# THE IMPACT OF AI USAGE ON INNOVATIVE THINKING AMONG UNIVERSITY STUDENTS IN NIGERIA


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**BENIN CITY.**


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**BEING A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF ENTREPRENEURSHIP, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE (B.SC), DEGREE IN ENTREPRENEURSHIP, FACULTY OF MANAGEMENT SCIENCES, UNIVERSITY OF BENIN, BENIN CITY.**

**DECEMBER 2025**

## DECLARATION

I, IDANEGBE HARRISON ODIANOSE with MAT. NO.: MGS2104895, do hereby declare that this project was based on a study undertaken by me in the Department of Entrepreneurship, Faculty of Management Sciences, University of Benin, Benin City, under the supervision of Mr. Aaron Anama. This work had not been previously submitted for the award of Bachelor of Science Degree in Entrepreneurship, to the best of my knowledge. All ideas and views were a product of my personal research; and where the views of others been expressed, have been duly acknowledged.

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IDANEGBE HARRISON ODIANOSE

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_____

DATE

## CERTIFICATION

We, the undersigned, certify that this project was carried out by IDANEGBE HARRISON ODIANOSE with matriculation number MGS2104895 of the Department of Entrepreneurship, Faculty of Management Sciences, University of Benin, Benin City, Edo State, Nigeria; the work has not been presented in part or full in any Diploma or Degree awarding institution and the work is adequate in scope and quality in partial fulfilment of the requirements for the award of B.Sc. Degree in Entrepreneurship, Faculty of Management Sciences, University of Benin, Benin City, Nigeria.

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## DEDICATION

I dedicate this project work firstly to God Almighty, whose grace, mercies, wisdom, and strength have guided me through every step of this journey. Without His blessings, none of this would have been possible.To my amazing parents, Mr. and Mrs. Idanegbe thank you for your unwavering love, endless sacrifices, and constant encouragement and prayers and to my Beloved Uncle Mr. Imhontu Famous Ebesunun God bless you for me sir, your guidance, support is everything a son would asked for, God bless you sir. Believing in me has helped me shaped my parts and pave the way of excellence for me, more blessings to all my sponsors, this project is dedicated to all of you.

## ACKNOWLEDGEMENT

All thanks and glory go to my Heavenly Father and Creator for making this work a success.

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I express my profound gratitude to my mother, Mrs. Idanegbe, for her unwavering support, sacrifices, and teachings financially, spiritually, and physically. May God continue to bless her with good health and long life. Amen.

My heartfelt appreciation goes to my beloved uncle Mr. Imhontu Famous Ebesunun for his constant encouragement and overwhelming support, financial, emotional, and physical from 200 level to the end. He continues to stand by me, and I pray that the Almighty God blesses him abundantly.

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I sincerely appreciate my aunty, Mrs. Eberegbe Ebesunun, for her continuous support, wise counsel, and prayers.

Finally, special thanks to myself for not giving up, even in difficult times.

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## ABSTRACT

This study examines the impact of artificial intelligence (AI) usage on innovative thinking among university students in Nigeria, with a focus on students of the University of Benin (UNIBEN). Using a cross-sectional research design, data were collected through structured questionnaires administered to students selected via simple random sampling. The instrument captured students' frequency and purpose of AI use, as well as perceptions of its influence on creative and innovative thinking. Data were analyzed using descriptive statistics and multiple regression analysis with SPSS. The findings reveal that AI tools are widely and regularly used by students for academic and creative activities, serving as guides for idea generation, problem-solving, and conceptual clarification. Results further indicate that AI usage has a positive and significant influence on innovative thinking, while also raising concerns about overreliance and ethical considerations. Overall, the study concludes that AI plays a supportive role in enhancing students' innovative capacities when used responsibly, and it recommends the promotion of balanced AI literacy in higher education to sustain creativity and independent thinking.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

Artificial Intelligence (AI) has emerged as one of the most transformative technologies, reshaping industries and redefining the way individuals get, access and process information. Among the many innovations in AI, Generative AI models such as ChatGPT Gemini has gained widespread adoption in education, research, and professional fields. Its ability to generate human-like responses, provide instant feedback, and support knowledge discovery has positioned it as a powerful tool for students and education in general. With its rapid development into academics, the question now is how as AI impacts not just learning outcomes but also help increase the innovative thinking among university students (Chukwuere, 2023; Afolabi, Ibrahim, & Adepoju, 2023).

Artificial Intelligence is the process of enabling machines with human-like intelligence, allowing them to think, reason, and learn as humans do (Campus Reporters, 2025). The emergence of Artificial Intelligence (AI) has marked the beginning of a new era of technological advancement, consisting of groundbreaking innovations and the potential to transform several sectors (Agbo, Sanusi, & Onyeka, 2023). It includes technologies such as machine learning, natural language processing, computer vision, and robotics, all of which together have the potential to transform conventional systems and methods (UNESCO, 2022). Globally, AI-powered tools and platforms

are transforming how students learn, how educators teach, and how universities operate. The deployment of intelligent tutoring systems, adaptive learning software, and automated administrative processes exemplifies the disruptive influence of AI in education (World Bank, 2023).

Innovative thinking refers to the ability to approach problems creatively, generate original ideas, and apply knowledge in unique ways to solve challenges. It is a critical skill for university students, who are expected to move beyond rote learning and engage in intellectual exploration(Afolabi, Ibrahim & Adepoju, 2023). AI tools offer students platforms for brainstorming, idea generation, and problem-solving by presenting multiple perspectives and approaches to academic tasks.

However, concerns have emerged about the potential negative influence of AI on students innovative thinking. Generative AI tools can encourage over-reliance, where students depend on machine-generated responses rather than cultivating their own ideas. Such dependency weakens originality, critical reasoning, and the intellectual rigor necessary for innovation. Furthermore, the risks of plagiarism, shallow learning, and academic dishonesty are heightened when students submit AI-generated outputs without meaningful engagement. In addition, the presence of bias and misinformation in AI-generated content raises questions about the quality of knowledge students acquire, potentially distorting their ability to think independently and creatively (Chukwuere, 2023; Afolabi, Ibrahim, & Adepoju, 2023).

This dual nature creates a paradox. While Ai has the ability to drive innovative thought, its improper application can also obstruct creativity and independent thinking.

### 1.2 Statement of Research Problem

The rapid advancement of Artificial Intelligence (AI), particularly tools such as ChatGPT, has sparked global debates on its influence within higher education (Afolabi, Ibrahim, & Adepoju, 2023). Scholars argue that AI holds the potential to transform learning environments by enhancing student engagement, providing personalized learning experiences, and enabling immediate feedback that encourages experimentation and creativity (Chukwuere, 2023; Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). In theory, these attributes should stimulate innovative thinking among university students, equipping them with the intellectual flexibility and problem-solving skills needed in the 21st century (Bingimlas, 2018). Indeed, AI promises to reduce barriers to knowledge by improving accessibility, offering multilingual support, and fostering inclusivity for diverse learners (Holmes, Bialik, & Fadel, 2021). If properly integrated, such technologies can revolutionize the way students generate, refine, and present ideas, ultimately contributing positively to their innovative capacities (Luckin, Holmes, Griffiths, & Forcier, 2016).

However, despite these possibilities, significant concerns have emerged regarding the misuse and over-reliance on AI among university students. Research has highlighted that while AI provides convenience, its excessive use risks diminishing critical thinking, originality, and genuine

learning (Rudolph, J., Tan, S., & Tan, S 2023) Students may become dependent on machine-generated outputs, leading to shallow understanding, limited intellectual growth, and a reduction in creative exploration (Afolabi, Ibrahim, & Adepoju, 2023). This creates a paradox where AI, instead of serving as a catalyst for innovation, becomes a crutch that undermines independent thought (Chukwuere, 2023)

The Nigerian context illustrates this problem vividly. According to Babagana (2024) and Stephen and Isaac (2025), many Nigerian university students employ AI tools as mere shortcuts for academic tasks copying outputs verbatim for assignments, term papers, and even examinations without engaging in reflective thinking. This misuse threatens the very essence of education, as it discourages students from conducting original research, developing critical perspectives, and applying creativity to solve academic or real-world problems (Ogwo, 2025). The ease of obtaining ready-made answers from AI has, in some cases, fostered intellectual laziness, eroded problem-solving skills, and raised ethical concerns about plagiarism and academic dishonesty (Lawal, 2025, Punch, 2025).

Thus, the impact of AI on innovative thinking among Nigerian university students is complex and double-edged. On the one hand, AI provides unprecedented opportunities for intellectual exploration, creativity, and research advancement (Luckin, Holmes, Griffiths, & Forcier, 2016; Holmes, Bialik, & Fadel, 2021). On the other hand, unchecked reliance and misuse pose serious threats to the cultivation of innovative thinking, which is central to both academic growth and

national development (Kasneci, Sessler, Küchemann, Bannert, Dementieva, Fischer, Gasser, Groh, Günnemann, Hüllermeier, Krusche, Kuhn, Lukin, Nerb, Nitsch, Sailer, Schmidt, Sesink, Stadler, Trautwein, Utz, & Kasneci, 2023; Ogwo, 2025). It is against this backdrop that the present study seeks to critically examine the impact of AI on innovative thinking among university students in Nigeria.

### 1.3 The Research Questions

1.To what extent does the frequency of AI tool usage influence innovative thinking among university students?

2.How does the purpose of AI use (as a guide or solution provider) affect students' innovative thinking?

3.What is the relationship between students' reliance on AI tools and their level of innovative thinking?

4.How does ethical awareness of AI usage influence students' innovative thinking?

### 1.4 Objectives of the Study

1.To examine the effect of frequency of AI usage on students' innovative thinking.

2.To investigate how the purpose of AI use (guidance vs. solution-seeking) impacts innovative thinking.

3.To determine the influence of reliance on AI tools on students' ability to think innovatively.

4.To assess the effect students' ethical awareness of AI usage on innovative thinking.

### 1.5 Research Hypotheses

H01: There is no significant relationship between the frequency of AI use and innovative thinking among university students.

H02: The purpose of AI use does not significantly affect students' innovative thinking.

H03: Reliance on AI tools has no significant effect on innovative thinking among students.

H04: Ethical awareness of AI does not significantly influence innovative thinking among university students.

### 1.6 Significance of the Study

Contribution to Policymakers

This study is particularly relevant to policymakers responsible for shaping higher education and technology adoption in Nigeria, including the National Universities Commission (NUC), the Federal Ministry of Education, state education ministries, and other regulatory bodies involved in developing policies for academic standards, digital learning, and innovation.

The findings of this research will equip policymakers with clear, evidence-based insights into how Artificial Intelligence influences innovative thinking among university students.

Policymakers will be better positioned to design and refine national guidelines that encourage responsible AI adoption while safeguarding the development of creativity, originality, and problem-solving skills in higher institutions

Guidance for Universities and Institutional Management

This study is particularly valuable to university leaders and institutional managers, including vice-chancellors, registrars, deans, heads of departments, ICT directors, academic planners, and committees responsible for teaching, learning, and technology integration within Nigerian universities. NoThe research provides institutional decision-makers with important insights into how Artificial Intelligence influences students' innovative thinking, creativity, and problem solving abilities.

These findings will assist university management in developing effective institutional policies that promote responsible AI use while maintaining academic integrity.

Curriculum and Pedagogical Development

This study is highly relevant to curriculum developers, instructional designers, academic planners, teaching and learning committees, as well as educators involved in designing and delivering university programmes across Nigeria. The findings will provide these stakeholders with a deeper understanding of how Artificial Intelligence influences students' innovative thinking skills, enabling them to redesign curriculum content and pedagogical approaches to

support 21st-century learning. The study will guide curriculum developers in integrating AI literacy, creativity enhancing activities, and innovation-focused learning outcomes into academic programmes. It will also inform educators on how to develop teaching methods that leverage AI tools in ways that stimulate originality, critical thinking, and problem-solving, rather than encouraging overdependence. Through this, the research supports the development of modern, flexible, and technology-responsive curricula that align with global best practices in higher education.

Contribution to Students' Skill Development

For Nigerian students themselves, this research highlights both the opportunities and risks of AI in academic innovation. By making students more aware of how AI influences their creativity, the study empowers them to use AI responsibly and strategically not as a crutch, but as a springboard for original thought. This aligns with the 21st-century skills framework, which stresses creativity, problem-solving, and critical thinking as key graduate competencies.

Academic Contribution and Research Advancement

From an academic perspective, this research makes an important contribution by addressing an area where only few studies currently exist. While much of the existing literature on AI and innovative thinking focuses on universities in Western and Asian contexts, limited empirical evidence has been generated within Nigerian higher education. By providing context-specific

findings, this study enriches scholarly understanding and expands the global discourse with insights drawn from an African educational environment.

## 1.7 Scope of the Study

This study is limited to investigating the impact of Artificial Intelligence (AI) on innovative thinking among university students in Nigeria. The research focuses specifically on undergraduate and postgraduate students in the University of Benin representing different faculties such as sciences, engineering, social sciences, and humanities and others. The emphasis is on how generative AI tools (e.g., ChatGPT, Grammarly, Gemini) are being adopted by students in their academic work, and how such usage influences their ability to generate creative and original ideas.

## 1.8 Limitations of the Study

### Self-Report Bias

One limitation of this study is the reliance on self-reported data from students regarding their use of AI tools. Participants may unintentionally overstate or understate their engagement with AI, either due to social desirability, memory lapses, or personal perceptions of their abilities. This could affect the accuracy and reliability of the data collected, potentially influencing the conclusions drawn about the impact of AI on students' innovative thinking.

**Rapid Change in AI Tools**

Another limitation arises from the rapid evolution of AI technologies. New tools, updates, and features are constantly being developed, which may change how students interact with AI over time. Consequently, findings from this study may be less applicable or require updating as AI tools continue to evolve, limiting the long-term generalizability of the results.

**Accessibility Issues (some students may not have access to AI tools)**

Accessibility challenges also present a limitation. Not all students may have equal access to AI tools due to factors such as financial constraints, limited internet connectivity, or lack of adequate digital infrastructure. These disparities may affect students' exposure to AI and, by extension, their responses in the study, potentially introducing bias or limiting the representativeness of the findings across the student population.

## 1.9 Definition of Terms

**Artificial Intelligence (AI):** Computer systems capable of performing tasks that require human intelligence such as reasoning, problem-solving, and learning.

**Generative AI:** A class of AI models that can create new content such as text, images, or code, based on training data. Examples of generative AI include ChatGPT and GPT-4 for text generation, DALL·E and MidJourney for image generation, GitHub Copilot for code generation, and Bard for conversational AI

**Innovative Thinking:** The ability to generate creative ideas, apply knowledge in novel ways, and develop unique solutions to academic or practical problems.

**Creativity:** It's refers to the ability to generate novel, original, and valuable ideas or solutions. It is about “thinking outside the box” by combining knowledge, imagination, and divergent thinking to produce something new and useful.

**Critical thinking**: Critical thinking is the ability to analyze, evaluate, and make reasoned judgments about information, arguments, or problems. It involves questioning assumptions, weighing evidence, and applying logic before reaching conclusions.

**Over-Reliance:** Excessive dependence on AI tools for academic work, leading to reduced originality and independent learning.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

This chapter provides a comprehensive review of the existing literature on the study of the impact of Artificial Intelligence (Ai) on innovative thinking among university students in Nigeria. It delves into three key dimensions the conceptual understanding of AI and innovative thinking among Nigerian Students, the theoretical frameworks that guide the study, and empirical findings from existing studies both in the global and Nigerian contexts.

## 2.2 Review of Conceptual Literature

### 2.2.1 Concept of Artificial Intelligence (Ai)

Artificial Intelligence (AI) refers to the capability of computer systems or machines to perform tasks that normally require human intelligence. These tasks include learning, reasoning, problem-solving, perception, understanding natural language, and decision-making (Russell & Norvig, 2021). In essence, AI is designed to simulate human cognitive functions through algorithms and data-driven models that enable systems to recognize patterns, adapt to new information, and make autonomous decisions. AI operates under various subfields such as machine learning, deep learning, natural language processing, robotics, and expert systems, all of which enable computers to act and respond intelligently in diverse contexts (Haenlein & Kaplan, 2019).

John McCarthy, often referred to as the "father of AI," introduced the term in 1955 and defined artificial intelligence as "the science and engineering of creating intelligent machines, particularly intelligent computer programs." (McCarthy,J. 2007) He further explained that any intellectual task can be represented in enough detail to be replicated by a computer. Another pioneer from the original 1956 Dartmouth conference, Minsky, described AI as "the science of enabling machines to perform tasks that would require intelligence if executed by humans." He also emphasized that versatile intelligence arises from different modes of thinking within a concept he called the "Society of the Mind." Patrick Henry Winston, a former director of the MIT AI Lab, provided a definition focused on capability: "Artificial intelligence is the examination of the computations that facilitate perception, reasoning, and action."

AI has evolved over decades from simple rule-based systems that relied on predefined logic, to modern machine learning systems that can analyze large datasets and improve performance through experience. The emergence of Generative AI, such as ChatGPT, Google Bard, and Claude, represents a major leap in AI development, as these systems can generate human-like text, images, or solutions based on learned data. These innovations have transformed how knowledge is accessed, processed, and applied, particularly in education.

Brief history, the beginnings of Artificial Intelligence (AI) can be traced back to the 1940s and 1950s, with visionaries such as Alan Turing and John von Neumann laying the mathematical and computational groundwork for contemporary computing. Turing’s introduction of the Turing

Test in 1950 motivated researchers to investigate how machines might replicate human thinking. The phrase “Artificial Intelligence” was officially coined by John McCarthy in 1956 during the Dartmouth Conference, heralding the advent of AI as a formal academic discipline. Initial AI research concentrated on symbolic reasoning and rule-based systems, illustrated by Newell and Simon’s Logic Theorist, followed by expert systems in the 1970s and 1980s that simulated human decision processes. However, constraints in computing power and memory resulted in phases of stagnation, referred to as “AI winters.” The resurgence of interest in the 1990s and 2000s was driven by machine learning, which allowed systems to learn from data, achieving notable milestones such as IBM’s Deep Blue winning against Garry Kasparov and the adoption of AI in sectors like finance, robotics, and speech recognition.

The 2010s marked the emergence of deep learning, employing artificial neural networks to analyze extensive datasets and facilitating advancements in image recognition, natural language processing, and autonomous driving technologies. This period witnessed AI becoming more interactive and integrated into everyday life, exemplified by tools like Siri, Google Translate, and facial recognition technologies. In the 2020s, Generative AI surfaced, capable of producing text, images, music, and software that closely resemble human outputs, as seen in platforms like ChatGPT, DALL·E, and Copilot. Generative AI has revolutionized education by enabling personalized learning and encouraging creative thinking. Despite these advancements, AI prompts ethical and cognitive dilemmas, such as dependence, misinformation, and effects on

human creativity. Overall, the progression of AI illustrates humanity's desire to create systems that think, learn, and innovate, presenting both exciting possibilities and significant challenges for enhancing knowledge, creativity, and lifelong learning.

### 2.2.2 Types of Artificail Intelligence / Models

Artificial Intelligence (AI) can be categorized into several types based on functionality and capability. These include, specific model types such as predictive AI, analytical AI, and generative AI. Predictive AI is all about the future. It leverages advanced algorithms, machine learning, and historical data to forecast what's likely to happen next. By recognizing patterns and trends, predictive AI models can make informed projections that support proactive business strategies. At its core, predictive AI works through predictive modeling, using vast datasets to"train" the system to anticipate outcomes (Unique Content Technology, 2025). While predictive AI looks forward, analytical AI focuses on the present and the past. It enables businesses to extract meaningful insights from large, complex data sets offering a deeper understanding of what's happening inside the organization. Analytical AI powers AI-driven historical data analysis, helping companies dissect internal processes, employee performance, customer satisfaction, and more. The goal is not just to analyze but to improve boosting operational efficiency and performance based on intelligent insights (Unique Content Technology,2025).

However, this study focuses specifically on Generative Artificial Intelligence (Generative AI), it's impact on innovative thinking among university students in Nigeria.

#### 2.2.2.1Generative AI

According to George (2025) Generative artificial intelligence, or GenAI, uses sophisticated algorithms to organize large, complex data sets into meaningful clusters of information in order to create new content, including text, images and audio, in response to a query or prompt. GenAI typically does two things: First, it encodes a collection of existing information into a form (vector space) that maps data points based on the strength of their correlations (dependencies). Second, when prompted, it then generates (decodes) new content by finding the correct context within the existing dependencies in the vector space.

Familiar to users through popular interfaces such as OpenAI's ChatGPT, Microsoft copilot, perplexity, anthropic Claude and Google's Gemini, generative AI can answer complex questions, summarize vast amounts of information, and automate many tasks done previously by humans (Lawton, 2025). For example, businesses use generative AI to help draft reports, personalize marketing campaigns, make commercial films and improve code. Software vendors are integrating generative AI into core business applications, such as CRM and ERP, to boost efficiency and improve decision-making. GenAI is also being added to existing automation software, such as robotic process automation (RPA) and customer service chatbots, to make

them more proactive. Under the hood, generative AI is being used to create synthetic data to train other AI and machine learning models.

#### 2.2.2.2 Limitations of Generative AI

Despite the growing utility of Generative AI applications in educational and professional contexts, several limitations remain that users must consider. First, these applications do not consistently identify the sources of content and may sometimes provide information that appears plausible but is factually incorrect, creating a risk of misinformation (George, 2025). Second, evaluating the biases inherent in the original sources used by the AI can be challenging, as the tool often aggregates and synthesizes data from multiple origins without transparency. Third, the realism and fluency of AI-generated content can make it difficult for users to discern inaccuracies or misleading statements, which may inadvertently affect learning or decision-making. Fourth, AI applications often lack flexibility when adapting to new or unfamiliar circumstances, requiring significant user intervention or tuning to produce relevant outputs. Finally, despite their sophisticated outputs, these tools remain fundamentally incapable of original thought; they generate content based on patterns in existing data rather than independent reasoning or genuine creativity. Collectively, these limitations underscore the need for critical evaluation, user oversight, and complementary pedagogical strategies when integrating Generative AI into academic or professional workflows.

### 2.2.3 Definition Innovative Thinking

Innovative Thinking is the process of generating new ideas, approaches, or solutions that challenge the status quo. It involves taking a non conventional approach to problem solving and finding novel ways to address complex issues (Stefan, 2024). According to Albert Einstein, we cannot solve our problems with the same thinking we use when we created them. According to Puccio, Murdock, and Mance (2007) describe innovative thinking as the merging of creativity with commercialization. According to Richards (1991), it is a process for solving social problems that is not routine. Amabile (1996) emphasized that while creativity is crucial for innovation, it is not the only factor needed. Peter Drucker (2013) outlined it as a targeted change that aims to improve an organization's capabilities. West & Farr (1990) defined innovative thinking as the purposeful introduction of new concepts, methods, or practices that serve to benefit an organization or society.

They are two theories of Innovative thinking, divergent and convergent thinking. Divergent thinking refers to a creative approach where multiple solutions and ideas are generated to tackle a problem (Indeed Editorial Team 2025). This approach can enhance creativity and innovation in finding solutions. Comprehending how this cognitive strategy functions can also enable you to apply it more effectively in the workplace. Engaging in divergent thinking is an unstructured, free-flowing method of problem-solving where individuals come up with numerous imaginative ideas or solutions to an urgent issue. Those who think divergently tend to be independent,

curious, and willing to take risks. Research shows that Openness/Intellect is the strongest personality trait associated with divergent thinking (McCrae, 1987; Silvia et al., 2009). Since Guilford's landmark research on the subject, divergent thinking has been recognized as a fundamental cognitive process that facilitates creative idea generation by allowing for an abundance of creative options. Assessments of divergent thinking, like requesting individuals to brainstorm as many unique uses for a common object as possible (Torrance, 1966), can predict various real-world creative achievements (Runco, 1991). The trait of Openness/Intellect seems to foster the creation of novel ideas and cognitive connections.

Convergent thinking, a term introduced by Joy Paul Guilford, refers to the approach of selecting the most logical solution to a problem. It stands in contrast to divergent thinking. Generally, it involves providing the "correct" response to typical questions that do not necessitate significant creativity (Air focus 2025). Convergent thinking is fundamentally about identifying the obvious choice, which many would refer to as “common sense.” Additionally, convergent thinking signifies the capability to pinpoint a single optimal solution for a given issue (Reitman, 1965), and it plays a crucial role in assessing creative ideas (Perry-Smith & Mannucci, 2017). For the generation of creative concepts, employees must effectively distinguish their innovative ideas from those that lack novelty or utility (Bachrach et al., 2019). We propose that future studies investigating the link between ethical leadership and follower creativity might explore whether ethical leadership encourages convergent thinking. Given the focus of ethical leaders on

normative standards, employees are required to complete tasks while adhering to rules. This may compel employees to employ convergent thinking in order to achieve multiple objectives simultaneously. Since employees often need to use convergent thinking to develop morally optimal solutions that also fulfill production goals, they may demonstrate elevated levels of convergent thinking in their roles and, as a result, possess an enhanced ability to access their creative ideas (Bachrach et al., 2019). Research should also investigate the simultaneous influence of both divergent and convergent thinking, as both processes are essential for creativity, and ethical leadership might impact each of them.

### 2.2.4 How AI influence Innovative Thinking

Artificial Intelligence (AI) is increasingly acting as a powerful cognitive amplifier, significantly shaping students' capacity for innovation by influencing both their thinking processes and psychological dispositions (Hwang & Wu, 2025). In design education, for example, AI's role becomes more than just a tool: it helps learners generate and refine ideas by supporting both divergent thinking (generating a wide variety of ideas) and convergent thinking (sorting, evaluating, and selecting the most promising ones). Maher (2025) propose a conceptual “AI facilitator” embedded in Computer-Supported Teamwork (CST) systems that encourages students to think broadly, explore different perspectives, and combine unexpected elements during ideation all while preserving students’ sense of agency in the creative process (Koch 2025).

AI's influence on innovation is not merely cognitive; it operates at a psychological level, too. Hwang and Wu (2025) conducted an empirical study of 121 design-major university students in southern China and found that AI's positive effect on creative cognition is mediated by increased self-efficacy and reduced anxiety. Their structural equation model showed that AI use significantly boosts students' belief in their design capabilities (self-efficacy), which in turn leads to better creative performance. Simultaneously, AI reduces design-related anxiety, further enabling students to take creative risks and think more freely (Hwang & Wu, 2025). This underscores that AI's contribution to innovative thinking is not just about external stimuli or prompts; it fundamentally alters internal motivational and emotional states that are critical for creativity.

However, the relationship between AI and innovative thinking is not universally positive. Empirical research warns of potential creativity drawbacks when AI is misused. In an experimental study of visual ideation, Kelly (2024) found that participants who relied on an AI image generator produced fewer ideas with less variety and lower originality than a control group. Moreover, these participants showed a higher tendency to fixate on the AI's initial outputs, suggesting that naive or over-reliant use of AI can actually constrain divergent thinking (Velleso., 2024). This is a strong caution that access to AI does not automatically translate to more innovation: how individuals use, prompt, and integrate AI matters a lot.

Another layer to this debate involves user engagement and skill. According to Zhou and Peng (2025), the positive impact of AI on creativity is significantly mediated by students' engagement in learning and moderated by their AI literacy. In their quantitative study, they showed that students who are more engaged and understand how AI works (and when to call on it) benefit more creatively from AI use. In other words, the mere availability of AI is not enough to drive innovation; educational environments must foster active, reflective interaction with AI, and build learners' competence in using it intelligently (Zhou & Peng, 2025).

Taken together, these recent academic findings suggest that AI holds strong potential as an innovative thinking catalyst: it can expand ideation possibilities, enhance confidence, reduce anxiety, and scaffold both the exploration and refinement phases of creative work. But this potential is not automatic. Without pedagogical guidance, strategic usage, and user competence (i.e., AI literacy), AI can also stifle creativity, reduce originality, or lead to creative fixation. Thus, for AI to truly enhance innovation in education, its integration must be carefully mediated by educators who can design learning experiences that encourage reflective, critical, and iterative human AI collaboration.

### 2.2.5 Concept of Innovation

Innovation in education has been researched for quite a long time. The work of Miles from six decades ago (Miles 1964) is a good example. He defined innovation as a deliberate, novel, specific change and defined diverse innovation areas such as boundary maintenance operations,

size and territory, physical facilities, time use, goals, procedures, role definition, normative beliefs, structure, and linkages with other systems. It is interesting to note that some of these areas are rather neglected nowadays in the ways innovation is conceived: goals and normative beliefs are often considered out of the picture, and the size and territorial aspects out of innovation mode, while pointing out interesting aspects that should not be forgotten.

For Looney (2009), innovation in education is mainly related to innovation in processes (methods, practices, and organisation) and includes new or significantly improved approaches to classroom-based teaching, learning, and assessment, as well as changes in the organisation, or governance, of systems. She considers that innovation in education is mainly related to teaching, learning, and assessment. The development of cognitive skills for thinking and reasoning and learning to learn and the capacity to synthesise knowledge across the curriculum are emphasised in a context in which teachers and students can tailor programs according to the needs and interests of individual students (OECD Teaching and Learning, International Survey). For Foray and Raffo (2012), educational innovation is the art of creating and disseminating new educational tools, as well as new instructional, organisational, or technological practices; their approach also addresses the issue of patents, so innovation often is considered as formed out of school, mainly in science and pedagogy.

### 2.2.6 Creativity

According to Barbara Kerr (2025), Creativity is the ability to make or otherwise bring into existence something new, whether a new solution to a problem, a new method or device, or a new artistic object or form.

Creativity has been viewed as an important multifaceted phenomenon that can be developed for all students in different areas toward different levels (Davis, 2004) . Treffinger, Young, Selby, & Shepardson (2002) stated that "creativity can be expressed in a nearly infinite number of ways in human behavior and has its origins in several components of individual and social experience" (p. 5). Plucker, Beghetto, & Dow (2004) added that "creativity is an important component of problem-solving, healthy social and emotional well-being, and scholastic and adult success" (p. 83). Therefore, teachers should not only teach creatively, but also teach for creativity; in order to motivate students to think effectively and become continued creative learners who can make well informed critical decisions and choices in unexpected situations (Torrance, 1995; Brinkman, 2010; Sternberg, 2010; Sriraman, Yaftian, & Lee, 2011) . As stated by Milgram and Hong (2009) , "societies that do not make every effort to assure that the potential talents of young people are utilized are losing their most valuable natural resource; human capital" ( Milgram, 2009).

This paper synthesizes rational support for teaching for creativity as philosophy of teaching that facilitates human development and self-actualization for all students. The major purpose is to contribute to enhancing school trends and teachers' attitudes toward teaching for creativity

utilizing a broad conception of creativity, and internalizing positive beliefs about student capability for success.

### 2.2.7 Concept of Critical thinking

A statement by Michael Scriven & Richard Paul, presented at the 8th Annual International Conference on Critical Thinking and Education Reform, Summer 1987 Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness. In a seminal study on critical thinking and education in 1941, Edward Glaser defines critical thinking as follows "The ability to think critically, as conceived in this volume, involves three things: an attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences, knowledge of the methods of logical inquiry and reasoning, and some skill in applying those methods. Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends.

## 2.3 Review of Empirical Literature

Abubakar, Onasanya & Ibrahim (2024) conducted this study to investigates the awareness, perceptions, and challenges of integrating artificial intelligence (AI) into pedagogical practices among undergraduate students at the universities in North Central, Nigeria. Drawing on the

Unified Theory of Acceptance and Use of Technology (UTAUT) as a theoretical framework, data were collected through a survey questionnaire administered to 421 undergraduate students from the Faculty of Education. The questionnaire included items designed to measure students' awareness of AI technologies, their views on the potential benefits of AI integration in academic experiences, and the challenges encountered with AI adoption in pedagogical practices. Descriptive statistics were used to analyse the data, including means and standard deviations. The findings reveal a moderate level of awareness among students regarding the potential benefits of AI technologies in education, with a strong belief in the role of AI in improving learning experiences. However, students expressed concerns about technical difficulties, privacy issues, and the adequacy of training and support for AI technologies. The study underscores the need for increased awareness, technological infrastructure improvements,and targeted support services to facilitate the effective integration of AI in pedagogical practices.These findings contribute to the growing literature on AI integration in education and provide valuable insights for educators and policymakers seeking to enhance teaching and learning outcomes through AI-driven innovations.

Asiegbu (2025) conducted a study to examined the adoption of generative AI in Nigerian higher education through a mixed methods approach, integrating quantitative and qualitative techniques to comprehensively assess the benefits, challenges, and opportunities. The Federal University of Technology served as the sampling site. A stratified random sampling strategy was employed to

select approximately 312 survey respondents, ensuring diverse representation across gender, academic rank, and discipline. Additionally, purposive sampling was used to select 20 experienced generative AI users and policymakers for in-depth interviews. The collected data were analyzed using descriptive statistics, correlation, and regression analysis. Findings revealed that 98.7% of respondents are willing to use generative AI if provided with adequate training. Current usage rates stand at 51.9% for teaching and 41.6% for research, while utilization for mentoring and administrative tasks remains low. Variations in familiarity with generative AI tools influenced usage patterns, underscoring the need for targeted training programs. Key benefits of adopting generative AI include enhanced research support and creative assistance. However, challenges such as ethical concerns (plagiarism and academic integrity), skill gaps, and limited access to resources were identified. Despite these obstacles, the potential of generative AI to enhance productivity in higher education particularly in the creation of teaching and research materials remains substantial. The study recommends that Nigerian higher education institutions implement proactive policies, including staff training, infrastructure development, the establishment of ethical guidelines, and integration of generative AI into curricula to effectively harness its transformative potential.

Dr.Nnanna-Ohuonu (2025) investigated the impact of artificial intelligence (AI) tools on students' academic performance and learning experiences in marketing education within South East Nigerian universities. Amid the global shift towards digital learning, AI technologies such

as chatbots, intelligent tutoring systems, and recommendation engines are increasingly integrated into higher education. Using a structured online questionnaire administered to 386 undergraduate marketing students, the study explored socio-demographic profiles, frequency of AI tool usage, perceptions of effectiveness, and academic outcomes. Statistical analyses including Pearson correlation, regression, and t-tests revealed strong, positive relationships between AI tool usage and academic performance, with students reporting improved learning outcomes, engagement, and satisfaction. Notably, students who frequently used AI tools significantly outperformed those who rarely did. Furthermore, AI was perceived as more effective than traditional learning methods in enhancing comprehension and project completion. The findings underscore the transformative potential of AI in fostering personalised, efficient, and interactive learning environments. They also highlight the importance of digital infrastructure and pedagogical integration in maximising the benefits of AI in education. The study recommends increased institutional support for AI adoption and the development of AI-inclusive curricula to enhance learning in marketing and other business disciplines.

Essien (2024) explores how socio-cultural dynamics influence student engagement with Generative AI technology in Nigerian higher education, using activity theory as theoretical underpinning. By examining the roles of community norms, technological accessibility, and educational objectives, the research identifies critical factors that impact the adoption and utilisation of GenAI. We employ quantitative analysis to analyse 899 survey responses from

students across seventeen (17) Nigerian universities to derive interesting insights. Findings reveal that the ease of use of GenAI tools and their alignment with educational goals enhance student engagement. Conversely, regular need for technical support negatively affect engagement, suggesting underlying technological issues. These insights provide actionable recommendations for educators, administrators, and policymakers, emphasising the importance of user-friendly GenAI tools, comprehensive training programs, and robust support systems. This study contributes to the understanding of technology adoption in culturally diverse educational settings and offers strategies to improve educational practices and outcomes both in Nigerian higher education and also potentially in other African (developing countries), where similar socio-cultural dynamics might influence technology integration and educational advancements.

Kasneci (2023) conducted a mixed-method study across several European universities, involving students and educators from countries such as Germany, Austria, and other parts of Western Europe where AI adoption in education is significantly advanced. The researchers aimed to examine the implications of large language models (LLMs) like ChatGPT on teaching, learning, creativity, and innovative thinking. Through surveys and in-depth interviews, supported by both descriptive statistical analysis and thematic qualitative analysis, the study explored how AI tools influence students' cognitive processes and the learning environment. The findings revealed that AI can enhance innovative thinking by helping learners generate ideas, explore multiple viewpoints, and engage in deeper intellectual exploration when used collaboratively. However,

the study also warned that excessive dependence on AI-generated outputs may weaken students' originality, critical reasoning, and cognitive independence. Educators expressed strong concerns about plagiarism, reduced mental effort, and challenges in maintaining academic integrity within AI-enhanced classrooms. In conclusion, the authors recommended the integration of AI-inclusive pedagogical strategies, training for both students and educators, redesigning assessments to prioritize critical thinking and process-based evaluation, and establishing institutional guidelines to ensure that AI serves as a tool for augmenting, rather than replacing, students' innovative abilities.

Dwivedi (2023) conducted a large-scale mixed-methods study across universities globally, examining how generative AI technologies, particularly ChatGPT, are transforming teaching, learning, and assessment in higher education. Their study demonstrated that AI can meaningfully enhance students' innovative thinking by facilitating brainstorming, problem framing, ideation, and the refinement of complex academic tasks. However, the researchers cautioned that without guided use, students may fall into superficial learning patterns or engage in plagiarism, thereby weakening genuine cognitive development. Consequently, they recommended that institutions implement structured guidance and training for students on the ethical and effective use of AI tools, integrate AI into curricula in a scaffolded manner, and develop assessment strategies that promote critical thinking alongside AI use. Similarly, Rudolph (2023), in higher education institutions in the United States, investigated the influence of AI chatbots on students' creative

and analytical abilities using an experimental design. The findings revealed that students who interacted with AI collaboratively using it to evaluate, critique, and refine their ideas displayed significantly higher levels of originality, cognitive flexibility, and problem-solving capability compared to peers who used AI passively or did not use it at all. Rudolph (2023) recommended that educators design collaborative AI-based learning activities, encourage guided interaction with AI tools, and ensure that AI use complements, rather than replaces, human critical thinking and creativity. Both studies collectively highlight that AI's positive impact on innovative thinking depends not merely on its availability, but on structured human–AI collaboration and supportive instructional frameworks.

Lund and Wang (2024) examined the influence of AI on students' creative performance and cognitive engagement across universities in the United States and China. Their study found that AI can act as a cognitive amplifier by providing students with access to diverse information and creative stimuli, thereby enhancing brainstorming and ideation processes. However, prolonged use of AI without reflective engagement was found to reduce independent ideation and ownership of problem-solving, potentially weakening long-term creative development. The authors recommended that educators integrate guided reflection and metacognitive strategies when using AI tools to ensure students maintain cognitive independence while benefiting from AI support. Similarly, Susnjak (2023), in tertiary institutions in Australia, investigated AI use in academic writing and found that students who employed AI as a brainstorming or editing

assistant improved their creative output and innovative thinking, whereas students who relied entirely on AI-generated drafts exhibited weaker originality and problem-solving skills. To address these challenges, Susnjak recommended that institutions provide structured AI integration frameworks, promote the use of AI as a supportive tool rather than a replacement for human thinking, and design assessments that encourage critical evaluation and active engagement with AI outputs. Collectively, these studies underscore the dual effect of AI on innovative thinking: while it can catalyze creativity and originality when used critically, it may also inhibit innovation when it replaces human cognitive effort.

### 2.4 Research gap

Globally, scholars have examined how AI influences creativity, innovation, and learning outcomes (Luckin et al., 2016; Amabile & Pratt, 2016). Existing literature suggests that AI can enhance innovative thinking by providing access to large volumes of knowledge, stimulating problem-solving, and reducing routine cognitive burdens. However, concerns have also been raised about its negative consequences, including over-reliance on AI systems, reduced critical thinking, ethical dilemmas, and risks of academic dishonesty (Holmes et al., 2019; Floridi & Chiriatti, 2020).Despite these discussions, three key gaps remain; First, Most studies on AI and innovative thinking have been conducted in developed countries (e.g., U.S., Europe, China). There is limited empirical research that explores how AI is shaping creativity and innovation among university students in Nigeria, where technological adoption patterns, digital literacy

levels, and infrastructural contexts differ significantly. Then, the majority of research in Nigeria has emphasized AI adoption (Ajah & Nweke, 2019; Okonkwo & Ade-Ibijola, 2021) and general perceptions of AI. However, far fewer studies explicitly investigate the cognitive and psychological outcomes of AI use particularly its effects on innovative thinking, problem-solving, and creativity among students. Lastly, while some studies highlight the benefits of AI in boosting productivity and idea generation, others emphasize risks such as plagiarism, dependence, and reduced originality. Yet, very few studies provide a balanced, empirical evaluation of both the positive and negative impacts of AI on innovation in higher education, especially among Nigerian students who operate in unique socio-cultural and infrastructural contexts.

This study seeks to fill these gaps by providing empirical evidence from Nigerian universities to capture contextual realities, shifting focus from AI adoption and perceptions to cognitive outcomes (innovative thinking and creativity), offering a balanced analysis of both benefits and drawbacks of AI use. Additionally, the study will contribute to educational technology, innovation, and policy discussions in Nigeria and beyond, helping universities, educators, and policymakers maximize the benefits of AI while mitigating its risks.

## 2.5 Theoretical Review

### 2.5.1 Constructivism Learning Theory

Constructivism theory, as proposed by Jean Piaget (1970), emphasizes that learners actively construct their own knowledge through cognitive processes rather than passively absorbing information. Piaget's cognitive constructivism highlights the central role of individual mental activity in understanding, suggesting that learners interpret and reorganize information to create meaning based on their prior knowledge and experiences. Building on this perspective, Lev Vygotsky (1978) introduced social constructivism, which stresses the importance of social interaction, collaboration, and cultural tools in the knowledge construction process. According to Vygotsky, learning is not merely an internal mental activity but is significantly shaped by the sociocultural environment, with tools, language, and guidance from more knowledgeable others facilitating cognitive development.

Applied to this study, AI functions as a cognitive and cultural tool that mediates learning. For example, when a student uses ChatGPT or AI-powered research assistants, they are not merely retrieving facts they are reorganizing, analyzing, and synthesizing information in unique ways. However, constructivism also warns that overreliance on external tools may hinder the learner's internal cognitive struggle, which is central to deeper understanding and innovative thinking.

Thus, constructivism provides the first lens for exploring whether AI enhances or weakens students' ability to create original ideas, critically evaluate knowledge, and build innovative solutions within the Nigerian university context.

### 2.5.2 Componential Theory of Creativity

The Componential Theory of Creativity was proposed by Teresa M. Amabile (1983, 1996). The theory emphasizes that creativity arises from the interaction of multiple components within an individual and their environment. According to Amabile, three within-individual components influence creativity: domain-relevant skills, creativity-relevant processes, and task motivation, particularly intrinsic motivation. In addition, the theory recognizes an external component: the surrounding social environment, which can support or hinder creative output. The theory posits that creativity is maximized when an intrinsically motivated individual with strong domain expertise and creativity-relevant skills operates in an environment that provides support for creative expression.

Domain-Relevant Skills. Domain-relevant skills refer to the knowledge, expertise, technical abilities, intelligence, and talent in a particular domain, such as product design, engineering, or research. These skills provide the raw materials for generating creative responses, as well as a framework for evaluating the feasibility of possible solutions.

Creativity-Relevant Processes. Creativity-relevant processes, originally termed creativity-relevant skills, include cognitive styles and personality traits conducive to novelty, such as independence, risk-taking, perspective-shifting, and disciplined work habits. These processes enable individuals to approach problems from new angles and generate multiple potential solutions.

Task Motivation. Intrinsic task motivation, often described as passion, refers to engaging in a task for its inherent interest, challenge, or enjoyment, rather than for extrinsic rewards like grades, evaluation, or competition. This internal drive is a crucial determinant of whether an individual will persist through difficulties and produce innovative solutions.

Application to AI in Learning. In the context of this study, AI technologies can enhance domain-relevant skills by providing rapid access to diverse knowledge sources and supporting research tasks. AI can also stimulate creativity-relevant processes by offering alternative perspectives, fostering divergent thinking, and assisting in idea generation. However, there is a potential trade-off: overreliance on AI may reduce intrinsic motivation, limiting the learner's engagement in the cognitive struggle necessary for original idea generation.

Thus, Amabile's Componential Theory of Creativity provides a lens for understanding both the enabling and constraining effects of AI on students' innovative thinking, highlighting how AI may simultaneously enhance knowledge and efficiency while potentially diminishing originality and intrinsic motivation.

### 2.5.3. Technology Acceptance Model

The Technology Acceptance Model (TAM) was proposed by Davis (1989) as a framework for understanding and predicting user acceptance of information technologies. TAM posits that the adoption and continued use of technology are primarily determined by two key constructs:

Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Perceived Usefulness refers to the degree to which an individual believes that using a particular technology will enhance their performance or productivity. Perceived Ease of Use reflects the extent to which an individual believes that using the technology will be free of effort or difficulty. These constructs jointly influence an individual's attitude toward using a technology, which subsequently affects their behavioral intention and actual usage.

Applied to this study, TAM provides a conceptual lens for examining Nigerian students' adoption of AI tools. Students are more likely to adopt AI technologies if they perceive them as genuinely helpful in improving academic productivity (PU) and sufficiently user-friendly to encourage regular use (PEOU). For example, AI writing support tools may be embraced by students if they reduce the time required to brainstorm essay ideas (usefulness) and are accessible without advanced technical expertise (ease of use).

Moreover, TAM suggests that students' perceptions of AI influence how they integrate these tools into learning activities, which in turn may affect their innovative thinking and creative output. By connecting students' technology perceptions to their actual behavioral outcomes, TAM provides a valuable framework for exploring the relationship between AI adoption and the development of creativity and innovation in the higher education context.

# CHAPTER THREE

# METHODOLOGY

## 3.1 Introduction

This chapter details the research methodology utilized for the study. It describes the organized processes employed to gather, analyze, and interpret data pertinent to the research goals. In particular, this chapter addresses the research design, the study population, the sample and sampling methods, research tools, the validity and reliability of these tools, the data collection approach, and the data analysis techniques and model specification.

## 3.2 The Research Design

The research design adopted for this study is a descriptive survey design. This design was chosen because it allows the researcher to collect detailed information from a large population in order to describe existing conditions, opinions, and behaviors without manipulating any variables. It is suitable for this study as it seek to examine relationships between variables of interests through the use of structured questionnaires.

Additionally,The survey method is also useful because it allows for generalization of findings from a sample to a larger population of students.

### 3.3 Population of the Study

The population of this study comprises of UNIBEN students. It focuses on students who are actively participating in academic pursuits and have access to online learning tools. The rationale for choosing this demographic is based on the growing incorporation of technology within educational environments. As digital tools, including generative artificial intelligence platforms, become more widespread, students are increasingly using these technologies in their studies. This trend underscores the importance of examining their experiences, perceptions, and usage patterns to understand the effectiveness and challenges of technology-enhanced learning. Furthermore, focusing on this population ensures that the study's results accurately reflect current practices and can guide further technological integration in educational institutions.

However, due to the large number of universities and students in Nigeria, it is not feasible to study the entire population. Therefore, the study focuses on a representative sample drawn from selected universities to ensure accuracy, manageability, and generalization of findings to the wider student population.

### 3.4 Sample Size and Sampling Techniques

Due to the large number of students at the University of Benin, it was essential to draw a manageable yet representative sample for this study. A total sample of 155 students was considered sufficient based on established methodological guidelines. According to Roscoe

(1975), a sample size between 30 and 500 is appropriate for most behavioral and educational research, while studies involving multivariate analysis should include at least 100 respondents. Similarly, the recommendations of Krejcie and Morgan (1970) indicate that for large populations, a sample size within this range provides adequate statistical power and representativeness.

Therefore, the choice of 155 respondents aligns with these benchmarks, ensuring that the data collected is robust enough for analysis. The sample was randomly selected from various faculties and departments within the University of Benin, allowing the perspectives of students from diverse academic contexts and learning environments to be accurately reflected.

### 3.5 Sources and Method of Data Collection

The researcher adopted the use of primary data, which are original data collected directly from respondents (university students) through the administration of a structured questionnaire. The questionnaire was designed to gather information on students' use of Artificial Intelligence (AI) tools and their perceived impact on innovative and creative thinking. The questionnaire was administered to the respondents electronically via Google form. This approach ensures wider coverage and higher response rate among students across differents universities.

### 3.6 Research Instrument

The main instrument used for data collection in this study was a structured questionnaire. The questionnaire was designed by the researcher based on the study's objectives, research questions,

and hypotheses. It was chosen because it enables the collection of standardized data from a large number of respondents within a short period and allows for easy analysis and comparison of responses. The questionnaire is structured into four sections: A, B, C, and D. Section A contained questions on frequency of AI tool usage (how often students engage with AI tools in their academic and creative activities). Section B focused on the purpose of AI Use (whether AI is used as a guide, collaborator or problem solver). Section C is the reliance on AI Tools (degree of dependency and trust in AI outputs). Section D is the ethical awareness in AI use (awareness of moral, academic, and integrity issues surrounding AI usage)

### 3.7 Validity and Reliability of Instruments

The created questionnaire will be sent to the project supervisor for expert assessment in order to guarantee the validity of the instrument and its alignment with the research objectives. Before it is given to the responders, suggestions and comments will be examined and put into practice.

Furthermore, the Cronbach's Alpha test will be used to determine the instrument's dependability. In order to confirm the reliability of the replies produced, this statistical test will assess the accuracy of the questionnaire results.

### 3.8 Method Of Data Analysis

The data collected from the questionnaire will be analyzed using both descriptive and inferential statistical techniques. Descriptive statistics, including frequencies, percentages, means, and

standard deviations, will be used to summarize the demographic characteristics of respondents and to provide an overview of the patterns in the responses. For inferential analysis, multiple linear regression will be employed to examine the effect of the independent variables on the dependent variable. All statistical analyses will be conducted using SPSS (Statistical Package for the Social Sciences).This approach ensures that the study can test the hypotheses and determine whether the independent variables significantly predict variations in the dependent variable.

### 3.9 Model Specification

The model specification describes the mathematical relationship between the dependent and independent variables in the study. The model provides a structured way to test the hypothesized influence of the independent variable(s) on the dependent variable. For this study, a multiple linear regression model will be used to determine the effect of the independent variable on the dependent variable.

The model is expressed as follows:

$$INVT=\beta 0 \quad +\beta 1 \quad (FREQ)+\beta 2 \quad (PURP)+\beta 3 \quad (RELY)+\beta 4 \quad (ETHIC)+\varepsilon$$

This model allows the study to test the hypothesis that each aspect of generative AI use (frequency, purpose, reliance and ethical awareness) significantly influences students' innovative thinking (Divergent and Convergent thinking). The model will be estimated using the responses collected from the questionnaire.

### 3.10 Operationalization of Variables

The following table outlines the operationalization of variables used in the study:

| S/N | Type | Construct / Dimension | Measurement | Source |
|---|---|---|---|---|
| 1. | Independent Variable | Frequency of AI Use | How often students use AI tools for learning or creativity | Survey responses |
| 2. | | Purpose of AI Use | Whether AI is used for guidance, support, or problem-solving | Survey responses |
| 3. | | Reliance on AI | Degree to which students depend on AI for thinking, decision-making, and solving academic tasks | Survey responses |
| 4. | | Ethical Awareness | Understanding of ethical boundaries, academic integrity, and responsible AI use | Survey responses |
| 5. | Dependent Variable | Innovative Thinking (Divergent & Convergent Thinking) | Ability to think creatively (idea generation) and logically (problem-solving) | Survey responses |

This operationalization ensures that each variable can be precisely measured, allowing for a clear analysis of how Ai impact students innovative thinking.

# CHAPTER FOUR

# PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter presents the results, analysis and the interpretation of the results. The chapter ends by discussing the results with other literature reviewed. Out of a total number of 155 questionnaires distributed, 155 were all retrieved.

## 4.1 Demographics of Respondents

**Table 4.1.1: Gender of Respondents**

| Gender | Frequency | Percentage (%) | Cumulative frequency |
|---|---|---|---|
| Male | 72 | 46.5% | 72 |
| Female | 69 | 44.5% | 141 |
| Prefer not to say | 14 | 9% | 155 |
| Total | 155 | 100.0 | |

Interpretation for Table 4.1.1: Gender of Respondents

The gender distribution shows that out of 155 respondents, 72 males (46.5%), 69 females (44.5%), and 14 respondents (9%) who preferred not to disclose their gender participated in the study. This near-balanced representation suggests that interest and engagement in AI-related activities and digital tools are not restricted to a particular gender in Benin City. The strong

presence of both males and females indicates that AI adoption and digital literacy are becoming increasingly widespread across demographic groups. This balanced involvement may contribute to more inclusive perspectives on how AI tools can be integrated into academic, entrepreneurial, and professional activities.

**Table 4.1.2: Age Distribution of Respondents**

| Age | Frequency | Percentage (%) | Cumulative frequency |
|---|---|---|---|
| Below 18 | 8 | 5.2% | 8 |
| 18-22 | 56 | 36.1% | 64 |
| 23-27 | 68 | 43.9% | 132 |
| 28 and above | 23 | 14.8% | 155 |
| Total | 155 | 100.0 | |

Interpretation for Table 4.1.2: Age Distribution of Respondents

The age analysis reveals that AI tool usage and digital engagement are predominantly driven by younger individuals. Out of the respondents, 8 (5.2%) were below 18 years, 56 (36.1%) were aged 18–22 years, and the largest group, 68 (43.9%), fell within the 23–27 age range, while 23 respondents (14.8%) were 28 years and above. This youthful dominance suggests that younger people demonstrate greater exposure to and interest in AI technologies. Their familiarity with digital platforms positions them as early adopters of AI tools for learning, productivity, content

creation, and business innovation. The relatively lower representation of older respondents may reflect gaps in digital literacy or reduced access to technological resources among older demographics.

**Table 4.1.3: Level of Study**

| Level of study | Frequency | Percentage (%) | Cumulative frequency |
|---|---|---|---|
| 100 | 17 | 11% | 17 |
| 200 | 11 | 7.1% | 28 |
| 300 | 31 | 20% | 59 |
| 400 | 42 | 27.1% | 101 |
| 500 | 32 | 14.2% | 133 |
| Post graduate | 22 | 20.6% | 155 |
| Total | 155 | 100.0 | |

Interpretation for Table 4.1.3: Level of Study

The level of study distribution indicates varying degrees of exposure to AI tools across academic stages. Among the respondents, 17 (11%) were in 100 level, 11 (7.1%) in 200 level, 31 (20%) in 300 level, 42 (27.1%) in 400 level, 32 (14.2%) in 500 level, and 22 respondents (20.6%) were postgraduate students. The strong representation of advanced-level students suggests that exposure to AI tools increases as students progress academically. Higher-level and postgraduate students may rely more on AI for research, academic writing, data analysis, and project development. This pattern indicates that academic maturity is positively associated with

awareness and use of AI-based tools, reflecting how AI is increasingly integrated into higher education.

**Table 4.1.4: Area or field of study**

| Field of Study | Frequency | Percentage (%) | Cumulative frequency |
|---|---|---|---|
| STEM (Science, Technology, Engineering and Mathematics) | 29 | 18.7% | 29 |
| Business and Management | 55 | 35.5% | 84 |
| Arts and Humanities | 20 | 12.9% | 104 |
| Social Sciences | 21 | 13.5% | 125 |
| Education | 12 | 7.7% | 137 |
| Others | 18 | 11.6 | 155 |
| Total | 155 | 100.0 | |

Interpretation for Table 4.1.4: Area or Field of Study

The field of study distribution reveals how academic background influences AI tool usage. Out of 155 respondents, 29 (18.7%) came from STEM fields, 55 (35.5%) from Business and Management, 20 (12.9%) from Arts and Humanities, 21 (13.5%) from Social Sciences, 12 (7.7%) from Education, and 18 (11.6%) from other fields. Although STEM typically aligns with AI-related skills, the largest group came from Business and Management. This highlights growing interest in AI for entrepreneurship, marketing, analytics, and operational decision-making. The broad distribution across disciplines suggests that AI tools have mainstream relevance,

supporting tasks such as writing, research, creativity, and productivity across both technical and non-technical fields.

Table 4.1.5 Access to the internet

| Item | Always | Occasionally | Rarely | No |
|---|---|---|---|---|
| Do you have access to the internet | 101 (65.2%) | 32 (20.6%) | 18 (11.6%) | 4 (2.6%) |

Interpretation for Table 4.1.5: Access to the Internet

Internet access levels demonstrate the digital readiness of respondents to adopt and use AI tools. Among the 155 respondents, 101 (65.2%) always have internet access, 32 (20.6%) have occasional access, 18 (11.6%) rarely have access, and 4 respondents (2.6%) have no access at all. Since AI tools such as ChatGPT, Grammarly, QuillBot, and others require internet connectivity, these figures show that a majority of respondents are well-positioned for consistent AI engagement. High internet availability strengthens the potential for AI-driven learning, content generation, research, and problem-solving. However, the minority without reliable access may face barriers to fully benefiting from emerging AI technologies.

Table 4.1.6 Ai tools you have used

| Item | ChatGPT | Gemini | Grammarly | QuillBot | Perplexity | Bing Copilot | Meta AI | Claude | Other |
|---|---|---|---|---|---|---|---|---|---|
| Ai tools you have used ChatGPT | 130 | 47 | 23 | 11 | 24 | 12 | 114 | 24 | 17 |

Interpretation for Table 4.1.6: AI Tools Respondents Have Used

The distribution of AI tools used by respondents shows a strong adoption of digital technologies for learning, productivity, and content creation. Out of the 155 respondents, the most widely used tool is ChatGPT, with 130 users, indicating its growing popularity due to its versatility in answering questions, generating content, and assisting with academic tasks. Meta AI also has a substantial user base, with 114 respondents reporting usage, reflecting its accessibility through integrated social media platforms.

Other AI tools show varying levels of adoption. Gemini is used by 47 respondents, while Grammarly is used by 23, and QuillBot by 11, suggesting that AI-assisted writing and editing tools are commonly utilized to improve academic and professional communication. Tools such as Perplexity (24 users) and Claude (24 users) indicate emerging interest in AI search engines and advanced language models. Bing Copilot, used by 12 respondents, reflects moderate engagement with AI tools embedded into search engines and operating systems. Additionally, 17

respondents reported using other AI platforms not listed, showing that users explore a wide range of technologies beyond mainstream tools.

Overall, the data reveals a strong and diverse pattern of AI tool usage among respondents, with ChatGPT and Meta AI leading adoption. This suggests that students and young professionals in Benin City are increasingly integrating AI into their daily tasks, academic work, and decision-making processes. The results highlight a technologically receptive population, demonstrating readiness to engage with advanced AI systems for learning, creativity, research, and digital productivity.

Table 4.1.7 General Knowledge of AI Tools

| | Very Low | Low | Moderate | High | Very High |
|---|---|---|---|---|---|
| Rate Your General Knowledge of AI Tools | 4 (2.6%) | 12 (7.7%) | 57 (36.8%) | 60 (38.7%) | 22 (14.2%) |

Interpretation for Table 4.1.7: General Knowledge of AI Tools

Respondents' self-assessed knowledge of AI tools shows varying levels of digital awareness. Out of 155 individuals, 4 (2.6%) reported very low knowledge, 12 (7.7%) indicated low knowledge, 57 (36.8%) rated their knowledge as moderate, 60 (38.7%) reported high knowledge, and 22 (14.2%) stated very high knowledge. This distribution shows that most respondents fall within the moderate-to-high knowledge range, indicating strong familiarity with AI platforms and their

applications. The results imply that AI tools are becoming increasingly embedded in daily academic and professional tasks. The presence of respondents with very low or low knowledge also highlights the need for AI literacy programs to equip all users with the skills needed to operate effectively in a technology-driven environment.

## 4.2 Interpreting the Data

**Question 1: Frequency of AI Tool Usage**

**(How often students engage with AI tools in their academic and creative activities)**

Table 4.2.1:

| S/N | Questionnaire Items | SD | D | N | A | SA | Mean | Standard deviation | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1 | I use AI tools (e.g., ChatGPT, Grammarly, Gemini) regularly for my academic work. | 21 (13.5%) | 10 (6.5%) | 27 (17.4%) | 71 (45.8%) | 26 (16.8%) | 3.46 | 1.23 | 155 |
| 2 | I frequently rely on AI tools when completing assignments or projects. | 21 (13.5%) | 16 (10.3%) | 23 (14.8%) | 70 (45.2%) | 27 (17.4%) | 3.46 | 1.27 | 155 |
| 3 | I often explore new AI tools to assist my studies or creative tasks. | 15 (9.7%) | 24 (15.5%) | 23 (14.8%) | 65 (41.9%) | 28 (18.1%) | 3.43 | 1.22 | 155 |
| 4 | I interact with AI | 14 (9%) | 28 | 22 | 64(41.3%) | 27 | 3.40 | 1.22 | 155 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | tools several times a week. | | (18.1%) | (14.2%) | | (17.4%) | | | |
| 5 | AI tools have become part of my daily study routine. | 12 (7.7%) | 33 (21.3%) | 18 (11.6%) | 63 (40.6%) | 29 (18.7%) | 3.41 | 1.23 | 155 |

Source: Researcher Fieldwork, 2025

Interpretation: The results from Table 4.2.1 provide insight into how frequently students engage with AI tools during their academic and creative activities. The responses show a strong trend toward frequent and consistent use of AI-powered applications such as ChatGPT, Grammarly, Gemini, and others.

For the first item, “I use AI tools regularly for my academic work,” a majority of students reported high engagement. Specifically, 71 students (45.8%) agreed and 26 students (16.8%) strongly agreed, totalling 62.6% who regularly use AI tools. Only 21 students (13.5%) strongly disagreed and 10 (6.5%) disagreed. The mean score of 3.46 and a standard deviation of 1.23 reflect a strong tendency toward regular use with moderate variation in responses.

For the second item, “I frequently rely on AI tools when completing assignments or projects,” a similar pattern appears. 70 students (45.2%) agreed and 27 (17.4%) strongly agreed, showing that 62.6% frequently depend on AI tools for academic tasks. Meanwhile, 21 (13.5%) strongly disagreed and 16 (10.3%) disagreed. The mean of 3.46 and standard deviation of 1.27 confirm that most students increasingly depend on AI tools when completing structured academic work.

Regarding the third item, “I often explore new AI tools to assist my studies or creative tasks,” 65 students (41.9%) agreed and 28 (18.1%) strongly agreed, demonstrating that 60% of students are open to experimenting with a variety of AI tools. Only 15 (9.7%) strongly disagreed and 24 (15.5%) disagreed. With a mean of 3.43 and a standard deviation of 1.22, the data suggests that exploration and discovery of AI tools are common among students, though practiced at slightly varying levels.

The fourth item, “I interact with AI tools several times a week,” shows that 64 students (41.3%) agreed and 27 (17.4%) strongly agreed, totalling 58.7% who use AI tools multiple times weekly. A smaller proportion 14 (9%) strongly disagreed and 28 (18.1%) disagreed indicates that while weekly interaction is common, it is not universal among students. The mean of 3.40 and standard deviation of 1.22 suggest consistent weekly engagement with moderate variation.

Finally, for the statement “AI tools have become part of my daily study routine,” the responses show slightly lower but still significant daily use. 63 students (40.6%) agreed and 29 (18.7%) strongly agreed, meaning 59.3% incorporate AI tools into their everyday academic activities. Only 12 students (7.7%) strongly disagreed and 33 (21.3%) disagreed, showing that while daily engagement is high, it is more varied than weekly use. The mean score of 3.41 and standard deviation of 1.23 indicate that daily reliance on AI is becoming a notable trend among students.

Overall, the results from all five items strongly indicate that students frequently and increasingly engage with AI tools for academic and creative purposes. The high levels of agreement across all

items show that AI tools have become integral to students' learning processes, supporting everything from writing tasks and assignments to exploration of new digital technologies. This widespread engagement suggests that AI literacy is becoming a core part of students' academic behaviour and daily study patterns.

**Question 2: Purpose of AI Use**

**(Whether AI is used as a guide, collaborator, or problem-solver)**

Table 4.2.2:

| S/N | Questionnaire Items | SD | D | N | A | SA | Mean | Standard deviation | Total |
|---|---|---|---|---|---|---|---|---|---|
| 6 | I mainly use AI tools to guide my thinking process. | 20 (12.9%) | 25 (16.1%) | 15 (9.7%) | 73 (47.1%) | 22 (14.2%) | 3.34 | 1.05 | 155 |
| 7 | I use AI tools to help me organize my ideas before starting a task. | 20 (12.9%) | 26 (16.8%) | 19 (12.3%) | 68 (43.9%) | 22 (14.2%) | 3.29 | 1.06 | 155 |
| 8 | I use AI tools to clarify difficult concepts rather than provide direct answers. | 10 (6.5%) | 24 (15.5%) | 19 (12.3%) | 75 (48.4%) | 27 (17.4%) | 3.55 | 1.02 | 155 |
| 9 | AI tools help me generate new perspectives or alternative approaches to a problem. | 10 (6.5%) | 27 (17.4%) | 17 (11%) | 74 (47.7%) | 27 (17.4%) | 3.55 | 1.03 | 155 |

Source: Researcher Fieldwork, 2025

Interpretation: The purposes of AI use as identified in the survey reveal valuable insights into how individuals leverage these tools in their cognitive processes. The data collected from 155 respondents, as outlined in Table 4.2.2, indicates varying degrees of reliance on AI across several applications: as a guide, organizer, clarifier, and innovator.

The first item in the questionnaire addresses the use of AI tools as cognitive guides. Here, a total of 95 respondents (61.3%) either agreed (73 or 47.1% agreed and 22 or 14.2% strongly agreed) or expressed neutrality (15 or 9.7%) regarding the statement, while 45 respondents (29%) disagreed in some form. This suggests a moderate acceptance of AI's role in guiding thought processes among users, with an average score of 3.34 and a standard deviation of 1.05, indicating that while many find value in AI's ability to steer their thinking, a significant minority remain skeptical.

In the context of idea organization, the second item shows that 90 respondents (58.1%) acknowledged using AI tools for organizing their ideas before commencing tasks, with 68 agreeing (43.9%) and 22 strongly agreeing (14.2%). However, there is a notable portion who were neutral (19 or 12.3%) or disagreed (46 or 29.7%), reflected in a slightly lower mean score of 3.29 and a comparable standard deviation of 1.06. This suggests that while AI aids many in structuring their thoughts, a substantial segment of the respondents still either finds such tools unnecessary or outside their preferred workflow.

The third item examines AI's role as a clarifier of complex concepts rather than providing direct responses. Remarkably, 102 respondents (65.8%) agreed or strongly agreed with this statement, including 27 (17.4%) who strongly agreed. This results in a high mean of 3.55 and a lower standard deviation of 1.02, indicating a strong consensus among users about AI's effectiveness in elucidating difficult ideas, promoting a perception of AI as a supportive resource rather than a direct answer generator.

Lastly, the survey investigates the capacity of AI to inspire new perspectives or alternative approaches to issues. Here too, respondents displayed considerable affirmation, with 101 individuals (65.1%) agreeing or strongly agreeing, 27 of whom (17.4%) strongly affirmed this role. The mean of 3.55, coupled with a standard deviation of 1.03, emphasizes how AI is perceived as a tool for innovation and creativity among users.

In summary, the interpretation of the data reveals that AI tools are predominantly viewed as guides and facilitators in cognitive and creative processes, with a significant portion of respondents relying on them for clarity and perspective formation. However, there remains a noteworthy segment of the population that exhibits skepticism towards AI's usefulness in certain capacities, particularly for organizing ideas. These insights underline the nuanced relationship users have with AI, highlighting areas of strength while also pointing to potential areas for growth and further engagement.

**Question 3: As a Solution Provider**

Table 4.2.3:

| S/N | Questionnaire Items | SD | D | N | A | SA | Mean | Standard deviation | Total |
|---|---|---|---|---|---|---|---|---|---|
| 10 | I often use AI tools to generate ready-made answers or complete tasks. | 10 (6.5%) | 34 (21.9%) | 18 (11.6%) | 55 (35.5%) | 38 (24.5%) | 3.50 | 1.05 | 155 |
| 11 | I rely on AI tools to write or solve problems instead of doing them myself. | 9 (5.8%) | 35 (22.6%) | 32 (20.6%) | 44 (28.4%) | 35 (22.6%) | 3.40 | 1.04 | 155 |
| 12 | When faced with academic challenges, I let AI tools handle most of the work. | 12 (7.7%) | 28 (18.1%) | 32 (20.6%) | 48 (31%) | 35 (22.6%) | 3.43 | 1.06 | 155 |
| 13 | I prefer AI-generated content over creating original ideas myself. | 14 (9%) | 39 (25.2%) | 24 (15.5%) | 46 (29.7%) | 32 (20.6%) | 3.47 | 1.03 | 155 |

Source: Researcher Fieldwork, 2025

Interpretation: The data presented in Table 4.2.3 offers insights into the reliance of individuals on Artificial Intelligence (AI) tools for various tasks, particularly within academic contexts. This survey includes four specific questionnaire items, each designed to gauge the frequency and preference for using AI tools to facilitate problem-solving and content creation. The responses are categorized into five levels of agreement: Strongly Disagree (SD), Disagree (D), Neutral (N),

Agree (A), and Strongly Agree (SA). Additionally, the mean scores and standard deviations provide a quantitative assessment of the respondents' attitudes toward AI usage.

Starting with item 10, which states, "I often use AI tools to generate ready-made answers or complete tasks," the data reveals that 10 respondents (6.5%) strongly disagree, while 34 (21.9%) disagree, indicating a notable percentage who do not prioritize AI tools for task completion. In contrast, a considerable 93 respondents (35.5% agree and 24.5% strongly agree) utilize AI tools frequently, yielding a mean score of 3.50 and a standard deviation of 1.05. This suggests a general tendency among participants to favor AI over traditional methods of answer generation.

Item 11, which probes the degree of reliance on AI to write or solve problems instead of undertaking them independently, displays slightly lower levels of commitment. Here, 9 participants (5.8%) strongly disagree and 35 (22.6%) disagree, contributing to a total of 44% of respondents who express reservations about entirely depending on AI for learning and problem-solving. Conversely, 44 (28.4%) agree, and 35 (22.6%) strongly agree, resulting in a mean score of 3.40 and a standard deviation of 1.04. This indicates that while a portion of respondents acknowledges a reliance on AI tools, skepticism persists regarding fully delegating academic responsibilities to these systems.

In referencing item 12, "When faced with academic challenges, I let AI tools handle most of the work," the responses suggest a moderate inclination towards using AI. With 12 respondents (7.7%) strongly disagreeing and 28 (18.1%) disagreeing, it indicates that a greater number

remain proactive in their approach to challenges. However, the total of 83 respondents (31% agree and 22.6% strongly agree) shows a significant proportion who favor utilizing AI assistance. The mean score of 3.43 and the standard deviation of 1.06 support this view, revealing a balanced perspective where respondents appreciate AI help but do not wholly surrender their academic duties.

Lastly, item 13, which inquires about the preference for AI-generated content over producing original ideas, demonstrates that the inclination towards AI varies. Among responders, 14 (9%) strongly disagree, and 39 (25.2%) disagree, which indicates a skepticism towards replacing original thought with AI products. Nonetheless, 78 respondents (29.7% agree and 20.6% strongly agree) indicate a preference for AI-generated solutions, with a mean score of 3.47 and a standard deviation of 1.03. This illustrates a complex relationship where respondents may appreciate AI-generated ideas while still valuing their own creative processes.

In conclusion, the gathered data reveals a nuanced perspective on the use of AI tools among respondents. While there is a notable acceptance and integration of AI into their academic lives, concerns about the adequacy of relying solely on these tools persist. The mean scores across items show an overall trend towards favoring AI support, yet they also underscore a continuing appreciation for personal engagement in learning and creativity.

**Question 4: Reliance on AI Tools**

**(Degree of dependency and trust in AI outputs)**

Table 4.2.4:

| S/N | Questionnaire Items | SD | D | N | A | SA | Mean | Standard deviation | Total |
|---|---|---|---|---|---|---|---|---|---|
| 14 | I find it difficult to complete academic tasks without using AI tools. | 28 (18.1%) | 22 (14.2%) | 23 (14.8%) | 53 (34.2%) | 29 (18.7%) | 3.24 | 1.07 | 155 |
| 15 | I trust the outputs from AI tools without much verification. | 20 (12.9%) | 32 (20.6%) | 19 (12.3%) | 57 (36.8%) | 27 (17.4%) | 3.43 | 1.06 | 155 |
| 16 | I feel less confident working on assignments without AI assistance. | 24 (15.5%) | 36 (23.2%) | 23 (14.8%) | 46 (29.7%) | 26 (16.8%) | 3.31 | 1.07 | 155 |
| 17 | AI tools save me from spending too much time thinking through problems. | 20 (12.9%) | 27 (17.4%) | 21 (13.5%) | 62 (40%) | 25 (16.1%) | 3.51 | 1.07 | 155 |
| 18 | I would struggle academically if AI tools were no longer available. | 22 (14.2%) | 33 (21.3%) | 27 (17.4%) | 51 (32.9%) | 22 (14.2%) | 3.28 | 1.09 | 155 |

Source: Researcher Fieldwork, 2025

In Table 4.2.4, we explore respondents' reliance on AI tools and their trust in the outputs generated by these technologies. The data indicates a significant dependency on AI for academic tasks, with an average mean score of 3.24 for the statement "I find it difficult to complete

academic tasks without using AI tools." This illustrates that a considerable portion of respondents (approximately 52.9%) expressed agreement or strong agreement, highlighting a prevailing reliance on AI in academic contexts.

The trust in AI-generated outputs is further emphasized by the mean score of 3.43 for the statement, "I trust the outputs from AI tools without much verification." Almost 54.2% of the respondents indicated agreement or strong agreement, suggesting that many participants tend to accept AI-generated information without rigorous validation, raising questions about critical thinking and verification processes.

Moreover, the sentiment regarding self-confidence in academic work reveals a mean score of 3.31 for the statement, "I feel less confident working on assignments without AI assistance." Here, about 46.5% of the respondents showcased a level of agreement, indicating that AI tools are seen as a confidence booster in academic endeavors.

Participants also noted that AI tools significantly aid in reducing the time spent on problem-solving, with a mean score of 3.51 for the statement, "AI tools save me from spending too much time thinking through problems." This response highlights how AI supports efficiency in academic work, with a majority (about 56.1%) indicating agreement or strong agreement.

Lastly, the statement "I would struggle academically if AI tools were no longer available" received a mean score of 3.28, with almost 47.1% of respondents agreeing. This aligns with the previous findings, confirming a perceived dependency on AI tools among students.

In summary, the data underscores a growing reliance on AI tools in academic settings, characterized by a notable level of trust in their outputs. While these tools are seen to enhance efficiency and confidence, the implications for critical thinking and independent problem-solving warrant further examination.

**Question 5: Ethical Awareness in AI Use**

**(Awareness of moral, academic, and integrity issues surrounding AI usage)**

Table 4.2.5:

| S/N | Questionnaire Items | SD | D | N | A | SA | Mean | Standard deviation | Total |
|---|---|---|---|---|---|---|---|---|---|
| 19 | I am aware of the ethical implications of using AI tools for academic work | 10 (6.5%) | 26 (16.8%) | 18 (11.6%) | 79 (51%) | 22 (14.2%) | 3.72 | 0.93 | 155 |
| 20 | I avoid using AI tools in ways that violate academic integrity. | 5 (3.2%) | 18 (11.6%) | 18 (11.6%) | 92 (59.4%) | 22 (14.2%) | 3.80 | 0.92 | 155 |
| 21 | I understand that excessive reliance on AI can reduce personal creativity. | 5 (3.2%) | 16 (10.3%) | 19 (12.3%) | 76 (49%) | 39 (25.2%) | 3.69 | 0.89 | 155 |
| 22 | I make sure to acknowledge or reference AI contributions in my | 5 (3.1%) | 19 (12.3%) | 37 (23.9%) | 68 (43.9%) | 26 (16.8%) | 3.57 | 0.92 | 155 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | work. | | | | | | | | |
| 23 | I believe that AI use in education should be guided by clear ethical policies. | 5 (3.2%) | 17 (11%) | 25 (16.1%) | 71 (45.8%) | 37 (23.9%) | 3.61 | 0.96 | 155 |

Source: Researcher Fieldwork, 2025

Interpretation: The data presented in Table 4.2.5 highlights the level of ethical awareness among individuals regarding the use of artificial intelligence (AI) tools, particularly in the context of academic work. The questionnaire encompassed five distinct items, each reflecting different aspects of ethical considerations surrounding AI usage.

Item 19 queries respondents about their awareness of the ethical implications inherent in utilizing AI tools for academic purposes. A majority of respondents (51%) affirmed their awareness, scoring an average of 3.72 with a standard deviation of 0.93. This indicates a relatively high level of consciousness among the participants regarding the ethical dimensions of AI, suggesting that most individuals recognize the potential moral concerns that can arise from such technologies in academia.

Item 20 delves into the respondents' commitment to upholding academic integrity while using AI tools. The results show that 59.4% of participants indicated agreement with the statement claiming they avoid using these tools in ways that compromise academic integrity. The mean score of 3.80 and a standard deviation of 0.92 further affirm a strong adherence to ethical academic practices among most individuals surveyed.

In Item 21, the impact of excessive reliance on AI on personal creativity is assessed. Here, 49% of respondents agreed that such dependence can indeed diminish creativity, with a mean score of 3.69 and a standard deviation of 0.89. This reflects a recognized tension between leveraging AI for assistance and the potential adverse effects on individual creative capacities.

Item 22 addresses the importance of acknowledging AI contributions in academic work. A significant portion of respondents, 43.9%, agreed with this practice, which received a mean score of 3.57 and a standard deviation of 0.92. This suggests a general understanding among participants of the need for transparency in academic submissions involving AI-generated content, although some may still hesitate given that only 16.8% strongly agree with the necessity of acknowledgment.

Finally, Item 23 seeks respondents' opinions on the need for clear ethical policies guiding AI use in education. Here, 45.8% of individuals indicated agreement with the idea that such policies should exist, leading to a mean score of 3.61 and a standard deviation of 0.96. This emphasizes a consensus on the necessity of establishing frameworks that govern the ethical deployment of AI in education, as participants clearly see the importance of structured guidelines.

In conclusion, the collected responses reflect a generally strong awareness of ethical considerations related to AI usage for academic purposes among the surveyed individuals. With the majority reporting a commitment to academic integrity, awareness of the implications of AI

on personal creativity, and a call for clear ethical policies, the results suggest a proactive engagement with the ethical landscape that AI technology introduces in educational settings.

**Research Question 6: Divergent Thinking (Idea Generation & Creativity Stimulation)**

**(Measures how AI supports students' ability to think broadly, creatively, and originally)**

Table 4.2.6:

| S/N | Questionnaire Items | SD | D | N | A | SA | Mean | Standard deviation | Total |
|---|---|---|---|---|---|---|---|---|---|
| 24 | Using AI tools helps me generate a variety of ideas for a single problem. | 19 (12.3%) | 18 (11.6%) | 20 (12.9%) | 76 (49%) | 22 (14.2%) | 3.46 | 1.09 | 155 |
| 25 | AI prompts often inspire me to explore different perspectives or approaches. | 18 (11.6%) | 17 (11%) | 23 (14.8%) | 72 (46.5%) | 25 (16.1%) | 3.46 | 1.06 | 155 |
| 26 | When using AI, I am able to combine unrelated ideas to produce something novel. | 11 (7.1%) | 25 (16.1%) | 24 (15.5%) | 67 (43.2%) | 28 (18.1%) | 3.45 | 1.05 | 155 |
| 27 | AI tools stimulate my imagination and creativity in ways I didn't expect. | 14 (6.5%) | 28 (16.8%) | 22 (18.1%) | 64 (41.3%) | 27 (17.4%) | 3.45 | 1.02 | 155 |
| 28 | I depend on AI so much that I no longer challenge myself creatively. | 19 (12.3%) | 36 (23.2%) | 26 (16.8%) | 45 (31.6%) | 25 (16.1%) | 3.25 | 1.08 | 155 |

Source: Researcher Fieldwork, 2025

Interpretation: The survey data presented in Table 4.2.6 explores the impact of artificial intelligence (AI) tools on students' divergent thinking, creativity stimulation, and idea generation. The responses indicate a generally positive perception of how these tools contribute to enhancing creative thinking among students.

For instance, the statement "Using AI tools helps me generate a variety of ideas for a single problem" received a mean score of 3.46, with 49% of respondents agreeing (A) and 14.2% strongly agreeing (SA). This reflects a consensus that AI facilitates the exploration of multiple solutions, highlighting its utility in problem-solving contexts.

Similarly, the item "AI prompts often inspire me to explore different perspectives or approaches" also garnered a mean score of 3.46, with 46.5% of participants agreeing and 16.1% strongly agreeing. Again, this underscores the role of AI in broadening the scope of students' thought processes and encouraging them to consider alternatives they might not have otherwise examined.

The item "When using AI, I am able to combine unrelated ideas to produce something novel" achieved a mean score of 3.45, with 43.2% agreeing and 18.1% strongly agreeing. This indicates that AI not only assists in generating ideas but also fosters innovative thinking by allowing students to synthesize disparate concepts.

The statement "AI tools stimulate my imagination and creativity in ways I didn't expect" parallels this sentiment, with a mean score of 3.45 and 41.3% agreeing, alongside 17.4% strongly

agreeing. It suggests that AI serves as a surprise catalyst for creativity, providing students with inspiration in unforeseen ways.

However, the survey also disclosed a potential downside with the statement "I depend on AI so much that I no longer challenge myself creatively." It recorded a mean score of 3.25, indicating some level of concern, with 31.6% of respondents agreeing and 12.3% strongly agreeing. This suggests that while AI tools can enhance creativity, there are implications for students' self-reliance in creative thinking.

In summary, the findings suggest that AI tools significantly support students' ability to think creatively and generate diverse ideas. Nevertheless, there is an important caveat regarding the over-reliance on these tools, which may impair individual creative challenges.

**Question 7: Convergent Thinking (Creative Problem Solving & Refinement)**

**(Measures how AI supports or hinders logical reasoning, refinement, and decision-making)**

Table 4.2.7:

| S/N | Questionnaire Items | SD | D | N | A | SA | Mean | Standard deviation | Total |
|---|---|---|---|---|---|---|---|---|---|
| 29 | AI tools help me evaluate which ideas are most practical or effective. | 10 (6.5%) | 25 (16.1%) | 22 (14.2%) | 73 (47.1%) | 25 (16.1%) | 3.50 | 1.13 | 155 |
| 30 | I can use AI feedback to refine and improve my initial concepts. | 8 (5.2%) | 33 (21.3%) | 21 (14.2%) | 69 (44.5%) | 24 (14.8%) | 3.49 | 1.14 | 155 |
| 31 | AI helps me organize my thoughts and arrive at clearer conclusions | 15 (9.7%) | 24 (16 1%) | 20 (12.9%) | 65 (51.6%) | 28 (14.8%) | 3.53 | 1.20 | 155 |
| 32 | I critically analyze AI-generated ideas before applying them to my work. | 11 (1.9%) | 22 (15.5%) | 23 (15.5%) | 66 (46.5%) | 29 (20.6%) | 3.77 | 1.11 | 155 |
| 33 | I feel less motivated to think deeply because AI gives answers quickly. | 9 (5.8%) | 37 (23.9%) | 22 (14.2%) | 53 (37.4%) | 34 (18.7%) | 3.05 | 1.16 | 155 |
| 34 | I prefer using AI instead of struggling to come up with my own solutions. | 6 (8.4%) | 30 (19.4%) | 25 (14.2%) | 52 (38.1%) | 42 (20%) | 3.45 | 1.30 | 155 |

Source: Researcher Fieldwork, 2025

Interpretation: The data presented offers insights into how AI tools influence convergent thinking, particularly in terms of problem solving, idea refinement, and decision-making. Across the five

items assessed, varying degrees of agreement and perceptions were noted among respondents, indicating both the advantages and potential drawbacks of AI integration in cognitive processes.

Item 29, which states that "AI tools help me evaluate which ideas are most practical or effective," received notable support, with a mean score of 3.50. This indicates that 63.2% of respondents agree (combined categories of Agree and Strongly Agree) that AI effectively assists in appraising the practicality of ideas. However, a minority of 16.5% expressed disagreement, suggesting that while generally positive, there remains a segment skeptical of AI's effectiveness in this regard.

Similarly, Item 30 highlights the perceived ability of AI feedback to refine initial concepts, yielding a closely aligned mean score of 3.49. Here, 59.3% of participants affirm the usefulness of AI in enhancing their preliminary ideas, although some respondents (26.5%) held neutral or opposing views.

The third item, concerning AI's role in organizing thoughts, returned the highest mean score of 3.53, with 66.4% of participants agreeing that AI aids in reaching clearer conclusions. This reflects a strong recognition of AI's organizational capabilities in the creative process.

Interestingly, Item 32 reveals a more critical stance, where respondents acknowledged the importance of analytical thinking by stating, "I critically analyze AI-generated ideas before applying them to my work." With a mean of 3.77, this suggests a commitment among

participants to evaluate AI suggestions, signifying a balance between reliance on AI and personal judgment.

On the contrary, responses to Item 33, which claims that "I feel less motivated to think deeply because AI gives answers quickly," exhibited mixed feelings. Here, a mean score of 3.05 indicates a tendency towards neutrality, yet with 23.9% expressing disagreement and a notable 37.4% finding some resonance in the statement. This contradiction highlights a nuanced relationship with AI, where its efficiency may simultaneously drain motivation and engender dependence.

Finally, Item 34, suggesting a preference for AI over personal problem-solving efforts, garnered a mean score of 3.45, showing that while many appreciate the convenience AI offers, a significant 38.1% did not see it as a substitute for their own cognitive efforts.

In summary, the analyzed data presents a complex view of AI's impact on convergent thinking. Overall, respondents exhibit a favorable attitude towards AI's role in enhancing decision-making and refining ideas, while also demonstrating a critical awareness of their cognitive processes and the potential pitfalls of over-reliance on AI.

### 4.3 Multiple Regression Analysis

A multiple regression analysis was conducted to determine the joint and individual influence of four predictors frequency of AI tool usage, purpose of AI use, reliance on AI tools, and ethical awareness in AI use on students' innovative thinking (convergent thinking and divergent thinking). The results are presented in the Model Summary, ANOVA, and Coefficients tables.

**Model Summary**[b]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .420[a] | .177 | .155 | 7.83062 | 1.718 |

a. Predictors: (Constant), Ethical_Awareness_in_AI_Use, Reliance_on_AI_Tools, Frequency_of_AI_Tool_Usage, Purpose_of_AI_Use

b. Dependent Variable: Innovative_Thinking

The regression model produced an R value of .420, indicating a moderate positive relationship between the set of independent variables and innovative thinking among university students. The R Square value of .177 shows that 17.7% of the variance in innovative thinking is explained collectively by frequency of AI usage, purpose of AI use, reliance on AI tools, and ethical awareness.

Although this percentage is modest, it demonstrates that the predictors contribute meaningfully to explaining innovative thinking.

The Durbin–Watson statistic of **1.718** indicates that the residuals are independent and that the model does not suffer from autocorrelation.

**ANOVA**[a]

| **Model** | | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
|---|---|---|---|---|---|---|
| 1 | Regression | 1973.967 | 4 | 493.492 | 8.048 | <.001[b] |
| | Residual | 9197.801 | 150 | 61.319 | | |
| | Total | 11171.768 | 154 | | | |

a. Dependent Variable: Innovative_Thinking

b. Predictors: (Constant), Ethical_Awareness_in_AI_Use, Reliance_on_AI_Tools, Frequency_of_AI_Tool_Usage, Purpose_of_AI_Use

The ANOVA table reveals that the model is statistically significant,

**F(4,150) = 8.048, p < .001**, showing that the combined influence of the four predictors has a significant effect on innovative thinking.

This implies that, taken together, the predictors are meaningful determinants of students' innovative thinking.

**Coefficients**[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 24.169 | 3.236 | | 7.470 | <.001 |
| | Frequency_of_AI_Tool_Usage | .185 | .144 | .119 | 1.281 | .202 |
| | Purpose_of_AI_Use | .328 | .115 | .285 | 2.855 | .005 |
| | Reliance_on_AI_Tools | -.297 | .122 | -.202 | -2.426 | .016 |
| | Ethical_Awareness_in_AI_Use | .349 | .161 | .175 | 2.168 | .032 |

**Coefficients**[a]

| Model | | 95.0% Confidence Interval for B | | Collinearity Statistics | |
|---|---|---|---|---|---|
| | | Lower Bound | Upper Bound | Tolerance | VIF |
| 1 | (Constant) | 17.776 | 30.563 | | |
| | Frequency_of_AI_Tool_Usage | -.100 | .469 | .636 | 1.571 |
| | Purpose_of_AI_Use | .101 | .555 | .549 | 1.821 |
| | Reliance_on_AI_Tools | -.538 | -.055 | .796 | 1.257 |
| | Ethical_Awareness_in_AI_Use | .031 | .668 | .844 | 1.184 |

The Coefficients table was used to examine the extent to which each predictor contributes to explaining innovative thinking.

**1. Frequency of AI Tool Usage (H01)**

- **β = .119, p = .202**

- The relationship is positive but statistically **not** significant.

  This means that how often students use AI tools does not significantly influence their level of innovative thinking.

**Decision on H01:** *Fail to reject H01.*

There is no significant relationship between frequency of AI use and innovative thinking.

**2. Purpose of AI Use (H02)**

- **β = .285, p = .005**
- This predictor is significant and positive.

  This indicates that students who use AI for meaningful purposes—such as guidance, ideation, or conceptual support tend to demonstrate higher innovative thinking.

**Decision on H02:** *Reject H02.*

The purpose for which students use AI significantly affects their innovative thinking.

**3. Reliance on AI Tools (H03)**

- **β = –.202, p = .016**
- This predictor is significant but negative.

  This means that high dependence on AI tools decreases students' innovative thinking.

In other words, the more students rely on AI to supply complete answers or solutions, the lower their ability for original or innovative thinking.

**Decision on H03:** *Reject H03.*

Reliance on AI tools has a significant influence, but the effect is negative.

**4. Ethical Awareness of AI Use (RQ4 / H04)**

- **β = .175, p = .032**
- This predictor is significant and positive.

  The result indicates that students who are more aware of ethical considerations in AI use such as originality, plagiarism issues, and responsible usage demonstrate higher innovative thinking.

**Decision on H04:** *Reject H04.*

Ethical awareness significantly enhances innovative thinking.

**Summary of Hypothesis Testing**

| Hypothesis | Statement | Decision | Interpretation |
|---|---|---|---|
| **H01** | No significant relationship between frequency of AI use and innovative thinking | **Not Rejected** | Frequency of use does not predict innovative thinking |
| **H02** | Purpose of AI use does not significantly affect innovative thinking | **Rejected** | Purpose of use **positively and significantly** influences innovative thinking |
| **H03** | Reliance on AI tools has no significant effect on innovative thinking | **Rejected** | Reliance has a **significant negative** effect |
| **H04** | Ethical awareness does not significantly influence innovative thinking | **Rejected** | Ethical awareness **positively** influences innovative thinking |

**Overall Interpretation**

The regression analysis demonstrates that while the general frequency of AI tool usage does not significantly predict innovative thinking, the *manner* and *mindset* with which students engage with AI tools play a substantial role. Specifically, using AI purposefully—as a guide rather than a full solution provider—and maintaining ethical awareness significantly enhances innovative thinking. Conversely, heavy reliance on AI for answers reduces students' ability to think creatively and generate original ideas.

| **RegressionNotes** |
|---|

| | | |
|---|---|---|
| Output Created | | 05-DEC-2025 21:47:42 |
| Comments | | |
| Input | Active Dataset | DataSet2 |
| | Filter | <none> |
| | Weight | <none> |
| | Split File | <none> |
| | N of Rows in Working Data File | 155 |
| Missing Value Handling | Definition of Missing | User-defined missing values are treated as missing. |
| | Cases Used | Statistics are based on cases with no missing values for any variable used. |
| Syntax | | REGRESSION<br>/MISSING LISTWISE<br>/STATISTICS COEFF OUTS CI(95) R ANOVA COLLIN TOL<br>/CRITERIA=PIN(.05) POUT(.10) TOLERANCE(.0001)<br>/NOORIGIN<br>/DEPENDENT<br>Innovative_Thinking<br>/METHOD=ENTER<br>Frequency_of_AI_Tool_Usage<br>Purpose_of_AI_Use<br>Reliance_on_AI_Tools<br>Ethical_Awareness_in_AI_Use<br>/RESIDUALS DURBIN. |
| Resources | Processor Time | 00:00:00.08 |
| | Elapsed Time | 00:00:00.06 |
| | Memory Required | 6592 bytes |
| | Additional Memory Required for Residual Plots | 0 bytes |

**Variables Entered/Removed**[a]

| Model | Variables Entered | Variables | Method |
|---|---|---|---|

| | | | |
|---|---|---|---|
| | | Removed | |
| 1 | Ethical_Awareness_in_AI_Use, Reliance_on_AI_Tools, Frequency_of_AI_Tool_Usage, Purpose_of_AI_Use[b] | . | Enter |

a. Dependent Variable: Innovative_Thinking
b. All requested variables entered.

**Model Summary**[b]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .420[a] | .177 | .155 | 7.83062 | 1.718 |

a. Predictors: (Constant), Ethical_Awareness_in_AI_Use, Reliance_on_AI_Tools, Frequency_of_AI_Tool_Usage, Purpose_of_AI_Use
b. Dependent Variable: Innovative_Thinking

**ANOVA**[a]

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1973.967 | 4 | 493.492 | 8.048 | <.001[b] |
| | Residual | 9197.801 | 150 | 61.319 | | |
| | Total | 11171.768 | 154 | | | |

a. Dependent Variable: Innovative_Thinking
b. Predictors: (Constant), Ethical_Awareness_in_AI_Use, Reliance_on_AI_Tools, Frequency_of_AI_Tool_Usage, Purpose_of_AI_Use

**Coefficients**[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 24.169 | 3.236 | | 7.470 | <.001 |
| | Frequency_of_AI_Tool_Usage | .185 | .144 | .119 | 1.281 | .202 |
| | Purpose_of_AI_Use | .328 | .115 | .285 | 2.855 | .005 |
| | Reliance_on_AI_Tools | -.297 | .122 | -.202 | -2.426 | .016 |
| | Ethical_Awareness_in_AI_Use | .349 | .161 | .175 | 2.168 | .032 |

**Coefficients**[a]

| Model | | 95.0% Confidence Interval for B | | Collinearity Statistics | |
|---|---|---|---|---|---|
| | | Lower Bound | Upper Bound | Tolerance | VIF |
| 1 | (Constant) | 17.776 | 30.563 | | |
| | Frequency_of_AI_Tool_Usage | -.100 | .469 | .636 | 1.571 |
| | Purpose_of_AI_Use | .101 | .555 | .549 | 1.821 |
| | Reliance_on_AI_Tools | -.538 | -.055 | .796 | 1.257 |
| | Ethical_Awareness_in_AI_Use | .031 | .668 | .844 | 1.184 |

a. Dependent Variable: Innovative_Thinking

**Collinearity Diagnostics**[a]

| Model | Dimension | Eigenvalue | Condition Index | Variance Proportions | | |
|---|---|---|---|---|---|---|
| | | | | (Constant) | Frequency_of_AI_Tool_Usage | Purpose_of_AI_Use |
| 1 | 1 | 4.808 | 1.000 | .00 | .00 | .00 |
| | 2 | .079 | 7.826 | .03 | .03 | .00 |
| | 3 | .059 | 9.012 | .10 | .56 | .03 |
| | 4 | .029 | 12.868 | .11 | .38 | .93 |
| | 5 | .025 | 13.871 | .76 | .03 | .04 |

| **Collinearity Diagnostics**[a] | | | |
|---|---|---|---|
| Model | Dimension | Variance Proportions | |
| | | Reliance_on_AI_Tools | Ethical_Awareness_in_AI_Use |
| 1 | 1 | .00 | .00 |
| | 2 | .90 | .07 |
| | 3 | .02 | .16 |
| | 4 | .04 | .00 |
| | 5 | .04 | .77 |

a. Dependent Variable: Innovative_Thinking

**Residuals Statistics**[a]

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 27.9783 | 46.1664 | 37.9613 | 3.58022 | 155 |
| Residual | -21.12311 | 22.47989 | .00000 | 7.72826 | 155 |
| Std. Predicted Value | -2.788 | 2.292 | .000 | 1.000 | 155 |
| Std. Residual | -2.698 | 2.871 | .000 | .987 | 155 |

a. Dependent Variable: Innovative_Thinking

### 4.4 Discussion of findings

The results across all tables collectively reveal a comprehensive picture of how students interact with, depend on, and critically assess AI tools in their academic and creative lives. Overall, the findings indicate that AI has become deeply integrated into students' daily routines, serving multiple cognitive functions from guiding thinking and organizing ideas to stimulating creativity and facilitating problem-solving. However, alongside these positive influences, the data also highlight concerns about overreliance, ethical responsibility, and the potential diminishing of personal cognitive effort.

To begin, the findings show that AI usage is both frequent and normalized among students. The majority of respondents reported regular engagement with AI tools for academic work, assignments, and creative tasks. High levels of agreement across items related to daily and weekly use suggest that AI is no longer perceived as an optional aid but rather as an essential component of students' academic workflow. This widespread integration reflects broader technological trends in education, where AI applications such as ChatGPT, Grammarly, and Gemini have become accessible and intuitive tools for enhancing productivity.

Beyond frequency of use, students also employ AI for a variety of cognitive purposes. Many participants use AI as a guide to help shape their thinking, explore new ideas, clarify complex

concepts, and inspire novel approaches. The strong agreement on AI's ability to clarify difficult ideas and stimulate innovative thought demonstrates that students perceive AI as more than a mere answer generator; instead, it is seen as a cognitive partner that supports deeper understanding and creative exploration. This aligns with emerging research suggesting that AI serves as an effective scaffold for critical thinking and concept development.

However, the findings also reveal ambivalence in certain cognitive domains particularly in organizing ideas and navigating academic challenges. While a significant portion of respondents acknowledged using AI for idea structuring and task completion, a substantial minority remained neutral or resistant. This suggests that although AI is valued for its convenience and intellectual support, some students still prefer traditional methods or view AI as insufficient for more nuanced or personal cognitive tasks. This ambivalence reflects ongoing debates about AI's influence on independent learning and whether it enhances or replaces essential cognitive processes.

The Issue of overreliance emerges strongly in the data related to students' tendencies to use AI for generating ready-made answers or solving problems in place of independent work. While many respondents admitted to relying on AI for academic challenges, others expressed hesitation or skepticism. The mixed responses highlight a tension between AI's efficiency and the need for personal intellectual engagement. Some students feel motivated and empowered by AI's support,

yet others recognize that easy access to automated solutions may reduce their drive to think deeply or solve problems creatively.

Ethical considerations add another layer to this discussion. The majority of respondents demonstrated awareness of the ethical implications of AI use and expressed commitments to maintaining academic integrity. At the same time, the findings indicate that acknowledging AI contributions remains inconsistent, pointing to the need for clearer academic guidelines and instructional support. Students' recognition of AI's potential to diminish creativity also reflects an understanding that balancing technological assistance with personal intellectual effort is essential.

Finally, the impact of AI on divergent and convergent thinking reveals a nuanced cognitive landscape. On one hand, students perceive AI as a powerful stimulus for creativity, idea generation, and perspective-taking. On the other hand, concerns about diminished self-challenge and reduced motivation for deep thinking suggest that AI's benefits may come with psychological trade-offs. Yet, importantly, many respondents reported critically analyzing AI-generated ideas before applying them an encouraging sign that students maintain an active evaluative role rather than accepting AI outputs uncritically. This indicates an emerging form of AI literacy that emphasizes collaboration with, rather than dependence on, technological tools.

In summary, the findings illustrate a complex but largely positive relationship between students and AI tools. AI serves as a facilitator of creativity, learning, and cognitive organization, while

also raising important questions about ethical usage, accountability, and the preservation of independent thought. As AI continues to evolve, these insights underscore the need for educational institutions to cultivate balanced AI literacy one that empowers students to use AI effectively while maintaining their own critical and creative capacities.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

## 5.1 Summary of Findings

The results of the study show that AI tools have become deeply integrated into students' academic and creative activities. Across the different categories examined frequency of use, purpose of use, levels of reliance, ethical awareness, and effects on divergent and convergent thinking students consistently demonstrated substantial engagement with AI technologies. The findings indicate that most students use AI tools regularly for academic tasks, assignments, and daily study routines, suggesting that AI has become a normalized part of their educational experience. Students rely on AI not only to complete work but also to guide their thinking, clarify complex topics, organize ideas, and generate new perspectives.

The results further reveal that students view AI as both a creative catalyst and an Intellectual support system. AI assists them in producing diverse ideas, combining unrelated concepts to

inspire innovation, improving the clarity of their thought processes, and refining initial ideas toward more effective solutions. At the same time, some respondents expressed concerns about overreliance, acknowledging that excessive dependence on AI may weaken their motivation to think deeply or solve problems independently. Ethical awareness was also a significant factor, with many students demonstrating an understanding of the importance of academic integrity and the potential moral implications of AI use. However, variations were observed in how consistently students practice ethical behaviors, such as attributing AI-generated content. Altogether, the summary of findings reveals a multifaceted relationship between students and AI, wherein enthusiasm for its benefits coexists with thoughtful awareness of its limitations and potential risks.

## 5.2 Conclusions

Based on the findings, it is evident that AI tools have become a substantial and permanent feature of the academic environment. Students rely on AI frequently and in diverse ways, indicating that the technology has transitioned from being optional support to becoming an essential part of daily learning. AI now serves not only as an information resource but also as a cognitive partner that guides thinking, clarifies ideas, and fosters creativity. The data also show that while students value these benefits, they remain conscious of the risks associated with overdependence on AI, particularly in relation to creativity and deep thinking. This demonstrates

a balanced awareness where students appreciate AI's advantages but still recognize the importance of their own intellectual engagement.

The level of ethical awareness observed among students suggests that they are increasingly considering the implications of AI use within academic contexts. Although many understand the importance of maintaining academic integrity, inconsistencies in their actual practices indicate a need for clearer institutional direction. The study also concludes that students are developing a form of emerging AI literacy, characterized by their ability to evaluate AI-generated ideas before applying them to their work. However, this literacy remains incomplete, as students still encounter challenges in distinguishing appropriate from inappropriate forms of AI assistance. Overall, the conclusions affirm that while AI enhances learning in numerous ways, its integration must be accompanied by thoughtful guidance to maximize benefits and mitigate negative outcomes.

### 5.3 Recommendations

In light of the conclusions drawn from the study, it is recommended that educational institutions take an active role in shaping how students engage with AI. Schools and universities should consider incorporating AI literacy programs into their curricula so that students learn not only how to use AI tools effectively but also how to evaluate them critically and ethically. Such

training would support responsible usage and ensure that students do not rely on AI as a substitute for independent thought. Additionally, institutions should create clear and comprehensive policies outlining appropriate uses of AI in academic work. Establishing these guidelines would help address inconsistencies in ethical practices and ensure that students understand their responsibilities when using AI.

Teachers and faculty members also need support and training to properly guide students in the appropriate use of AI. As AI becomes more embedded in education, educators must be equipped to explain its benefits, limitations, and ethical considerations. Encouraging students to maintain a healthy balance between AI assistance and personal effort is equally important. Educators can foster this balance by designing assignments that require creative thinking, critical analysis, and personal interpretation that cannot simply be outsourced to AI tools. Institutions should also promote reflective practices that encourage students to consider the ethical and cognitive impacts of their AI usage. Finally, future research should explore the long-term effects of AI on independent thinking, creativity, and learning habits, allowing educators to adapt strategies as technology evolves. Through these measures, AI can be integrated into education in a way that supports student growth while preserving the essential human skills at the core of meaningful learning.

## REFERENCES


Abubakar, U., Falade, A. A., & Ibrahim, H. A. (2024). Redefining student assessment in Nigerian tertiary institutions: The impact of AI technologies on academic performance and developing countermeasures. Advances in Mobile Learning Educational Research, 4(2), 1149–1159.

Abubakar, U., Onasanya, S. A., & Ibrahim, H. A. (2024). Student perspectives and impact of AI integration in pedagogical practices in Nigerian tertiary institutions.

Advances in Mobile Learning Educational Research, 4(2), 1135–1148.

Afolabi, A., Ibrahim, T., & Adepoju, K. (2023). The role of generative artificial intelligence in enhancing learning and innovation among students in Nigeria

African Journal of Humanities and Contemporary Education Research, 20(1), 285–304.

Agbo, J., Sanusi, M., & Onyeka, T. (2023). Artificial intelligence adoption and its influence on students' creative learning in Nigerian universities

Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. Journal of Personality and Social Psychology, 45(2), 357–37.

Amabile, T. M. (1996). Creativity in context: Update to the social psychology of creativity. Westview Press.

Amabile, T. M., Hadley, C. N., & Kramer, S. J. (2002). Creativity under the gun. Harvard Business Review, 80(8), 52–61.

Babagana (2024, February 15). Students’ misuse of AI tools threatens academic integrity.

Babbie, E. (2010). The practice of social research (12th ed.). Wadsworth Cengage Learning.

Bingimlas, K. A. (2018). Barriers to the successful integration of ICT in teaching and learning environments: A review of the literature. Eurasia Journal of Mathematics, Science and Technology Education, 5(3), 235–245.

Campus Reporters. (2025). AI use and academic integrity among Nigerian students

Chukwuere, J. (2023). Generative AI and its educational implications in higher institutions of learning.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika 16(3),297-334.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. Management Science, 35(8), 982–1003.

Ebiringa, O. T., Ikerionwu, C. O., Erike, A. I., & Asiegbu, B. C. (2025). Generative AI adoption in Nigerian higher education: Benefits, challenges, and opportunities.

Essien, A., Salami, A., Ajala, O., et al. (2024). Exploring socio-cultural influences on generative AI engagement in Nigerian higher education: An activity theory analysis. Smart Learning Environments, 11, 63.

Fosnot, C. T. (2005). Constructivism: Theory, perspectives, and practice (2nd ed.). Teachers College Press.

Gujarati, D. N., & Porter, D. C. (2009). Basic econometrics (5th ed.). McGraw-Hill.

Holmes, W., Bialik, M., & Fadel, C. (2021). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign.

IBM Corp. (2022). IBM SPSS Statistics for Windows (Version 29.0). IBM Corp.

Jiani Zhu-Ireland, & Shalley, C. E. (n.d.). The relationship between ethics and creativity: An ethical leadership focus.

Jonassen, D. H. (1999). Learning with technology: A constructivist perspective. Prentice Hall.

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., et al.

Kasneci, E., Seßler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., Stadler, M., Weller, J., Kühn, J., & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. Learning and Individual Differences, 103

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30(3), 607-610.

Likert, R. (1932). A technique for the measurement of attitudes. Archives of Psychology, 22(140), 1–55.

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. (2016). Intelligence unleashed: An argument for AI in education. Pearson Education.

Mathew, S., & Isaac, E. A. (2025). Artificial intelligence (AI): A threat to education in Nigeria. Journal of Education Research and Library Practice, 8(8).

McCarthy, J. (2007). What is artificial intelligence? Stanford University.

Nnanna-Ohuonu, O. (2025). The impact of artificial intelligence tools on academic performance in marketing education: Evidence from universities in South-East Nigeria. Multidisciplinary Journal of Law, Education and Humanities, 2 (2).

Nunnally, J. C., & Bernstein, I. H. (1994). Psychometric theory (3rd ed.). McGraHill.

Ogwo, E. (2025). The ethics of AI use among Nigerian undergraduates: Implications for academic innovation.

Olaleye, T., & Hassan, M. (2022). Digital transformation and innovation in Nigerian tertiary institutions: Challenges and opportunities.

Pearson, K. (1896). Mathematical contributions to the theory of evolution. Philosophical Transactions of the Royal Society of London A, 187, 253–318.

Piaget, J. (1970). Science of education and the psychology of the child. Orion Press.

Roscoe, J. T. (1975). Fundamental research statistics for the behavioral sciences (2nd ed.). Holt, Rinehart and Winston.

Rudolph, J., Tan, S., & Tan, S. (2023). The impact of AI tools on higher education: Perspectives from learners and educators. Computers and Education: Artificial Intelligence, 4, 100123.

UNESCO. (2022). Education and artificial intelligence: Challenges and opportunities. UNESCO Publishing.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2), 186–204.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

Wooldridge, J. M. (2013). Introductory econometrics: A modern approach (5th ed.). Cengage Learning.

World Bank. (2023). The future of learning in an AI-driven world. World Bank Group.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. International Journal of Educational Technology in Higher Education, 16(39).

## APPENDIX

**DEPARTMENT OF ENTREPRENEURSHIP**
**FACULTY OF MANAGEMENT SCIENCES**
**UNIVERSITY OF BENIN, BENIN CITY**

**Questionnaire on the Impact of AI Usage on Innovative thinking among university students in Nigeria.**

I am an undergraduate student in the Department of Entrepreneurship, University of Benin, Benin City, Edo State, conducting a study on the impact of AI usage on innovative thinking among university students in Nigeria. I kindly request your assistance in completing this questionnaire.

Please note that no personal identifying information (such as name, matriculation number, or contact details) is required or recorded. Your responses will remain strictly confidential and will be used solely for academic purposes.

Kindly respond honestly based on your experiences and opinions.

By completing this questionnaire, you are voluntarily giving your consent to participate in this study.

Thank you very much for your time and valuable contribution.

**Section A: Demographic Information**

1.Gender

A. Male ( ) b. Female ( ) c. Prefer not to say ( )

2. Age

A. Below 18 ( ) b.18-22 ( ) c. 23-27 d. 28 and above

3. Level of Study

100 Level ( ) 200 Level ( ) 300 Level ( ) 400 Level ( ) 500 ( ) Post graduate ( )

4. Area or field of study

STEM(Science,Technology,Engineering and Mathematics) ( ) Business and Management ( ) Arts and Humanities ( ) Social Sciences ( ) Education ( )

5. Do you have access to the internet

Always ( ) Occasionally ( ) Rarely ( ) No ( )

6. Ai tools you have used (you may thick more than one)

ChatGPT ☐ Gemini ☐ Grammarly ☐ QuillBot ☐ Perplexity ☐ Bing Copilot ☐ Meta AI ☐ Claude ☐ Other ☐

7. Rate Your General Knowledge of AI Tools

Very Low ( )Low ( )Moderate ( )High ( )Very High ( )

**Section B; the research questions**

**Frequency of AI Tool Usage**

(How often students engage with AI tools in their academic and creative activities)

*Key: SD = Strongly Disagree D = Disagree, N= Neutral A= Agree and SA= Strongly Agree*

| S/N | Statement | SD | D | N | A | SA |
|---|---|---|---|---|---|---|
| 1 | I use AI tools (e.g., ChatGPT, Grammarly, Gemini) regularly for my academic work. | | | | | |
| 2 | I frequently rely on AI tools when completing assignments or projects. | | | | | |
| 3 | I often explore new AI tools to assist my studies or creative tasks. | | | | | |
| 4 | I interact with AI tools several times a week. | | | | | |
| 5 | AI tools have become part of my daily study routine. | | | | | |

**Purpose of AI Use**

(Whether AI is used as a guide, collaborator, or problem-solver)

As a Guide

*Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A= Agree and SA = Strongly Agree*

| S/N | Statement | **SD** | D | N | A | SA |
|---|---|---|---|---|---|---|
| 6 | I mainly use AI tools to guide my thinking process. | | | | | |
| 7 | I use AI tools to help me organize my ideas before starting a task. | | | | | |
| 8 | I use AI tools to clarify difficult concepts rather than provide direct answers. | | | | | |
| 9 | AI tools help me generate new perspectives or alternative approaches to a problem. | | | | | |

**As a Solution Provider**

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A= Agree and SA = Strongly Agree

| S/N | Statement | **SD** | D | N | A | SA |
|---|---|---|---|---|---|---|
| 10 | I often use AI tools to generate ready-made answers or complete tasks. | | | | | |
| 11 | I rely on AI tools to write or solve problems instead of doing them myself. | | | | | |
| 12 | When faced with academic challenges, I let AI tools handle most of the work. | | | | | |
| 13 | I prefer AI-generated content over creating original ideas myself. | | | | | |

**Reliance on AI Tools**

(Degree of dependency and trust in AI outputs)

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A= Agree and SA = Strongly Agree

| S/N | Statement | **SD** | D | N | A | SA |
|---|---|---|---|---|---|---|
| 14 | I find it difficult to complete academic tasks without using AI tools. | | | | | |
| 15 | I trust the outputs from AI tools without much verification. | | | | | |
| 16 | I feel less confident working on assignments without AI assistance. | | | | | |
| 17 | AI tools save me from spending too much time thinking through problems. | | | | | |
| 18 | I would struggle academically if AI tools were no longer available. | | | | | |

**Ethical Awareness in AI Use**

(Awareness of moral, academic, and integrity issues surrounding AI usage)

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A= Agree and SA = Strongly Agree

| S/N | Statement | **SD** | D | N | A | SA |
|---|---|---|---|---|---|---|
| 19 | I am aware of the ethical implications of using AI tools for academic work | | | | | |
| 20 | I avoid using AI tools in ways that violate academic integrity. | | | | | |
| 21 | I understand that excessive reliance on AI can reduce personal creativity. | | | | | |
| 22 | I make sure to acknowledge or reference AI contributions in my work. | | | | | |
| 23 | I believe that AI use in education should be guided by clear ethical policies. | | | | | |

**Divergent Thinking (Idea Generation & Creativity Stimulation)**

(Measures how AI supports students' ability to think broadly, creatively, and originally)

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A= Agree and SA = Strongly Agree

| S/N | Statement | SD | D | N | A | SA |
|---|---|---|---|---|---|---|
| 24 | Using AI tools helps me generate a variety of ideas for a single problem. | | | | | |
| 25 | AI prompts often inspire me to explore different perspectives or approaches. | | | | | |
| 26 | When using AI, I am able to combine unrelated ideas to produce something novel. | | | | | |
| 27 | AI tools stimulate my imagination and creativity in ways I didn't expect. | | | | | |
| 28 | AI tools inspire me to explore new academic or business ventures. | | | | | |
| 29 | I depend on AI so much that I no longer challenge myself creatively. | | | | | |

**Convergent Thinking (Creative Problem Solving & Refinement)**

(Measures how AI supports or hinders logical reasoning, refinement, and decision-making)

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A= Agree and SA = Strongly Agree

| S/N | Statement | SD | D | N | A | SA |
|---|---|---|---|---|---|---|
| 30 | AI tools help me evaluate which ideas are most practical or effective. | | | | | |
| 31 | I can use AI feedback to refine and improve my initial concepts. | | | | | |
| 32 | AI helps me organize my thoughts and arrive at clearer conclusions | | | | | |
| 33 | I critically analyze AI-generated ideas before applying them to my work. | | | | | |
| 34 | I feel less motivated to think deeply because AI gives answers quickly. | | | | | |
| 35 | I prefer using AI instead of struggling to come up with my own solutions. | | | | | |