compared in relation to multiple dimensions of critical thinking and academic performance to capture nuanced effects. These approaches align with recent findings emphasizing the complex relationship between AI use and critical thinking; the suggestion for balanced integration and empirical evaluation is necessary for fostering responsible AI-enhanced education.

4. **Implementation of the propose action plan for Responsible use of Artificial Intelligence**

Table 13: Proposed Action Plan for Responsible Use of Artificial Intelligence in the Academic

Time Frame	Objectives	Activities	Person Involved	Resources Needed	Expected Outcome
January – February 2026	Create awareness and understanding on AI ethics and responsible use.	Participate in AI ethics orientations; Read AI guidelines; Join discussions	School Administrators, Teachers, Students, IT Staff	Guidelines, venue, projector, guest speakers	Clear understanding of ethical AI use
March –June 2026	Integrate Responsible AI Use into Teaching and Learning	Evaluate AI responses; Use AI for allowed tasks; Learn proper acknowledgment	Teachers, Curriculum Developers, Students	Training materials, approved AI tools, modules, devices	Ethical AI use in learning; Critical evaluation skills
July–August 2026	Implement Monitoring and Accountability Mechanisms	Submit original work; Disclose AI use; Follow reporting steps	Academic Integrity Committee, Teachers, Students	Detection software, reporting forms, review committee	Reduced AI misuse; Fair accountability
September – October 2026	Enhance Skill Development and Digital Literacy	Join literacy workshops; Practice using AI responsibly; Online safety	IT Department, Trainers, Teachers, Students	Digital literacy modules, trainers, computers	Improved AI literacy and digital responsibility
November–December 2026	Assess and Enhance AI Policy and Practice	Complete surveys; Suggest guideline improvements; Reflect on AI use	Policy Committee, Teachers, Students, Administrators	Survey tools, policy review team, meeting sessions	Updated and effective AI policies

Acknowledgements

The researchers humbly express their deepest gratitude to all the individuals and institutions who extended their guidance, support, and encouragement throughout the completion of this study entitled **“Exploring the Relationship Between Artificial Intelligence Dependence and Critical Thinking of Undergraduate Students at Laguna University.”**

First and foremost, we thank **Almighty God** for granting us the wisdom, strength, and perseverance

needed to accomplish this research.

We extend our sincere appreciation to **Ms. Czarina M. Esmerna**, whose expertise, constructive feedback, and unwavering support greatly contributed to the clarity and direction of this study. Their encouragement motivated us to strive for excellence.

We are deeply grateful to **Dr. Norayda M. Dimaculangan**, your insightful feedback, constructive criticism, and thoughtful suggestions have significantly contributed to the refinement of our thesis. Your mentorship has not only improved our research skills but has also inspired a deeper passion for the subject matter.

We want to express our gratitude to **Mrs. Rose J. San Juan** for the time and dedication invested in our paper, particularly for handling the statistical treatment and interpretation of the collected data.

We also express our gratitude to the **400 respondents** who willingly participated in this study. Their time, honesty, and insights made this research possible.

We want to sincerely thank **our friends and family, and special someone** for being constant sources of inspiration. Their unwavering love, financial support when needed, and understanding during challenging days have been encountered in the successful completion of our thesis. Their support has been like a guiding force, helping us stay strong through the ups and downs of this thesis journey. Their belief in our capabilities has motivated us to reach this significant milestone. The sacrifices they made and the encouragement they provided form the foundation on which the successful completion of this thesis rests, and for that, we feel truly blessed. Their unwavering support has not only impacted our academic journey but has also enriched our personal and professional growth.

Finally, we want to thank our **co-researchers** for their amazing work, commitment, and teamwork. This research has been greatly enhanced by their diligent efforts and insightful ideas.

To everyone who, in one way or another, contributed to the successful completion of this research, we offer our sincere appreciation. This work stands as a testament to your support and our shared commitment to knowledge and growth.

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