

**ARTIFICIAL INTELLIGENCE DEPENDENCY AMONG
UNDERGRADUATE STUDENTS IN UNIVERSITY OF BENIN,
BENIN CITY, NIGERIA**

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DECLARATION

We hereby declare that this project work is original and was carried out by the under-listed students under supervision and has not been published elsewhere for the award of a degree or certificate.

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CERTIFICATION

This is to certify that this research work titled “ARTIFICIAL INTELLIGENCE DEPENDENCY AMONG UNDERGRADUATE STUDENTS IN UNIVERSITY OF BENIN” was carried out by **UKPAI FORTUNE UKAIRO** with matriculation number **MED1807501** and **IZENOSE LUCY UKPEBOR** with matriculation number **MED1807502** under the supervision of **PROF O. A. ADELEYE** in the Department of Community Health, College of Medicine, University of Benin as part of the requirements for the award for Bachelor of Medicine, Bachelor of Surgery (MBBS).

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DEDICATION

We dedicate this work to God Almighty, who has brought us this far in our pursuit of becoming medical doctors. This project is also dedicated to our families, who have been our pillars over the years and have contributed immensely to our project. This work is also dedicated to our teacher who guided us throughout the course of this project, Prof. O. A. ADELEYE.

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LIST OF ABBREVIATIONS

AI:	Artificial Intelligence
AIdep-22:	Artificial Intelligence Dependence Scale (22-item)
CI:	Confidence Interval
GAIL-IQ:	Generative AI and Information Literacy Impact Questionnaire
HEPI:	Higher Education Policy Institute
IBM:	International Business Machines Corporation
Med-PaLM:	Medical Pathways Language Model
NLP:	Natural Language Processing
PLS-SEM:	Partial Least Squares Structural Equation Modelling
SPSS:	Statistical Package for the Social Sciences
STEM:	Science, Technology, Engineering, and Mathematics
UNESCO:	United Nations Educational, Scientific and Cultural Organization
UTAUT:	Unified Theory of Acceptance and Use of Technology

DEFINITION OF TERMS

Automation bias: is the human tendency to over-rely on automated systems and trust computer-generated advice over human judgment, even when that advice is incorrect.

Artificial Intelligence: Artificial intelligence (AI) is the capability of computational systems to perform tasks typically associated with human intelligence, such as learning, reasoning, problem-solving, perception, and decision-making.

Artificial Intelligence dependency: refers to the excessive reliance on artificial intelligence (AI) systems for tasks, decisions, and problem-solving, which can lead to the erosion of independent human skills, critical thinking, and reduced autonomy.

Artificial Intelligence Tools: are software applications or programs that utilize artificial intelligence algorithms to perform tasks such as decision-making, problem-solving, and data analysis in various fields like robotics, automation, and virtual assistants.

Cognition: Mental processes involved in acquiring knowledge and understanding, including thinking, reasoning, learning, and memory.

Cognitive offloading: is the practice of using external tools or resources to reduce mental effort and enhance cognitive performance.

Machine language: is the lowest level of programming language that directly corresponds to the instructions executed by a computer's hardware.

Overdependence: the state of relying too heavily on someone or something for support, to the detriment of self-sufficiency or healthy functioning.

ABSTRACT

Background: The rapid integration of artificial intelligence (AI) tools into higher education has transformed how students access information, complete academic tasks, and engage with learning. While AI offers significant benefits in efficiency and academic support, growing concerns exist regarding excessive student reliance on these tools, with potential implications for critical thinking, cognitive autonomy, and academic integrity. Despite near-universal AI adoption among students globally, empirical data on the nature and extent of AI dependency among Nigerian undergraduates remain limited.

Materials and Methods: A descriptive cross-sectional study was conducted among 588 undergraduate students selected from the Ugbowo campus of the University of Benin using a multi-stage sampling technique. Data were collected using a structured self-administered questionnaire that assessed AI tool awareness and usage, patterns of AI use, and level of AI dependency using the validated 22-item Artificial Intelligence Dependence Scale (AIdep-22), which measures four domains: functional dependence, cognitive dependence, emotional dependence, and loss of control. Factors associated with AI dependency were also explored. Data were analysed using IBM SPSS version 29.0; frequencies, proportions, and means were computed for descriptive statistics, while chi-square tests assessed associations between categorical variables at a significance level of $p < 0.05$.

Results: The mean age of respondents was 22.73 ± 4.65 years, with 52.9% being male. Internet access (99.1%) and smartphone ownership (98.6%) were nearly universal. AI tool awareness was reported by 99.3% of respondents, and 98.1% were active users, with ChatGPT being the most recognised (99.0%), most commonly used (83.2%), and most frequently used (83.2%) tool. The

primary academic applications were research assistance (72.3%), summarization of materials (69.7%), and writing support (66.7%), with over half reporting daily use. Regarding usage behaviours, 77.9% reported verifying AI outputs relatively more frequently while 58.8% modified AI-generated content before use more frequently, and 15.0% admitted to unethical use including examination malpractice. In terms of dependency, 49.8% of students exhibited low AI dependency, 40.1% moderate dependency, and 10.0% high dependency. Domain-level mean scores were highest for functional dependence (2.86), followed by emotional dependence (2.55), cognitive dependence (2.50), and loss of control (2.27), with an overall AIdep-22 mean of 2.55, corresponding to moderate dependency. Verification behaviour ($p = 0.004$) and modification of AI outputs ($p = 0.05$) were significantly associated with dependency level. The key factors associated with AI dependency were heavy academic workload, high performance expectations, ease of AI access, and fear of making errors.

Conclusion: AI tools, particularly ChatGPT, have become deeply embedded in undergraduate academic life at the University of Benin, with near-universal awareness and adoption. Most students exhibited moderate AI dependency, with functional dependence being the most prominent domain. Verification behaviour and output modification were significantly associated with dependency level, underscoring the importance of critical engagement with AI-generated content. These findings highlight the urgent need for institutional guidelines, AI literacy programmes, and pedagogical strategies that promote responsible AI use while preserving students' intellectual independence and academic integrity.

Keywords: Artificial intelligence, AI dependency, AIdep-22, undergraduate students, University of Benin, AI usage, academic integrity, higher education, Nigeria

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

In recent years, higher education has undergone a significant transformation driven by rapid advancements in digital technologies. The widespread availability of internet-enabled devices, online academic resources and digital learning platforms has changed how students access information, engage with academic materials, and complete learning tasks. This shift has moved education from traditional classroom-centered approaches toward more flexible, technology-supported learning environments. Among these technological developments, artificial intelligence (AI) has emerged as one of the most influential innovations shaping modern education systems.¹

Artificial intelligence refers to computer systems designed to perform tasks that typically require human intelligence, such as reasoning, learning, problem-solving, decision-making, and language processing. Advances in machine learning, deep learning, and natural language processing have enabled AI systems to simulate aspects of human cognition and interact more effectively with users. These developments have led to the integration of AI into various sectors, including education, where it is increasingly used to support teaching and learning processes.²

In the educational context, AI tools exist in various forms and serve multiple functions. One major category is generative AI tools, which can produce human-like text, generate academic content, summarize information, and assist with writing tasks. Examples include ChatGPT, Claude, and Perplexity, which are widely used by students for answering academic questions, generating ideas, and supporting research activities.^{2,3} Other writing-support tools such as

Grammarly and QuillBot are also commonly used to improve grammar, clarity, and paraphrasing in academic work.³

In addition to text-based tools, there are AI-powered search and research assistants such as Perplexity and Elicit, which combine information retrieval with summarization, allowing students to quickly access and synthesize academic information. There are also multimodal AI tools such as Gemini, which can process text, images, and other forms of data, further expanding the ways students interact with information.⁴ These diverse categories of AI tools have collectively contributed to a more interactive and efficient learning environment.

AI Chatbots serve as a bridge between students and educational resources, providing timely information on courses, academic results, and other educational queries. Many chatbots are designed to enhance students' comprehension, retention, and application of acquiring knowledge in real-time. The interactive nature of these chatbots allows for a more personalized learning experience, catering to individual student needs and learning styles.^{5,6}

Traditionally, university education relied on methods that emphasized active student participation and independent intellectual effort. These methods include attending lectures, reading textbooks and scholarly articles, engaging in discussions, taking notes, and solving problems independently. Such approaches are essential for developing critical thinking, analytical reasoning, creativity, and a deep understanding of subject matter. They encourage students to engage directly with knowledge and build their own interpretations rather than relying on external assistance.⁵

However, the growing integration of AI tools into academic environments is gradually reshaping these traditional learning practices. Students now have access to systems that can quickly generate answers, summarize materials, and assist in completing academic tasks. While this

enhances efficiency and reduces workload, it also changes the nature of learning by reducing the level of cognitive effort required from students. As a result, there is increasing concern that students may rely excessively on AI tools rather than engaging deeply with academic content.⁶

This shift has led to the emergence of AI dependency, which refers to excessive reliance on artificial intelligence tools to perform tasks that would ordinarily require independent thinking and effort. While AI has the potential to enhance learning outcomes, overdependence may weaken essential academic skills such as critical thinking, problem-solving, and creativity. It may also promote surface learning, where students focus on obtaining quick answers instead of developing a comprehensive understanding of concepts.³

Several factors contribute to the increasing reliance on AI tools among students. The need to manage academic workload, meet deadlines, and achieve high performance often encourages students to adopt more efficient methods of completing tasks. The accessibility and ease of use of AI tools further promote their widespread adoption, as many of these tools are readily available on mobile devices and online platforms. Additionally, increasing familiarity with digital technologies and the normalization of AI use in academic settings have made these tools a regular part of students' learning experiences.⁴

Furthermore, patterns of AI usage indicate a gradual shift from traditional independent learning toward AI-assisted learning. Students frequently use AI tools for generating ideas, drafting assignments, summarizing lecture materials, organizing academic content, and clarifying complex concepts. While these applications improve productivity, they also raise concerns about reduced originality, diminished engagement with learning materials, and potential over-reliance on automated systems.¹

Despite the growing presence of AI in education, there is still a need to better understand how students interact with these tools, the extent to which they rely on them, and the implications for academic development. Understanding these dynamics is important to ensure that AI serves as a supportive educational tool rather than replacing the intellectual processes that education is designed to develop.

1.2 STATEMENT OF PROBLEM

The use of artificial intelligence (AI) in higher education has increased rapidly, becoming a dominant feature of modern academic practice. A study conducted in a University of Science and Technology in Romania reported that 95.6% of university students use AI tools for academic activities, indicating near-universal adoption. The study further showed that 88.2% of students specifically use AI virtual assistants such as ChatGPT, making it the most commonly used AI tool among students.⁷ This widespread adoption reflects a major shift in how students engage with academic work. However, the dominance of a few AI tools raises concerns about over-reliance on automated systems rather than diverse learning methods.

Beyond high adoption rates, there is growing concern about the patterns of AI tool use among undergraduate students. Evidence shows that 57.6% of students use AI tools weekly, while 18.8% use them daily, indicating that AI has become a routine academic tool rather than for occasional academic support.⁸ Additionally, studies report that a significant proportion of students use AI primarily for assignment completion (over 60%) and information searching (over 50%), rather than for deep learning activities.⁹ This pattern is problematic because it reflects that students prioritize task completion over critical thinking and conceptual understanding.

The increasing frequency of AI use has also raised concerns about the level of AI dependency among undergraduate students. Research indicates that 32.7% of students exhibit moderate to severe AI dependency, while 25.8% are at risk of developing dependency, suggesting that more than half of students show some level of problematic reliance.¹⁰ Furthermore, dependent users report engaging in over 18 AI interactions per day, indicating habitual or compulsive use patterns.¹¹ This level of dependency is concerning because it is associated with reduced critical thinking, weaker problem-solving ability, and lower academic independence.¹²

Furthermore, studies on verification behaviour among students highlight important concerns as to whether AI-generated information is verified before use. A study among undergraduate students showed that only a small proportion consistently apply structured academic verification strategies when using AI outputs, while the majority rely on informal approaches such as general internet searches, personal judgment, or re-querying AI systems rather than engaging in rigorous cross-checking with credible academic sources.¹³ This suggests that many students accept AI-generated information with limited critical evaluation, thereby increasing the risk of misinformation and reinforcing dependence on AI for academic tasks.

In a related concern, a large-scale survey involving over 2,000 students and 850 instructors highlights growing worries about academic integrity in the context of AI use. The study reported that 53% of students believe that academic dishonesty has increased due to the availability of AI, with widespread use of AI for writing assistance, idea generation, and assignment support. Students were also found to be more likely than instructors to use AI in ways that may reduce independent academic effort, raising concerns about potential misuse and ethical challenges in learning environments.¹⁴

Given the increasing adoption of AI tools and rising dependency levels, there is a need for empirical investigation into artificial intelligence dependency among undergraduate students and this study therefore seeks to identify commonly used AI tools, examine patterns of usage, assess levels of dependency, determine the factors contributing to AI dependency.

1.3 JUSTIFICATION OF STUDY

In recent years, Artificial Intelligence (AI) tools have rapidly become integral to academic activities, offering students quick access to information, automated solutions and personalized learning experiences. While these technologies present enormous potential for enhancing education, their pervasive use raises concerns about students' reliance on AI for tasks that traditionally required independent reasoning and critical thinking. At the University of Benin, like many higher institutions globally, undergraduates increasingly use AI-based platforms for assignments, research, and problem-solving across disciplines.¹⁵

This study assesses the types of AI tools commonly used, the patterns of usage, and the level of artificial intelligence dependency among undergraduate students in the University of Benin. This will provide useful information on the extent to which AI has been integrated into students' academic activities and whether its usage supports or replaces independent learning. The findings will help determine the scale of intervention required and the most appropriate strategies to promote responsible and balanced use of AI in academic settings.

In addition, this research identifies the factors contributing to AI dependency among undergraduate students. Understanding the factors contributing to AI dependency will enable the development of more comprehensive and effective strategies for managing AI use in education.

It will also support the formulation of institutional guidelines and policies that encourage the productive use of AI while minimizing its negative effects.

1.4 RESEARCH QUESTIONS

The following are the research questions among undergraduates in University of Benin

1. What AI tools are commonly known and used?
2. What is the pattern of AI usage?
3. What is their level of AI dependency?
4. What factors are associated with AI dependency?

1.5 GENERAL OBJECTIVE

To assess artificial intelligence usage and determine the level of dependency and factors associated with AI dependency.

1.6 SPECIFIC OBJECTIVES

1. To identify the commonly used AI tools.
2. To ascertain the pattern of AI tool usage.
3. To assess the level of AI dependency.
4. To identify factors associated with AI dependency.

CHAPTER TWO

LITERATURE REVIEW

The use of Artificial Intelligence (AI) tools among undergraduate students is increasingly shaping learning, writing, and problem-solving practices, while AI use can improve efficiency and academic performance, excessive reliance raises concerns about reduced critical thinking and diminished independent problem-solving abilities¹³. This chapter reviews literature on the types of AI tools used, usage patterns, level of dependency and factors associated with AI dependency.

2.1 COMMONLY USED AI TOOLS

In 2025, a national cross-sectional online survey was conducted by the Higher Education Policy Institute (HEPI) and Kortext in the United Kingdom to measure the prevalence, purpose, and patterns of generative AI use among undergraduate students. A total of 1,041 full-time undergraduates were recruited through random online sampling. Data were collected using a standardized online questionnaire administered by Savanta. The study found that the majority of students had used at least one AI tool, with ChatGPT, Grammarly, QuillBot, and citation generators being the most frequently mentioned. The primary reasons for use were to save time, generate ideas, and improve writing quality.¹⁶

The Digital Education Council conducted a multi-country cross-sectional survey in 2025 titled Global Student AI Survey to assess trends in the use of AI among undergraduate students across 15 countries. A total of 11,706 students participated through an online questionnaire. The study found a high global prevalence of AI tool use, with ChatGPT, Google Bard, Grammarly, and QuillBot ranking highest. Students most often used AI for drafting essays, summarizing materials,

and exam preparation. The study concluded that AI has become a mainstream learning companion worldwide.¹⁷

In 2023, a cross-sectional online survey by Bosch et al. examined South African university students' use of AI-powered tools for engaged learning. The study aimed to understand the extent and purpose of AI tool use among undergraduates. Data were collected through an online questionnaire and focus group discussions. Students from five universities were sampled and findings revealed that students mainly used ChatGPT and Grammarly. Finding revealed that they were used mainly to clarify concepts, check grammar, and improve writing, emphasizing learning assistance rather than plagiarism.¹⁸

In 2025, a Cross-sectional survey using structured questionnaire was conducted by the Higher Education Policy Institute (HEPI) and Kortext in Ghana to exploring the use of generative artificial intelligence tools among University Students in Ghana. A total of 353 university students were recruited through snowball and convenience sampling via online platforms. Data were collected using a standardized online questionnaire. The study found that the Most students reported familiarity with tools such as MetaAI, ChatGPT and Grammarly.¹⁹

In 2024, a cross-sectional study was conducted by Ayeni et al titled Adoption of Generative AI in Sub-Saharan Africa. The study aimed to identify factors influencing AI adoption among university students and to catalogue common tools used. Data were collected using a structured online questionnaire administered across multiple Sub-Saharan universities. The sample included several hundred undergraduates across four countries. Findings showed Commonly used tools were ChatGPT, Grammarly, and domain-specific code assistants.²⁰

In 2024, a cross-sectional online survey conducted by Orok et al. examined Nigerian undergraduate pharmacy students' knowledge, perceptions, and use of chat-based artificial intelligence tools. The study aimed to assess students' awareness of AI tools and their patterns of use in academic activities. Data were collected using a structured self-administered questionnaire, and a total of 252 undergraduate students from Nigerian universities participated in the study. The findings revealed that ChatGPT was the most commonly used AI tool, with students primarily using it for studying, completing assignments, and understanding difficult concepts.²¹

A descriptive cross-sectional study titled "Adoption of Artificial Intelligence Tools and Students' Academic Performance" was carried in 2023 out among students of the Federal Polytechnic, Ilaro. The study aimed to examine how the use of AI tools affects students' academic productivity. Data were collected using a pilot-tested structured questionnaire from 350 students selected through random sampling. Findings showed that ChatGPT and Grammarly were the most widely used tools, with most students reporting improved writing quality and faster assignment completion.²²

2.2 PATTERN OF AI TOOLS USAGE

In 2024, a descriptive online survey study investigating undergraduate students' usage patterns of AI writing and learning tools across 16 countries was undertaken. A total of 3,839 students (undergraduate, master's, doctoral) participated in the "2024 Global Student AI Survey" by the Digital Education Council. Data were collected using a self-administered structured online questionnaire. The findings revealed that 86% of students reported using AI tools for study purposes, with 24% using them daily and 54% weekly. The study concluded that AI tools are

deeply embedded in student study routines worldwide, but their use is still unevenly distributed across countries and disciplines.²³

In 2024, a descriptive cross-sectional study investigating undergraduate students' usage and attitudes towards AI tools was undertaken in Slovenia. The aim of the study was to assess the frequency, purpose, and perception of AI usage across academic disciplines. A total of 422 students from various faculties were recruited using convenience sampling. Data were collected using a self-administered structured questionnaire that examined the type and purpose of AI tools used, ethical considerations, and perceived usefulness. The findings revealed that most students frequently use AI tools, especially for writing, summarizing, and coding tasks, though usage frequency varied significantly by field of study and year level. Concerns about academic integrity and learning dependence were also noted. The study concluded that AI tool usage is widespread but requires educational guidance to manage ethical challenges.²⁴

In 2024, a systematic review study investigating the strategic goals for AI integration among STEM academics and undergraduates in African higher education institutions was undertaken. A total of 24 published reports from African universities were reviewed. Data were collected using systematic review methods and content analysis. The findings revealed that 41.7% of reports showed undergraduates utilizing AI tools for learning, and 25% of reports indicated undergraduates using AI for academic content-generation.²⁵

In 2024, a cross-sectional questionnaire survey examined faculty and learners across 315 higher education institutions in Sub-Saharan Africa to assess their awareness and use of artificial intelligence tools. The study aimed to understand the extent and patterns of AI tool adoption among students and educators. Data were collected using a structured self-administered questionnaire, and participants included representatives from public, private, and vocational

institutions. The findings revealed high visibility and regular use of generative AI tools, particularly chat-based assistants, which were mainly used for idea generation, writing assistance, and exam preparation, emphasizing academic support rather than misuse.²⁶

In 2025, a cross-sectional descriptive survey at the Federal University of Health Sciences, Ila-Orangun assessed patterns of smartphone, medical app, and generative AI use among preclinical medical students via a structured questionnaire. Among 203 respondents, all owned smartphones, with most (81.3%) reporting 1–4 hours of daily smartphone use. Generative AI tools were frequently used, with ChatGPT accessed by 98% for summarizing complex topics, clarifying difficult concepts, and preparing for exams. Other AI tools like grammar checkers, Med-PaLM, Gemini, and Copilot were also used for similar academic purposes. This reflects daily or weekly engagement with AI for learning and academic support.²⁷

In 2024, A cross-sectional study was conducted among undergraduate students in Afe Babalola University, Ado-Ekiti, Nigeria (ABUAD) to assess perception, knowledge and usage patterns of chat-based artificial intelligence tools. A total of 252 students were selected by random sampling technique. The findings revealed most students (88%) were familiar with chat-based AI tools and had used it, with ChatGPT being the most commonly used (82.8%) for assignments and studying. Students generally showed a positive perception of the tools, with 85.3% believing it enhances academic performance.²⁸

2.3 LEVEL OF AI DEPENDENCY

In 2025, a descriptive cross-sectional study examining artificial intelligence dependence among undergraduate students to measure students' dependency on AI tools in higher education. The research involved a total sample size of 800 Chinese undergraduate students participants. Data

were collected using a 22-item questionnaire measuring four dimensions of AI dependence: emotional dependence, functional dependence, cognitive dependence, and loss of control. The findings revealed that students demonstrated a moderate to high level of AI dependency. The results further showed that students who used AI tools more frequently exhibited significantly higher dependency levels compared to those who used them occasionally. Additionally, male students and senior-year students showed higher AI dependence scores than female and junior students.²⁹

In 2025, a descriptive cross-sectional study examining dependency on AI chatbots among tertiary students was conducted among 872 students from public and private universities in Luzon, Philippines. Data were collected using a structured questionnaire measuring perceptions of reliance on AI chatbots for academic tasks. The findings revealed that most students disagreed with being heavily dependent on AI chatbots, indicating generally low levels of dependency, although some students—particularly those in STEM disciplines—reported greater reliance on AI tools for solving academic problems. The study concluded that AI chatbots are used mainly as supportive learning tools rather than complete replacements for traditional academic resources.³⁰

In 2025, a descriptive study examining dependency patterns on generative AI among undergraduate students was conducted in a Zimbabwean university. A total of 248 undergraduate students participated in the study. Data were collected through a structured survey measuring AI usage behavior and dependency indicators. The findings revealed that 32.7% of students demonstrated moderate to severe AI dependency patterns, while 67.3% did not show significant dependency. The study concluded that although AI tools are widely used, only about one-third of students exhibit strong dependency behaviors.³¹

A 2025 descriptive survey study by Stadi Analytics explored AI use and reliance patterns among Kenyan university students, finding that 90% of students engaged with AI regularly for academic work, with 35% using AI several times weekly. About 29.5% admitted that their use of AI tools had “somewhat replaced” traditional studying, indicating an emerging dependency pattern in how students approach learning. Furthermore, over 42% of students stated that heavy AI use significantly reduced their critical thinking, and more than 10% admitted that AI output shaped content they could no longer remember or explain independently. The research highlights a shift toward reliance on AI for coursework, especially among final-year students and in fields with heavy writing demands, suggesting increasing dependency trends in higher education in Kenya.³²

In 2025, a descriptive mixed-methods study assessing awareness and use of artificial intelligence tools among undergraduate students at Northwest University, Kano, Nigeria was undertaken. A total of 200 undergraduate students across four faculties participated. Data were collected using a structured questionnaire and follow-up interviews that measured students’ familiarity with AI technologies and how often they used them for academic activities. The findings revealed that the average utilization score was moderately high (mean = 3.46 out of 5). The study concluded that while awareness of AI tools is high among Nigerian undergraduates, actual dependence on these tools for academic success remains moderate, largely influenced by factors such as training and internet access.³³

In 2024, a descriptive survey study examining the usage and reliance on Artificial Intelligence (AI) tools among education undergraduates at Kwara State University, Malete, Nigeria was conducted. The study adopted a mixed-method approach, integrating both quantitative and qualitative data to assess how students use AI tools and the extent of their reliance on them for academic and everyday activities. The study population consisted of 1,560 undergraduate

students in the Faculty of Education, from which 308 students were selected through simple random sampling for the quantitative phase. The results revealed that 50.3% of the students predominantly used AI tools, indicating widespread engagement with AI technologies among undergraduates. Furthermore, 64.3% of the respondents demonstrated a high level of reliance on AI tools, suggesting that these technologies have become embedded in their academic routines.³⁴

2.4 FACTORS ASSOCIATED WITH AI DEPENDENCY

In 2026, a cross-sectional study was conducted to examine the prevalence of AI chatbot usage and factors associated with AI dependency among undergraduate medical students at Universiti Kebangsaan Malaysia. The study population included 300 medical faculty students, selected using non-probability sampling via online survey distribution. The findings revealed that 100% of respondents had used AI chatbots, indicating universal exposure. In terms of frequency, most students used AI tools 1–3 hours weekly (moderate frequency users), while a smaller proportion reported higher weekly usage (>4 hours, high-frequency users). Statistical analysis showed that higher frequency of AI use was significantly associated with AI dependency indicating that increased usage intensity predicts stronger dependency levels.⁴¹

In 2024, a cross-sectional comparative survey study was conducted among 2,098 university students in Poland (1,088) and the United Kingdom (1,010) to examine how sociodemographic factors relate to trust and use of artificial intelligence among students. Participants were selected using simple random stratified sampling technique. The findings showed that a higher proportion of students in the United Kingdom reported high trust in artificial intelligence compared to students in Poland, indicating geographical variation in AI perception. In terms of sex, a greater proportion of male students demonstrated higher trust in AI compared to female students,

suggesting gender differences in AI acceptance. Regarding level of study, students in advanced academic years constituted a larger proportion of those with high trust in AI compared to those in lower levels. Similarly, a higher proportion of students in science and technology-related disciplines reported greater trust in AI compared to those in non-technical fields. In relation to religion, students with lower levels of religiosity formed a larger proportion of those expressing high trust in AI compared to more religious students. Furthermore, a greater proportion of students residing in urban areas reported higher trust in AI compared to those from rural settings.⁴²

In 2025, a cross-sectional survey case study was conducted to examine the relationship between trust in AI, verification of AI outputs, and dependency-related behaviours among 132 undergraduate students from engineering and social sciences at Camilo José Cela University, Spain. The study used a quantitative questionnaire design, analyzing students' interaction with AI-generated academic outputs. The findings revealed that 76.9% of responses reflected insufficient verification practices, including no verification, reliance on personal judgment, or unverified internet sources. However, 62.9% of students reported frequently checking AI-provided sources, and 84.9% frequently verified whether AI solutions matched classroom methods. Despite this, the study concluded that students still demonstrated moderate to high reliance on AI outputs, indicating a paradox where high AI use and dependency coexist with inconsistent verification behaviour. The study further noted that students often trusted AI plausibility rather than systematically verifying accuracy, reflecting early signs of cognitive dependency and automation bias.⁴³

In 2025, a cross-sectional online survey study was conducted among 981 participants in China to examine the social-ecological factors associated with AI chatbot use and dependence. The study

population consisted of individuals using AI chatbots, and participants were selected using a simple random sampling technique. The findings revealed that AI chatbot use was more common among younger individuals, those with higher education, urban residents, and individuals with solitary leisure preferences. A higher proportion of users with regular sleep patterns, efficient work habits, higher family income, and larger social networks reported more frequent AI usage. Furthermore, AI dependency and problematic use were more prevalent among male participants, students in science-related disciplines, and individuals from regions with lower employment rates, indicating that both individual and environmental factors contribute significantly to AI dependency.⁴⁴

In 2024, a large-scale survey study was conducted among college students and instructors across North America to assess AI use and its impact on academic integrity behaviours. The study used a cross-sectional survey methodology. The findings showed that more than half of students (53%) believed cheating had increased, largely due to AI use, while 96% of instructors suspected students of cheating in the past year. Students reported using AI for writing assignments, brainstorming, and completing academic tasks, raising concerns about unauthorized AI assistance in coursework. The study concluded that AI tools are increasingly being used in ways that challenge traditional academic integrity frameworks.⁴⁵

In 2025, a case study using a quantitative assessment framework was conducted to evaluate the potential for misuse of AI tools in academic tasks within a Master's-level cybersecurity program at a UK university. The study analyzed assessment structures and AI susceptibility. The findings revealed a high risk of AI misuse, particularly in assignments such as essays, reports, and independent projects. Students were able to generate complete responses using AI tools, potentially bypassing learning objectives. The study concluded that traditional assessment

formats are highly vulnerable to AI-enabled academic misconduct, especially when monitoring is limited.⁴⁵

CHAPTER THREE

METHODOLOGY

3.1 STUDY AREA

This study was conducted in the University of Benin (UNIBEN), located in Benin City, Edo State, Nigeria. Edo state is one of the 6 Southern States in the 36 States of Nigeria with its capital in Benin City. Edo State is bounded by Kogi State to the Northeast and East, Anambra to the East, delta to the Southeast and South, and Ondo to the West and Northwest; the Niger river flows along the State's eastern boundary.

Edo State lies at elevations between 500 feet (150 metres) in the South and more than 1800 feet (550 metres) in the North and tropical rain forest covers most of the area. Agriculture is the mainstay of the economy with produce such as yams, cassava, oil palm, corn (maize) with an excellent road network and an airport at Benin City facilitating transportation. The state is largely inhabited by the Benin people and other ethnic groups including Esan, Owan, Etsako and other tribes that reside in there. There are seven (7) universities in the state comprising one federal university, two state universities and four private universities⁴⁶.

The University of Benin is located in Ovia North East Local Government Area which is one of the eighteen (18) local government areas in Edo State. It was established on the 23rd of November, 1970, by the then Colonel Samuel Osaigbovo Ogbemudia-led military administration of Midwest State. It was first established as Midwest Institute of Technology, before attaining the status of a full-fledged university in line with requirements of the National Universities

Commission on the 1st of July, 1971 and the name was changed to the University of Benin. The Institution became a federal government owned University on the 1st of April, 1975.⁴⁷

The University which currently has two campuses: Ugbowo and Ekenwan campuses initially commenced academic activities at the site of the Old Teachers' Training College on Ekehuan Road (which is now one of the campuses of the University) with 109 students, now has an estimated 60,000 student's population who are spread across the two campuses of the University. The University has a student enrolment of 38,287 full-time students and 4,000 – 4,499 academic staff with 21 Faculties, 1 College and 3 Institutes. The faculties in UNIBEN include Agriculture, Arts, Education, Engineering, Environmental Sciences, Humanities, Life Sciences, Management Sciences, Law, Institute of education, Pharmacy, Physical Sciences, Social Sciences, Veterinary Medicine, Medicine, Dentistry, Basic Medical Sciences, vocational and technical education, SPSSE.

Since the establishment of the University, it has continued to break new grounds in the realization of its goals of teaching, learning, research and community service. It offers programmes at both undergraduate and postgraduate levels, to which students are admitted annually. It is important to note that nearly all courses offered at the University of Benin are, by 2021, fully accredited. For over five decades of its existence, the University of Benin has grown to mentor other institutions that operate as affiliate institutions to the University. They include: Lagos State University, Akoka, Lagos; College of Education, Warri; College of Education, Asaba; College of Education, Mosogar, and the National Institute for Legislative and Democratic Studies, Abuja.

3.2 STUDY DESIGN

This study adopted a descriptive cross-sectional design.

3.3 STUDY POPULATION

The study population consists of undergraduate students of the University of Benin (UNIBEN) across all faculties and levels of study.

3.4 SELECTION CRITERIA

3.4.1 Inclusion Criteria

1. Undergraduate students currently enrolled in the University of Benin.
2. Students who were available and present in school during the data collection period.
3. Students who gave informed consent to participate.

3.4.2 Exclusion Criteria

- 1) Students unwilling to participate or those unable to provide consent.
- 2) Students with health conditions or disabilities that impaired their ability to complete the questionnaire or whose participation could place undue strain on their well-being.

3.5 SAMPLE SIZE DETERMINATION

The sample size was calculated using the Cochran formula, and a design effect was factored into the calculation while taking into consideration the sampling technique (systematic random sampling technique).

$$n = \frac{Z^2 pq}{d^2}$$

Where:

n = sample size (desired minimum size)

z = normal standard deviation (1.96 at 95% confidence interval)

p = proportion of undergraduate who are overdependent on AI in Kwara State University (64.3% = 0.643).³⁴

$$q = 1-p = 1-0.643 = 0.357$$

d = the desired level of precision, i.e. margin of error = 0.05

Hence,

$$n = \frac{(1.96)^2 * 0.643 * 0.357}{0.05^2}$$

$$n = \frac{0.88}{0.0025}$$

$$n = 352.7 \approx 353$$

Therefore, the minimum sample size for this study was 353 undergraduates.

To make room for non-response, a 10% non-response rate was added to the minimum sample size, using the formula for non-response rate.

$$n_s = \frac{n}{1 - n_r} \text{ Where;}$$

$n_s = \textit{Adjusted sample size}$

$n = \textit{Calculated sample size}$

$n_r = \textit{non - responserate} = 10\%$

$$n_s = \frac{353}{1 - 0.1}$$

$$n_s = 392.2$$

Thus, the minimum sample size was 392

A design effect of 1.5 was used.

$$392 \times 1.5 = 588$$

3.6 SAMPLING TECHNIQUE

Respondents for the study were selected using a multi-stage sampling technique involving four stages. A total of 588 undergraduate students participated, with questionnaires distributed across the selected degree programs. Respondents who met the inclusion criteria were consecutively recruited until the desired sample size was achieved.

Stage 1: Selection of Campus

The University of Benin operates two campuses—Ugbowo and Ekehuan. Using simple random sampling by balloting, the Ugbowo campus was selected for this study.

Stage 2: Selection of Faculties

A list of the 21 faculties in the University of Benin was obtained from the Central Records Processing Unit Division of the University. Eight faculties were chosen by simple random sampling through balloting. The faculties selected are Basic Medical Sciences, Art, Medicine, Social Science, Physical Science, Pharmacy, Engineering and Education. Faculties was also grouped into medical (Basic Medical Sciences, Medicine and Pharmacy) and non-medical (Art, Social Science, Physical Science, Engineering and Education).

Formula for proportional allocation:

$$n_i = (N_i \times n) / N$$

n_i = Sample size for the i th faculty

N_i = Total undergraduate population in the i th faculty

N = Total undergraduate population of the eight faculties selected.

n = Total required sample size (588)

Stage 3: Selection of Degree programs

Within each of the eight chosen faculties, one degree program was selected using simple random sampling by balloting. The degree programs selected were Medicine (Medicine), Physiotherapy (Basic Medical Sciences), Art (English and Literature), Educational Management (Education), Pharmacy (Pharmacy), Economics (Social Science), Chemistry (Physical Science) and Mechanical Engineering (Engineering)

Stage Four: Selection of Respondents

The total number of respondents selected from each degree program was determined using proportional allocation with the formula:

$$\left(\frac{\textit{Total number of students in a degree program}}{\textit{Total number of students in all eight degree programs}} \right) \times 588$$

This gave the number of respondents to be selected from each degree program.

Since each degree program comprised multiple levels of study (e.g., 100L, 200L, 300L, etc.), a stratified sampling technique was employed to determine the number of respondents to be selected from each level within the degree program.

A sampling frame containing the total number of students in each level was obtained, after which proportional allocation was applied using the formula:

$$\left(\frac{\textit{Total number of students in a level}}{\textit{Total number of students in the department}} \right) \times \textit{Predetermined departmental sample size of students in a level })$$

This produced the number of respondents to be selected from each level.

Thereafter, respondents from each level were selected using a systematic sampling technique. A sampling interval was determined by dividing the total number of students in each level by the required number of respondents for that level. The first respondent was selected randomly, after which every *n*th student based on the sampling interval was selected until the required sample size was attained. **See Appendix II.**

For the purpose of analysis, respondents were further categorized into lower level (below 300 level) and higher level (300 level and above).

3.7 DATA MANAGEMENT

3.7.1 TOOLS FOR DATA COLLECTION

The primary data collection tool is a structured questionnaire, designed to be self-administered in analogue (paper) format. The questionnaire was standardized and developed in line with the research objectives. The questionnaire used for this study was structured into five (5) sections (A–E), each aligned with the specific objectives of the study.

Section A: Socio-Demographic Characteristics

This section contains questions that obtained the socio-demographic characteristics of the respondents such as age, sex, faculty, degree program, level of study, ethnicity, religion, access to digital devices (smartphone, laptop and tablet), internet access. Faculties would also be grouped. Level of study was grouped into higher (300 level and above) and lower level (below 300 level). These variables helped to describe the background of respondents and support subgroup analysis.

Section B: Types of AI Tools Commonly Used by Undergraduate Students

This section contains items designed to identify the specific AI tools used by undergraduate students at the University of Benin. This section contains a total of five (5) questions assessing awareness and use of common AI tools by students of UNIBEN and the activities used for.

Section C: Patterns of AI Tool Usage

This section assessed how AI tools are used by students. It examines the extent of task-based AI usage, frequency of use, ethical use, and whether students critically evaluate AI-generated outputs or use them without verification or modification. This section was adapted from a previous similar study by Suresh et al. on 'AI Overdependence in Education'.⁴⁷

Section D: Level of AI dependency

Level of dependence was assessed using AI Dependence Scale (AIdep-22) which conceptualizes students' AI dependence as excessive academic reliance manifesting through emotional dependence, functional dependence, cognitive dependence, and loss of control.⁴⁸

The AIdep-22 scale is a relatively recent tool that is still undergoing validation processes. At the time of this study, no known published research has adopted the tool for use beyond its original development and validation context, this study represents the first known application of the AIdep-22 scale outside a formal validation study, as well as the first documented use of the instrument for substantive investigation of artificial intelligence dependency among undergraduate students rather than for validation purposes.

Section E: Factors associated with AI dependency

This section assessed factors (eg, socio-demographic characteristics and AI usage patterns) associated with AI dependency.

SCORING SYSTEM

Section A: Socio-Demographic Characteristics

This section includes variables such as: Age, Sex, Faculty, Degree program, Level of study, Residence, Religion, Internet access, Device ownership

No score was assigned to this section and data was analyzed using frequency distribution, percentages, mean, and standard deviation where appropriate.

Section B: Types of AI Tools Commonly Used by Undergraduate Students

This section is primarily descriptive and was not used to compute a cumulative score.

Each selected option = 1

Each Nonselected option = 0

For multiple response questions, each correctly selected option = 1

Frequencies and percentages was used to determine: commonly known AI tools, most commonly used AI tools, the most frequent academic applications of AI.

The AI tool with the highest frequency was identified as the most commonly used tool.

Section C: Patterns of AI Tool Usage

Q15; Each selected option = 1 and each Non-selected option = 0

Frequencies and percentages was used to determine major academic tasks AI is used for. The academic task with the highest frequency was identified as the most commonly used tool.

Q16, Q17, Q18 & Q19; Task specific usage, Frequency of use and whether students critically evaluated AI-generated outputs or used them without verification and modification was

evaluated using the Likert scale, responses were scored as follows: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always except stated otherwise.

For analysis, responses of “Never” and “Rarely” were classified as “Does not verify,” while responses of “Sometimes,” “Often,” and “Always” were classified as “Verifies.” Similarly, for items assessing modification of AI-generated outputs, responses of “Never” and “Rarely” were classified as “Does not modify,” whereas “Sometimes,” “Often,” and “Always” were classified as “Modifies.”

Q20; Yes-1, No-0

Section D: Level of AI dependency

Dependency level was assessed using the AIdep-22 Scale. The AIdep22 contains 22 items measuring dependency characteristics.⁴⁸

Response Format; Strongly Disagree = 1 Disagree = 2 Neutral = 3 Agree = 4 Strongly Agree = 5

Scoring

Minimum obtainable score = 22

Maximum obtainable score = 110

$$AI\ Dependency\ Score = \frac{Total\ Obtained\ Score}{22}$$

Classification of Dependency

Low Dependency: 1.00 - 2.49

Moderate Dependency: 2.50 - 3.49

High Dependency (AI Over-Dependence): 3.50 - 5.00

Section E: Factors associated with AI dependency

To objectively identify the associated factors, socio-demographic variables and patterns of AI usage was subjected to bivariate analysis (Chi-square or Fisher's Exact test) against the levels of AI dependency, with only those variables demonstrating a statistically significant relationship being identified as the actual factors.

3.7.2 QUESTIONNAIRE ADMINISTRATION

The questionnaire was self-administered by respondents in locations ensuring privacy and comfort, such as lecture theatres or study halls. No research assistants was engaged. Informed consent was obtained from all participants, and instructions for completing the questionnaire were clearly provided. Respondents were allowed to ask for clarification on any questions they did not understand.

3.7.3 DATA COLLATION

All completed questionnaires was carefully checked for completeness and consistency. Data was entered into a structured template in IBM SPSS version 29.0, which allowed for systematic coding of categorical variables and numerical entry for continuous variables. Variables was coded numerically to facilitate analysis, e.g., Likert scale responses: Strongly Disagree = 1 to Strongly Agree = 5.

3.7.4 DATA PRESENTATION

Results from the study were presented using numerical methods.

Independent variables: age, sex, ethnicity, religion, faculty, degree program, level of study, internet access, access to digital devices, and patterns of AI tool usage among undergraduate students.

Dependent variable: level of artificial intelligence dependency among undergraduate students.

Data were presented using frequency distribution tables, percentages, means, and standard deviations where appropriate. Socio-demographic characteristics such as sex, faculty, degree program, and level of study were summarized using frequencies and percentages. Continuous variables such as age were summarized using measures of central tendency and dispersion.

Responses relating to awareness and use of AI tools, frequency of AI usage, verification of AI-generated outputs, and modification of AI-generated content were also presented using appropriate tables.

AI dependency scores obtained from the AIdep-22 scale were computed and categorized into low, moderate, and high dependency levels. These findings were summarized and presented using tables to facilitate interpretation and comparison of results.

3.7.5 DATA ANALYSIS

Completed questionnaires were sorted and reviewed for errors, incomplete responses, and discrepancies prior to data entry. Only questionnaires that were completely and appropriately filled were included in the final analysis. Data were entered and analysed using the IBM Statistical Package for the Social Sciences (SPSS) version 29.0.

Univariate analysis was conducted for all study variables. Continuous variables such as age were summarised using means and standard deviations, while categorical variables including sociodemographic characteristics, AI tool awareness, usage patterns, and behavioural practices were presented as frequencies and percentages in distribution tables. For the AIdep-22 scale, mean scores were computed at the item level, domain level (functional dependence, cognitive dependence, emotional dependence, and loss of control), and overall level to characterise the distribution of AI dependency among respondents. Dependency was categorised as low (1.00–2.49), moderate (2.50–3.49), or high (3.50–5.00) based on established cut-off scores.

Bivariate analysis was performed to examine statistical associations between variables. Pearson's chi-square test were used to assess associations between:

Sociodemographic characteristics and AI tool usage, Sociodemographic characteristics and level of AI dependency, AI usage behavioural patterns (frequency of use, verification of AI outputs, modification of AI outputs, and unethical use) and level of AI dependency.

Statistical significance was set at $p < 0.05$ for all inferential tests. Results of bivariate analyses were presented in cross-tabulation tables displaying frequencies, percentages, chi-square values, and corresponding p-values.

3.8 ETHICAL CONSIDERATION

Ethical approval for this study was obtained from the Ethics and Research Committee, University of Benin Teaching Hospital (UBTH).

Permission was also obtained from the Vice Chancellor, University of Benin (UNIBEN).

A written Informed consent was obtained from the respondents before the questionnaire is administered and participation in this survey was purely voluntary as the participant were at

liberty to withdraw at any time during this survey. Confidentiality of the participant's information was strictly protected.

3.9 LIMITATIONS

Recall bias may be a limitation to this survey as respondents may intentionally or unintentionally fail to provide accurate information.

Social desirability bias may also be a problem as participants may want to respond favorably in contrast with their true opinion.

The AIdep-22 tool used in this study is a relatively new scale originally developed among Chinese students and has not yet been extensively validated in diverse cultural and educational settings, particularly in sub-Saharan Africa, this may affect the applicability of its constructs and cut-off thresholds within the Nigerian context.

3.10 STUDY STRENGTH

First, the study employed a rigorous multi-stage sampling technique combining simple random sampling, stratified sampling, and proportional allocation across eight faculties and multiple academic levels. This approach ensured that the sample was systematically and representatively drawn from the UNIBEN undergraduate population, reducing selection bias and improving the generalisability of findings within the institution.

Secondly, this study is one of the few to examine AI dependency in a Nigerian university population using a validated, multidimensional dependency scale (the AIdep-22) which assesses four distinct dimensions of dependency: functional, cognitive, emotional, and loss of control.

This nuanced approach moves beyond simple self-reported reliance estimates and provides a more comprehensive picture of how dependency manifests among students.

Thirdly, the multidisciplinary scope of the study, spanning both medical and non-medical faculties across science, arts, social science, and engineering disciplines, allows for comparisons across academic fields and provides findings that are relevant to a broad range of institutional stakeholders rather than a single discipline.

CHAPTER FOUR

RESULTS

A total of 588 undergraduate students in the University of Benin, Benin City, Edo State, participated in this study. The response rate was 100%.

The results are divided into the following sections:

SECTION A: Sociodemographic characteristics of the respondents.

SECTION B: Types of AI tools commonly used by undergraduate students

SECTION C: Patterns of AI tools usage

SECTION D: Level of dependency on AI

SECTION E: Factors associated with AI dependency

SECTION A: Sociodemographic Characteristics of the Respondents

Table 4.1a: Sociodemographic Characteristics and Technology Access of Respondents

Variable	Frequency (n)	Percent (%)
Age Group (years)		
15–24	505	85.9
25–34	82	13.9
35–44	1	0.2
Sex		
Male	311	52.9
Female	277	47.1
Ethnicity		
Benin	164	27.9
Esan	142	24.1
Igbo	137	23.3
Yoruba	42	7.1
Urhobo	33	5.6
Akoko-Edo Ethnicities	13	2.2
Etsako	13	2.2
Hausa	10	1.7
Isoko	9	1.5
Ijaw	5	0.9
AkwaIbom Ethnicities	4	0.7
Idoma	3	0.5
Itsekiri	3	0.5
Others	10	1.7
Faculty		
Medicine	97	16.5
Basic Medical Science	67	11.4
Social Science	58	9.9
Arts	64	10.9
Physical Science	75	12.8
Pharmacy	118	20.1
Education	69	11.7
Engineering	40	6.8
Degree Program		
Medicine	97	16.5
Physiotherapy	67	11.4
English & Literature	64	10.9
Chemistry	75	12.8
Educational Management	69	11.7
Pharmacy	118	20.1
Economics	58	9.9
Mechanical Engineering	40	6.8

Mean Age (±SD): 22.73±4.65

Others : Auchi, Ebira, Ejagham, Fulani, Igala, Jukun, Tiv

***Multiple responses**

Table 4.1b: Sociodemographic Characteristics and Technology Access of Respondents

Variable	Frequency (n)	Percent (%)
Level of Study		
100	149	25.3
200	120	20.4
300	118	20.1
400	136	23.1
500	34	5.8
600	31	5.3
Religion		
Christianity	554	94.2
Islam	29	4.9
Atheist	4	0.7
Agnostic	1	0.2
Device with internet Access		
Yes	583	99.1
No	5	0.9
Access to Digital Devices*		
Smartphone	580	98.6
Laptop	250	42.5
Tablet	79	13.4

The mean age of respondents was 22.73 years (± 4.65). The majority were aged 15–24 years 505 (85.9%), followed by those aged 25–34 years 82 (13.9%), while only 1 (0.2%) respondent was aged 35–44 years.

Slightly more than half of the respondents were male 311 (52.9%), while 277 (47.1%) were female. Ethnic distribution showed that the largest group was Benin 164 (27.9%), followed by Esan 142 (24.1%) and Igbo 137 (23.3%). Other ethnic groups included Yoruba 42 (7.1%), Urhobo 33 (5.6%), Akoko-Edo ethnicities 13 (2.2%), Etsako 13 (2.2%), Hausa 10 (1.7%), Isoko 9 (1.5%), Ijaw 5 (0.9%), Akwa Ibom ethnicities 4 (0.7%), Idoma 3 (0.5%), and Itsekiri 3 (0.5%), while 10 (1.7%) belonged to other ethnic groups such as Auchi, Ebira, Ejagham, Fulani, Igala, Jukun, and Tiv.

By faculty, the highest proportion of respondents were from Pharmacy 118 (20.1%), followed by Medicine 97 (16.5%), Physical Science 75 (12.8%), Education 69 (11.7%), Basic Medical Science 67 (11.4%), Arts 64 (10.9%), Social Science 58 (9.9%), and Engineering 40 (6.8%).

Similarly, by degree program, most respondents were from Pharmacy 118 (20.1%) and Medicine 97 (16.5%), followed by Chemistry 75 (12.8%), Educational Management 69 (11.7%), Physiotherapy 67 (11.4%), English & Literature 64 (10.9%), Economics 58 (9.9%), and Mechanical Engineering 40 (6.8%).

Regarding level of study, the largest proportion of respondents were in 100 level 149 (25.3%), followed by 400 level 136 (23.1%), 200 level 120 (20.4%), 300 level 118 (20.1%), 500 level 34 (5.8%), and 600 level 31 (5.3%).

Christianity was the predominant religion 554 (94.2%), followed by Islam 29 (4.9%), while 4 (0.7%) were atheists and 1 (0.2%) was agnostic.

Access to the internet was nearly universal, with 583 (99.1%) reporting having internet access, while only 5 (0.9%) reported no access. In terms of access to digital devices (multiple responses), the vast majority owned a smartphone 580 (98.6%), while 250 (42.5%) had access to a laptop and 79 (13.4%) owned a tablet.

SECTION B: Types of AI Tools Commonly Used By Undergraduate Students

Table 4.2: Awareness and Use of AI Tools among Respondents

Variable	Frequency (n)	Percent (%)
Awareness of AI Tools*		
ChatGPT	582	99.0
DeepSeek	290	49.3
Gemini	423	71.9
Claude	184	31.3
Meta AI	298	50.7
QuillBot	117	19.9
Grammarly	213	36.2
Perplexity	157	26.7
SciSpace	35	6.0
AI Study Apps	88	15.0
AI Transcription Tools	47	8.0
Use of AI Applications (n=588)		
Yes	577	98.1
No	11	1.9
Reasons for Not Using AI (n = 11)		
Do not know how to use	2	18.2
Prefer traditional methods	3	27.3
Cost of paid versions	5	45.5
Privacy concerns	1	9.1
AI Tools Used for Academic Purposes*		
ChatGPT	554	94.2
DeepSeek	171	29.1
Gemini	288	49.0
Claude	75	12.8
Meta AI	138	23.5
QuillBot	40	6.8
Grammarly	91	15.5
Perplexity	81	13.8
SciSpace	15	2.6
AI Study Apps	40	6.8
AI Transcription Tools	9	1.5
Most Frequently Used AI Tool		
ChatGPT	489	83.2
Gemini	46	7.8
DeepSeek	14	2.4
Meta AI	14	2.4
Claude	8	1.4
Perplexity	8	1.4
Grok	4	0.7
Grammarly	2	0.3
SciSpace	1	0.2
AI Study Apps	1	0.2
Notebook LM	1	0.2

***Multiple responses**

Awareness of artificial intelligence (AI) tools among respondents was generally high. Nearly all respondents were aware of ChatGPT 582 (99.0%), followed by Gemini 423 (71.9%) and Meta AI 298 (50.7%). Awareness of other tools was lower, including DeepSeek 290 (49.3%), Grammarly 213 (36.2%), Claude 184 (31.3%), Perplexity 157 (26.7%), QuillBot 117 (19.9%), and AI study apps 88 (15.0%). Fewer respondents were aware of AI transcription tools 47 (8.0%) and SciSpace 35 (6.0%).

The use of AI applications was almost universal, with 577 (98.1%) of respondents reporting that they use AI tools, while only 11 (1.9%) reported that they do not. Among those who did not use AI, the most common reason was the cost of paid versions 5 (45.5%), followed by preference for traditional methods 3 (27.3%), lack of knowledge on how to use AI 2 (18.2%), and privacy concerns 1 (9.1%).

Regarding the use of AI tools for academic purposes, ChatGPT 554 (94.2%) was the most commonly used, followed by Gemini 288 (49.0%), DeepSeek 171 (29.1%) and Meta AI 138 (23.5%). Other tools were less frequently used, including Grammarly 91 (15.5%), Claude 75 (12.8%), Perplexity 81 (13.8%), QuillBot 40 (6.8%), and AI study apps 40 (6.8%), while very few respondents used SciSpace 15 (2.6%) and AI transcription tools 9 (1.5%) for academic activities.

In terms of the most frequently used AI tool, ChatGPT 489 (83.2%) was by far the dominant choice among respondents. This was followed by Gemini 46 (7.8%), while DeepSeek 14 (2.4%) and Meta AI 14 (2.4%) had similar levels of usage. Other tools such as Claude 8 (1.4%), Perplexity 8 (1.4%), Grok 4 (0.7%), Grammarly 2 (0.3%), SciSpace 1 (0.2%), AI study apps 1 (0.2%), and Notebook LM 1 (0.2%) were rarely reported as the most frequently used tools.

Table 4.3a Prevalence of AI Application Use and Sociodemographic factors of Respondents

Category	AI Tools Use Prevalence		χ^2	p-value
	Yes (n=577) Freq (%)	No (n=11) Freq (%)		
Age group (years)				
15–24	495 (98.0)	10 (2.0)	0.241	0.886
25–34	81 (98.8)	1 (1.2)		
35–44	1 (100.0)	0 (0.0)		
Sex				
Male	305 (98.1)	6 (1.9)	0.012	0.912
Female	272 (98.2)	5 (1.8)		
Degree Program				
Medicine	94 (96.9)	3 (3.1)	6.842	0.446
Physiotherapy	65 (97.0)	2 (3.0)		
English and Literature	64 (100.0)	0 (0.0)		
Chemistry	72 (96.0)	3 (4.0)		
Educational Management	69 (100.0)	0 (0.0)		
Pharmacy	116 (98.3)	2 (1.7)		
Economics	58 (100.0)	0 (0.0)		
Mechanical Engineering	39 (97.5)	1 (2.5)		

Table 4.3b Prevalence of AI Application Use and Sociodemographic Characteristics of Respondents

Category	AI Apps Use Prevalence		χ^2	p-value
	Yes	No		
	(n=577) Freq (%)	(n=11) Freq (%)		
Faculty				
Medical	275 (97.5)	7 (2.5)	1.104	0.293
Non-medical	302 (98.7)	4 (1.3)		
Level				
Lower level	263 (97.8)	6 (2.2)	0.350	0.554
Higher level	314 (98.4)	5 (1.6)		
Device with internet access				
No	4 (80.0)	1 (20.0)	9.029	0.003*
Yes	573 (98.3)	10 (1.7)		

*** Statistically Significant p <0.05**

There was no statistically significant association between age group and AI application use ($\chi^2 = 0.241$, $p = 0.886$). Among respondents aged 15–24 years, the majority used AI applications 495 (98.0%), while 10 (2.0%) did not. Similarly, among those aged 25–34 years, 81 (98.8%) used AI applications and 1 (1.2%) did not, while the only respondent aged 35–44 years reported 100.0% use.

Sex was also not significantly associated with AI application use ($\chi^2 = 0.012$, $p = 0.912$). Among males, 305 (98.1%) used AI applications while 6 (1.9%) did not, while among females, 272 (98.2%) used AI applications and 5 (1.8%) did not.

Similarly, degree program was not significantly associated with AI application use ($\chi^2 = 6.842$, $p = 0.446$). AI use was high across all programs, including English and Literature, Educational Management, and Economics, where usage was 100.0%, while slightly lower proportions were observed in Medicine 94 (96.9%), Physiotherapy 65 (97.0%), Chemistry 72 (96.0%), Pharmacy 116 (98.3%), and Mechanical Engineering 39 (97.5%).

Faculty also showed no statistically significant association with AI application use ($\chi^2 = 1.104$, $p = 0.293$). Among respondents in medical faculties, 275 (97.5%) used AI applications while 7 (2.5%) did not, compared to 302 (98.7%) and 4 (1.3%) among those in non-medical faculties.

Level of study was not significantly associated with AI application use ($\chi^2 = 0.350$, $p = 0.554$). Among respondents in the lower level, 263 (97.8%) used AI applications while 6 (2.2%) did not, compared to 314 (98.4%) and 5 (1.6%) among those in the higher level.

However, there was a statistically significant association between internet access and AI application use ($\chi^2 = 9.029$, $p = 0.003$). Among respondents with internet access, the majority used AI applications 573 (98.3%), while 10 (1.7%) did not. In contrast, among those without internet accessible device, 4 (80.0%) used AI applications while 1 (20.0%) did not.

SECTION C: Patterns of AI Tools Usage

Table 4.4: Patterns of AI Tool Usage Among Respondents

Variable	Frequency (n)	Percent (%)
Academic Tasks Performed Using AI *		
Writing essays/assignments	358	60.9
Summarizing textbooks/materials	410	69.7
Grammar proofreading	311	52.9
Research assistance	425	72.3
Solving mathematical problems	209	35.5
Coding/programming	68	11.6
Data analysis/statistics	94	16.0
Creating presentations	162	27.6
Frequency of AI Use		
Daily	310	52.7
Few times/week	227	38.6
Once/week	22	3.7
Rarely	26	4.4
Never	3	0.5
Verification of AI Output		
Never	19	3.2
Rarely	111	18.9
Sometimes	192	32.7
Often	119	20.2
Always	147	25.0
Modification Before Submission		
Never	77	13.1
Rarely	165	28.1
Sometimes	188	32.0
Often	109	18.5
Always	49	8.3
Use Violating Academic Integrity		
Yes	88	15.0
No	500	85.0

***Multiple response**

The pattern of AI tool usage among respondents showed that AI was widely applied across various academic tasks. The most common use was for research assistance 425 (72.3%), followed by summarizing textbooks/materials 410 (69.7%) and writing essays/assignments 358 (60.9%). Over half also used AI for grammar proofreading 311 (52.9%). Other uses included solving mathematical problems 209 (35.5%), creating presentations 162 (27.6%), and data analysis/statistics 94 (16.0%), while relatively few respondents used AI for coding/programming 68 (11.6%).

Regarding frequency of use, more than half of the respondents reported using AI daily 310 (52.7%), while 227 (38.6%) used it a few times per week. A smaller proportion used AI once a week 22 (3.7%) or rarely 26 (4.4%), while only 3 (0.5%) reported never using AI tools.

Verification of AI-generated outputs varied among respondents. About one-third 192 (32.7%) reported that they sometimes verify AI outputs, while 147 (25.0%) always do so and 119 (20.2%) often verify. However, 111 (18.9%) rarely verify outputs and 19 (3.2%) never verify them.

Similarly, modification of AI-generated content before submission was inconsistent. The largest proportion 188 (32.0%) reported that they sometimes modify AI outputs, followed by 165 (28.1%) who rarely do so and 109 (18.5%) who often modify. Meanwhile, 77 (13.1%) never modify AI-generated content, and only 49 (8.3%) always make modifications before submission.

Concerning academic integrity, the majority of respondents reported that they had not used AI in ways that violate academic integrity 500 (85.0%), while 88 (15.0%) admitted to such practices.

Table 4.5a: AI Frequency and Sociodemographic Characteristics of Respondents

Category	AI Frequency		χ^2	p-value
	Frequent (n=537) Freq (%)	Infrequent (n=51) Freq (%)		
Age group (years)				
15–24	454 (89.9)	51 (10.1)	9.178	0.010*
25–34	82 (100.0)	0 (0.0)		
35–44	1 (100.0)	0 (0.0)		
Sex				
Male	277 (89.1)	34 (10.9)	4.253	0.039*
Female	260 (93.9)	17 (6.1)		
Degree Program				
Medicine	89 (91.8)	8 (8.2)	3.351	0.851
Physiotherapy	64 (95.5)	3 (4.5)		
English and Literature	57 (89.1)	7 (10.9)		
Chemistry	67 (89.3)	8 (10.7)		
Educational Management	61 (88.4)	8 (11.6)		
Pharmacy	108 (91.5)	10 (8.5)		
Economics	54 (93.1)	4 (6.9)		
Mechanical Engineering	37 (92.5)	3 (7.5)		

Table 4.5b: AI Frequency and Sociodemographic Characteristics of Respondents

Category	AI Frequency		χ^2	p-value
	Frequent (n=537) Freq (%)	Infrequent (n=51) Freq (%)		
Faculty				
Medical	261 (92.6)	21 (7.4)	1.029	0.310
Non-medical	276 (90.2)	30 (9.8)		
Level				
Lower level	242 (90.0)	27 (10.0)	1.164	0.281
Higher level	295 (92.5)	24 (7.5)		
Device with internet access				
No	5 (100.0)	0 (0.0)	0.479	0.489
Yes	532 (91.3)	51 (8.7)		

The association between AI frequency of use and sociodemographic characteristics is presented in Tables 4.5a and 4.5b.

There was a statistically significant association between age group and AI frequency of use ($\chi^2 = 9.178$, $p = 0.010$). Among respondents aged 15–24 years, the majority reported frequent use 454 (89.9%), while 51 (10.1%) reported infrequent use. All respondents aged 25–34 years 82 (100.0%) and 35–44 years 1 (100.0%) reported frequent use, with no cases of infrequent use.

Sex was also significantly associated with AI frequency of use ($\chi^2 = 4.253$, $p = 0.039$). Among males, 277 (89.1%) reported frequent use while 34 (10.9%) reported infrequent use, whereas among females, a higher proportion 260 (93.9%) reported frequent use and 17 (6.1%) reported infrequent use.

However, degree program was not significantly associated with AI frequency of use ($\chi^2 = 3.351$, $p = 0.851$). Frequent use was high across all programs, including Physiotherapy 64 (95.5%), Economics 54 (93.1%), Mechanical Engineering 37 (92.5%), Pharmacy 108 (91.5%), and Medicine 89 (91.8%), while slightly lower proportions were observed in Educational Management 61 (88.4%), English and Literature 57 (89.1%), and Chemistry 67 (89.3%).

Faculty also showed no statistically significant association ($\chi^2 = 1.029$, $p = 0.310$). Among respondents in medical faculties, 261 (92.6%) reported frequent use while 21 (7.4%) reported infrequent use, compared to 276 (90.2%) and 30 (9.8%) among those in non-medical faculties.

Similarly, level of study was not significantly associated with AI frequency of use ($\chi^2 = 1.164$, $p = 0.281$). Among respondents in the lower level, 242 (90.0%) reported frequent use while 27 (10.0%) reported infrequent use, compared to 295 (92.5%) and 24 (7.5%) among those in the higher level.

Internet access was also not significantly associated with AI frequency of use ($\chi^2 = 0.479$, $p = 0.489$). All respondents without internet access 5 (100.0%) reported frequent use, while among those with internet access, 532 (91.3%) reported frequent use and 51 (8.7%) reported infrequent use.

Overall, the findings indicate that age group and sex were significantly associated with AI frequency of use, while degree program, faculty, level of study, and internet access showed no significant association.

Table 4.6a: AI Modification Practice and Sociodemographic Characteristics of Respondents

Category	AI Modification Practice		χ^2	p-value
	Modifies (n=346) Freq (%)	Does not Modify (n=242) Freq (%)		
Age group (years)				
15–24	292 (57.8)	213 (42.2)	3.311	0.191
25–34	54 (65.9)	28 (34.1)		
35–44	0 (0.0)	1 (100.0)		
Sex				
Male	198 (63.7)	113 (36.3)	6.338	0.012*
Female	148 (53.4)	129 (46.6)		
Degree Program				
Medicine	55 (56.7)	42 (43.3)	3.770	0.806
Physiotherapy	41 (61.2)	26 (38.8)		
English and Literature	40 (62.5)	24 (37.5)		
Chemistry	46 (61.3)	29 (38.7)		
Educational Management	37 (53.6)	32 (46.4)		
Pharmacy	74 (62.7)	44 (37.3)		
Economics	33 (56.9)	25 (43.1)		
Mechanical Engineering	20 (50.0)	20 (50.0)		

Table 4.6b: AI Modification Practice and Sociodemographic Characteristics of Respondents

Category	AI Modification Practice		χ^2	p-value
	Modifies (n=346) Freq (%)	Does not Modify (n=242) Freq (%)		
Faculty				
Medical	170 (60.3)	112 (39.7)	0.464	0.496
Non-medical	176 (57.5)	130 (42.5)		
Level				
Lower level	162 (60.2)	107 (39.8)	0.390	0.532
Higher level	184 (57.7)	135 (42.3)		
Device with internet access				
No	4 (80.0)	1 (20.0)	0.932	0.334
Yes	342 (58.7)	241 (41.3)		

The association between AI modification practice and sociodemographic characteristics is presented in Tables 4.6a and 4.6b.

There was no statistically significant association between age group and AI modification practice ($\chi^2 = 3.311$, $p = 0.191$). Among respondents aged 15–24 years, 292 (57.8%) reported modifying AI outputs while 213 (42.2%) did not. Similarly, among those aged 25–34 years, 54 (65.9%) modified AI outputs and 28 (34.1%) did not, while the only respondent aged 35–44 years reported not modifying AI outputs 1 (100.0%).

However, there was a statistically significant association between sex and AI modification practice ($\chi^2 = 6.338$, $p = 0.012$). Among males, 198 (63.7%) reported modifying AI outputs while

113 (36.3%) did not, whereas among females, 148 (53.4%) modified AI outputs and 129 (46.6%) did not.

Degree program was not significantly associated with AI modification practice ($\chi^2 = 3.770$, $p = 0.806$). Respondents across all programs reported similar patterns of modification, including Pharmacy 74 (62.7%), Chemistry 46 (61.3%), Physiotherapy 41 (61.2%), English and Literature 40 (62.5%), and Medicine 55 (56.7%), while relatively lower proportions were observed in Educational Management 37 (53.6%), Economics 33 (56.9%), and Mechanical Engineering 20 (50.0%).

Faculty also showed no statistically significant association ($\chi^2 = 0.464$, $p = 0.496$). Among respondents in medical faculties, 170 (60.3%) modified AI outputs while 112 (39.7%) did not, compared to 176 (57.5%) and 130 (42.5%) among those in non-medical faculties.

Similarly, level of study was not significantly associated with AI modification practice ($\chi^2 = 0.390$, $p = 0.532$). Among respondents in the lower level, 162 (60.2%) modified AI outputs while 107 (39.8%) did not, compared to 184 (57.7%) and 135 (42.3%) among those in the higher level.

Internet access was also not significantly associated with AI modification practice ($\chi^2 = 0.932$, $p = 0.334$). Among respondents with internet access, 342 (58.7%) modified AI outputs while 241 (41.3%) did not, while among those without internet access, 4 (80.0%) modified AI outputs and 1 (20.0%) did not.

Table 4.7a: Use of AI Without Academic Integrity and Sociodemographic Characteristics of Respondents

Category	AI Use without Academic Integrity		χ^2	p-value
	Yes (n=88) Freq (%)	No (n=500) Freq (%)		
Age group (years)				
15–24	74 (14.7)	431 (85.3)	0.501	0.778
25–34	14 (17.1)	68 (82.9)		
35–44	0 (0.0)	1 (100.0)		
Sex				
Male	64 (20.6)	247 (79.4)	16.342	<0.001*
Female	24 (8.7)	253 (91.3)		
Degree Program				
Medicine	16 (16.5)	81 (83.5)	7.234	0.405
Physiotherapy	11 (16.4)	56 (83.6)		
English and Literature	13 (20.3)	51 (79.7)		
Chemistry	12 (16.0)	63 (84.0)		
Educational Management	13 (18.8)	56 (81.2)		
Pharmacy	13 (11.0)	105 (89.0)		
Economics	8 (13.8)	50 (86.2)		
Mechanical Engineering	2 (5.0)	38 (95.0)		

* Statistically Significant p<0.05

Table 4.7b: Use of AI Without Academic Integrity and Sociodemographic Characteristics of Respondents

Category	AI Use without Academic Integrity		χ^2	p-value
	Yes (n=88) Freq (%)	No (n=500) Freq (%)		
Faculty				
Medical	40 (14.2)	242 (85.8)	0.260	0.610
Non-medical	48 (15.7)	258 (84.3)		
Level				
Lower level	32 (11.9)	237 (88.1)	3.672	0.055
Higher level	56 (17.6)	263 (82.4)		
Device with Internet access				
No	1 (20.0)	4 (80.0)	0.100	0.751
Yes	87 (14.9)	496 (85.1)		

The association between use of AI without academic integrity and sociodemographic characteristics is presented in Tables 4.7a and 4.7b.

There was no statistically significant association between age group and use of AI without academic integrity ($\chi^2 = 0.501$, $p = 0.778$). Among respondents aged 15–24 years, 74 (14.7%) reported using AI without academic integrity, while 431 (85.3%) did not. Similarly, among those aged 25–34 years, 14 (17.1%) reported such use while 68 (82.9%) did not, while the only respondent aged 35–44 years reported no such use 1 (100.0%).

However, there was a statistically significant association between sex and use of AI without academic integrity ($\chi^2 = 16.342$, $p < 0.001$). Among males, 64 (20.6%) reported using AI without

academic integrity while 247 (79.4%) did not, whereas among females, 24 (8.7%) reported such use and 253 (91.3%) did not.

Degree program was not significantly associated with use of AI without academic integrity ($\chi^2 = 7.234$, $p = 0.405$). The proportion of respondents reporting such use was relatively low across all programs, including English and Literature 13 (20.3%), Educational Management 13 (18.8%), Medicine 16 (16.5%), Physiotherapy 11 (16.4%), and Chemistry 12 (16.0%), while lower proportions were observed in Pharmacy 13 (11.0%), Economics 8 (13.8%), and Mechanical Engineering 2 (5.0%).

Faculty also showed no statistically significant association ($\chi^2 = 0.260$, $p = 0.610$). Among respondents in medical faculties, 40 (14.2%) reported using AI without academic integrity while 242 (85.8%) did not, compared to 48 (15.7%) and 258 (84.3%) among those in non-medical faculties.

Similarly, level of study was not significantly associated with use of AI without academic integrity ($\chi^2 = 3.672$, $p = 0.055$). Among respondents in the lower level, 32 (11.9%) reported such use while 237 (88.1%) did not, compared to 56 (17.6%) and 263 (82.4%) among those in the higher level.

Internet access was also not significantly associated ($\chi^2 = 0.100$, $p = 0.751$). Among respondents with internet access, 87 (14.9%) reported using AI without academic integrity while 496 (85.1%) did not, while among those without internet access, 1 (20.0%) reported such use and 4 (80.0%) did not.

Overall, the findings indicate that sex was the only sociodemographic factor significantly associated with use of AI without academic integrity, while age group, degree program, faculty, level of study, and internet access showed no significant association.

Table 4.8a: AI Verification Practice and Sociodemographic Characteristics of Respondents

Category	AI Verification Practice		χ^2	p-value
	Verify (n=458) Freq (%)	Does Not Verify (n=130) Freq (%)		
Age group (years)				
15–24	393 (77.8)	112 (22.2)	0.286	0.867
25–34	64 (78.0)	18 (22.0)		
35–44	1 (100.0)	0 (0.0)		
Sex				
Male	236 (75.9)	75 (24.1)	1.544	0.214
Female	222 (80.1)	55 (19.9)		
Degree Program				
Medicine	74 (76.3)	23 (23.7)	3.132	0.873
Physiotherapy	53 (79.1)	14 (20.9)		
English and Literature	49 (76.6)	15 (23.4)		
Chemistry	59 (78.7)	16 (21.3)		
Educational Management	56 (81.2)	13 (18.8)		
Pharmacy	88 (74.6)	30 (25.4)		
Economics	49 (84.5)	9 (15.5)		
Mechanical Engineering	30 (75.0)	10 (25.0)		

Table 4.8b: AI Verification Practice and Sociodemographic Characteristics of Respondents

Category	AI Verification Practice		χ^2	p-value
	Verify (n=458) Freq (%)	Does Not Verify (n=130) Freq (%)		
Faculty				
Medical	215 (76.2)	67 (23.8)	0.857	0.355
Non-medical	243 (79.4)	63 (20.6)		
Level				
Lower level	203 (75.5)	66 (24.5)	1.695	0.193
Higher level	255 (79.9)	64 (20.1)		
Device with internet access				
No	5 (100.0)	0 (0.0)	1.431	0.232
Yes	453 (77.7)	130 (22.3)		

The association between AI verification practice and sociodemographic characteristics is presented in Tables 4.8a and 4.8b.

There was no statistically significant association between age group and AI verification practice ($\chi^2 = 0.286$, $p = 0.867$). Among respondents aged 15–24 years, 393 (77.8%) reported verifying AI outputs while 112 (22.2%) did not. Similarly, among those aged 25–34 years, 64 (78.0%) verified AI outputs and 18 (22.0%) did not, while the only respondent aged 35–44 years reported verifying AI outputs 1 (100.0%).

Sex was also not significantly associated with AI verification practice ($\chi^2 = 1.544$, $p = 0.214$). Among males, 236 (75.9%) reported verifying AI outputs while 75 (24.1%) did not, whereas among females, 222 (80.1%) verified AI outputs and 55 (19.9%) did not.

Similarly, degree program was not significantly associated with AI verification practice ($\chi^2 = 3.132$, $p = 0.873$). Verification was high across all programs, including Economics 49 (84.5%), Educational Management 56 (81.2%), Physiotherapy 53 (79.1%), Chemistry 59 (78.7%), and English and Literature 49 (76.6%), while slightly lower proportions were observed in Medicine 74 (76.3%), Mechanical Engineering 30 (75.0%), and Pharmacy 88 (74.6%).

Faculty also showed no statistically significant association ($\chi^2 = 0.857$, $p = 0.355$). Among respondents in medical faculties, 215 (76.2%) verified AI outputs while 67 (23.8%) did not, compared to 243 (79.4%) and 63 (20.6%) among those in non-medical faculties.

Level of study was not significantly associated with AI verification practice ($\chi^2 = 1.695$, $p = 0.193$). Among respondents in the lower level, 203 (75.5%) verified AI outputs while 66 (24.5%) did not, compared to 255 (79.9%) and 64 (20.1%) among those in the higher level.

Internet access was also not significantly associated ($\chi^2 = 1.431$, $p = 0.232$). All respondents without internet access 5 (100.0%) reported verifying AI outputs, while among those with internet access, 453 (77.7%) verified AI outputs and 130 (22.3%) did not.

Table 4.9: Frequency of AI Use for Academic Tasks

Variable	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Always n (%)
Understanding concepts	8 (1.4)	13 (2.2)	104 (17.7)	277 (47.1)	186 (31.6)
Writing assignments	8 (1.4)	48 (8.2)	183 (31.1)	244 (41.5)	105 (17.9)
Verifying answers	7 (1.2)	30 (5.1)	144 (24.5)	242 (41.2)	165 (28.1)
Finding materials	9 (1.5)	49 (8.3)	134 (22.8)	233 (39.6)	163 (27.7)
Getting suggestions on academic work	15 (2.6)	50 (8.5)	143 (24.3)	235 (40.0)	145 (24.7)
Exam preparation	11 (1.9)	37 (6.3)	101 (17.2)	207 (35.2)	232 (39.5)

The frequency of AI use for specific academic tasks showed that respondents relied heavily on AI across multiple learning activities, with most reporting frequent use. For understanding concepts, the majority of respondents reported using AI often 277 (47.1%) and always 186 (31.6%), while fewer used it sometimes 104 (17.7%), rarely 13 (2.2%), or never 8 (1.4%). In terms of writing assignments, most respondents used AI often 244 (41.5%) and sometimes 183 (31.1%), while 105 (17.9%) reported always using it. A smaller proportion used it rarely 48 (8.2%) or never 8 (1.4%). For verifying answers, the largest proportion reported using AI often 242 (41.2%), followed by always 165 (28.1%) and sometimes 144 (24.5%), while 30 (5.1%) and 7 (1.2%) used it rarely or never, respectively.

Similarly, for finding materials, most respondents used AI often 233 (39.6%) and always 163 (27.7%), while 134 (22.8%) used it sometimes. Only a small proportion reported rarely 49 (8.3%) or never 9 (1.5%) using AI for this purpose.

Regarding getting feedback, the majority used AI often 235 (40.0%) and always 145 (24.7%), followed by sometimes 143 (24.3%), while fewer respondents used it rarely 50 (8.5%) or never 15 (2.6%).

For exam preparation, AI use was also high, with the largest proportion reporting always 232 (39.5%), followed by often 207 (35.2%) and sometimes 101 (17.2%), while only 37 (6.3%) and 11 (1.9%) used it rarely or never, respectively.

SECTION D: Level of Dependency On AI

Table 4.10: Responses to AIddep-22 Scale Items among Respondents

Variable	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)	Always n (%)
Functional Dependence					
Delegate academic tasks to AI	69 (11.7)	161 (27.4)	172 (29.3)	143 (24.3)	43 (7.3)
Use AI to improve learning efficiency	25 (4.3)	81 (13.8)	159 (27.0)	242 (41.2)	81 (13.8)
Cannot manage complex tasks without AI	126 (21.4)	203 (34.5)	143 (24.3)	79 (13.4)	37 (6.3)
Prefer AI to organize academic work	41 (7.0)	110 (18.7)	177 (30.1)	209 (35.5)	51 (8.7)
Rely on ready-made answers	79 (13.4)	177 (30.1)	200 (34.0)	93 (15.8)	39 (6.6)
Feel inadequate without AI support	139 (23.6)	194 (33.0)	150 (25.5)	82 (13.9)	23 (3.9)
Cognitive Dependence					
Ask AI before thinking independently	104 (17.7)	251 (42.7)	146 (24.8)	61 (10.4)	26 (4.4)
Reduced ability to analyze problems	114 (19.4)	216 (36.7)	147 (25.0)	84 (14.3)	27 (4.6)
Prefer AI over personal reasoning	82 (13.9)	219 (37.2)	170 (28.9)	82 (13.9)	35 (6.0)
Mental laziness due to AI use	111 (18.9)	191 (32.5)	128 (21.8)	114 (19.4)	44 (7.5)
Allow AI to make decisions	153 (26.0)	199 (33.8)	133 (22.6)	69 (11.7)	34 (5.8)
Loss of Control					
Unable to reduce AI usage	147 (25.0)	217 (36.9)	144 (24.5)	59 (10.0)	21 (3.6)
Difficult to stop using AI	142 (24.1)	219 (37.2)	147 (25.0)	60 (10.2)	20 (3.4)
Unable to control AI usage	158 (26.9)	219 (37.2)	134 (22.8)	65 (11.1)	12 (2.0)
No control over frequency of use	169 (28.7)	237 (40.3)	113 (19.2)	49 (8.3)	20 (3.4)
Cannot resist using AI	120 (20.4)	164 (27.9)	219 (37.2)	57 (9.7)	28 (4.8)
Experience urge when not using AI	237 (40.3)	167 (28.4)	115 (19.6)	52 (8.8)	17 (2.9)
Emotional Dependence					
Feel uneasy without AI	239 (40.6)	188 (32.0)	112 (19.0)	37 (6.3)	12 (2.0)
Feel calm when using AI	80 (13.6)	118 (20.1)	213 (36.2)	143 (24.3)	34 (5.8)
Feel anxious without AI	177 (30.1)	207 (35.2)	122 (20.7)	62 (10.5)	20 (3.4)
Feel tense without AI support	125 (21.3)	143 (24.3)	184 (31.3)	106 (18.0)	30 (5.1)
Feel supported by AI interaction	90 (15.3)	110 (18.7)	140 (23.8)	186 (31.6)	62 (10.5)

The level of AI dependency among respondents was assessed across functional, cognitive, loss of control, and emotional domains, showing varying degrees of reliance on AI tools.

Under functional dependence, the use of AI to improve learning efficiency was common, with most respondents reporting often 242 (41.2%), followed by sometimes 159 (27.0%) and always 81 (13.8%), while fewer reported rarely 81 (13.8%) and never 25 (4.3%). Similarly, preference for AI to organize academic work was high, with 209 (35.5%) reporting often and 177 (30.1%)

sometimes, while 110 (18.7%) and 41 (7.0%) reported rarely and never, respectively. Delegation of academic tasks to AI occurred mostly occasionally, with 172 (29.3%) reporting sometimes and 161 (27.4%) rarely, while 143 (24.3%) reported often, 69 (11.7%) never, and 43 (7.3%) always.

In contrast, most respondents indicated that they could manage complex academic tasks without AI, as 203 (34.5%) reported rarely and 126 (21.4%) never depending on AI, while 143 (24.3%) sometimes, 79 (13.4%) often, and 37 (6.3%) always relied on it. Reliance on ready-made answers was mostly occasional, with 200 (34.0%) sometimes and 177 (30.1%) rarely, while 93 (15.8%) often, 79 (13.4%) never, and 39 (6.6%) always. Feelings of inadequacy without AI were generally low, as most respondents reported rarely 194 (33.0%) and never 139 (23.6%), followed by sometimes 150 (25.5%), often 82 (13.9%), and always 23 (3.9%).

For cognitive dependence, most respondents reported that they rarely asked AI before thinking independently 251 (42.7%), followed by never 104 (17.7%), while 146 (24.8%) sometimes, 61 (10.4%) often, and 26 (4.4%) always did so. Similarly, reduced ability to analyze problems due to AI use was uncommon, with 216 (36.7%) reporting rarely and 114 (19.4%) never, while 147 (25.0%) sometimes, 84 (14.3%) often, and 27 (4.6%) always. Preference for AI over personal reasoning was also generally low, as 219 (37.2%) reported rarely and 82 (13.9%) never, while 170 (28.9%) sometimes, 82 (13.9%) often, and 35 (6.0%) always.

Mental laziness due to AI use was reported occasionally, with 191 (32.5%) rarely and 128 (21.8%) sometimes, while 114 (19.4%) often, 111 (18.9%) never, and 44 (7.5%) always. Most respondents also indicated that they do not allow AI to make decisions for them, as 199 (33.8%) reported rarely and 153 (26.0%) never, while 133 (22.6%) sometimes, 69 (11.7%) often, and 34 (5.8%) always.

Regarding loss of control, most respondents reported good control over AI usage. The majority indicated that they were unable to reduce AI usage rarely 217 (36.9%) or never 147 (25.0%), while 144 (24.5%) sometimes, 59 (10.0%) often, and 21 (3.6%) always. Similarly, difficulty in stopping AI use was reported rarely 219 (37.2%) and never 142 (24.1%), while 147 (25.0%) sometimes, 60 (10.2%) often, and 20 (3.4%) always.

Most respondents also reported that they were unable to control AI usage rarely 219 (37.2%) or never 158 (26.9%), while 134 (22.8%) sometimes, 65 (11.1%) often, and 12 (2.0%) always. Lack of control over frequency of use was also low, with 237 (40.3%) reporting rarely and 169 (28.7%) never, while 113 (19.2%) sometimes, 49 (8.3%) often, and 20 (3.4%) always.

Although some respondents reported difficulty resisting AI use, this was mostly occasional, with 219 (37.2%) sometimes and 164 (27.9%) rarely, while 120 (20.4%) never, 57 (9.7%) often, and 28 (4.8%) always. Feelings of urge when not using AI were generally low, with 237 (40.3%) never and 167 (28.4%) rarely, followed by 115 (19.6%) sometimes, 52 (8.8%) often, and 17 (2.9%) always.

Under emotional dependence, most respondents reported that they did not feel uneasy without AI, with 239 (40.6%) never and 188 (32.0%) rarely, while 112 (19.0%) sometimes, 37 (6.3%) often, and 12 (2.0%) always. Similarly, feelings of anxiety without AI were uncommon, with 207 (35.2%) rarely and 177 (30.1%) never, while 122 (20.7%) sometimes, 62 (10.5%) often, and 20 (3.4%) always.

However, some respondents reported positive emotional responses to AI use. Feeling calm when using AI was reported sometimes 213 (36.2%) and often 143 (24.3%), while 118 (20.1%) rarely, 80 (13.6%) never, and 34 (5.8%) always. Feeling supported by AI interaction was also notable,

with 186 (31.6%) reporting often and 140 (23.8%) sometimes, while 110 (18.7%) rarely, 90 (15.3%) never, and 62 (10.5%) always.

Table 4.11: Mean Scores of AI Dependency Domains among Respondents

Variable	Mean	SD
Overall AI Dependency	2.54	± 0.73
Functional Dependency	2.86	± 0.84
Cognitive Dependency	2.50	± 0.90
Loss of Control	2.27	± 0.88
Emotional Dependency	2.50	± 0.87

Table 4.11 shows the mean scores and standard deviations for overall AI dependency and its domains among respondents.

The mean score for overall AI dependency was 2.54 ± 0.73 , indicating a moderate level of AI dependency among respondents. Regarding functional dependency, respondents had the highest mean score of 2.86 ± 0.84 , suggesting a moderate level of functional dependency.

For cognitive dependency, the mean score was 2.50 ± 0.90 , indicating a moderate level of cognitive dependency among respondents. In terms of loss of control, respondents had the lowest mean score of 2.27 ± 0.88 , suggesting a relatively lower level of loss of control related to AI use.

Similarly, for emotional dependency, the mean score was 2.50 ± 0.87 , indicating a moderate level of emotional dependency among respondents.

Table 4.12: Level of AI Dependency among Respondents

Variable	Frequency (n)	Percent (%)
Overall AI Dependency		
Low	293	49.8
Moderate	236	40.1
High	59	10.0
Functional Dependency		
Low	196	33.3
Moderate	241	41.0
High	151	25.7
Cognitive Dependency		
Low	335	57.0
Moderate	160	27.2
High	93	15.8
Loss of Control		
Low	371	63.1
Moderate	161	27.4
High	56	9.5
Emotional Dependency		
Low	287	48.8
Moderate	225	38.3
High	76	12.9

The overall level of AI dependency among respondents showed that nearly half had low dependency 293 (49.8%), followed by moderate dependency 236 (40.1%), while only 59 (10.0%) had high dependency. Regarding functional dependency, the majority of respondents had moderate dependency 241 (41.0%), followed by low dependency 196 (33.3%), while 151 (25.7%) exhibited high functional dependency. For cognitive dependency, more than half of the respondents had low dependency 335 (57.0%), followed by moderate dependency 160 (27.2%), while 93 (15.8%) had high cognitive dependency. In terms of loss of control, most respondents had low dependency 371 (63.1%), followed by moderate dependency 161 (27.4%), while only 56 (9.5%) reported high loss of control. Similarly, for emotional dependency, the majority of respondents had low dependency 287 (48.8%), followed by moderate dependency 225 (38.3%), while 76 (12.9%) had high emotional dependency.

SECTION E: Factors associated with AI dependency

Table 4.13a: Level of AI Dependency and Sociodemographic Characteristics of Respondents

Level AI Dependency					
Category	Low (n=293) Freq (%)	Moderate (n =236) Freq (%)	High (n=59) Freq (%)	χ^2	p-value
Age Group(years)					
15–24	252 (49.9)	198 (39.2)	55 (10.9)	4.651	0.325
25–34	41 (50.0)	37 (45.1)	4 (4.9)		
35–44	0 (0.0)	1 (100.0)	0 (0.0)		
Sex					
Male	151 (48.6)	128 (41.2)	32 (10.3)	0.431	0.806
Female	142 (51.3)	108 (39.0)	27 (9.7)		
Degree Program					
Medicine	51 (52.6)	35 (36.1)	11 (11.3)	13.849	0.461
Physiotherapy	34 (50.7)	23 (34.3)	10 (14.9)		
English & Literature	37 (57.8)	21 (32.8)	6 (9.4)		
Chemistry	35 (46.7)	31 (41.3)	9 (12.0)		
Educational Management	32 (46.4)	30 (43.5)	7 (10.1)		
Pharmacy	51 (43.2)	60 (50.8)	7 (5.9)		
Economics	30 (51.7)	21 (36.2)	7 (12.1)		
Mechanical Engineering	23 (57.5)	15 (37.5)	2 (5)		

Table 4.13b: Level of AI Dependency and Sociodemographic Characteristics of Respondents

Level AI Dependency					
Variable	Low (n=293) Freq (%)	Moderate (n =236) Freq (%)	High (n=59) Freq (%)	χ^2	p-value
Faculty					
Medical faculty	136 (48.2)	118 (41.8)	28 (9.9)	0.679	0.712
Non-medical faculty	157 (51.3)	118 (38.6)	31 (10.1)		
Level of Study					
Lower level	126 (46.8)	116 (43.1)	27 (10.0)	1.991	0.369
Higher level	167 (52.4)	120 (37.6)	32 (10.0)		
Internet Accessible device					
No	4 (80.0)	1 (20.0)	0 (0.0)	1.937	0.380
Yes	289 (49.6)	235 (40.3)	59 (10.1)		

*Statistically significant $p < 0.05$

The association between level of AI dependency and sociodemographic characteristics is presented in Tables 4.12a and 4.12b.

There was no statistically significant association between age group and level of AI dependency ($\chi^2 = 4.651$, $p = 0.325$). Among respondents aged 15–24 years, 252 (49.9%) had low dependency, 198 (39.2%) had moderate dependency, and 55 (10.9%) had high dependency. Similarly, among those aged 25–34 years, 41 (50.0%) had low dependency, 37 (45.1%) had moderate dependency, and 4 (4.9%) had high dependency, while the only respondent aged 35–44 years had moderate dependency 1 (100.0%).

Sex was also not significantly associated with level of AI dependency ($\chi^2 = 0.431$, $p = 0.806$). Among males, 151 (48.6%) had low dependency, 128 (41.2%) had moderate dependency, and 32

(10.3%) had high dependency, while among females, 142 (51.3%) had low dependency, 108 (39.0%) had moderate dependency, and 27 (9.7%) had high dependency.

Similarly, degree program was not significantly associated with level of AI dependency ($\chi^2 = 13.849$, $p = 0.461$). In Medicine, 51 (52.6%) had low dependency, 35 (36.1%) had moderate dependency, and 11 (11.3%) had high dependency. In Physiotherapy, 34 (50.7%) had low dependency, 23 (34.3%) had moderate dependency, and 10 (14.9%) had high dependency. In English & Literature, 37 (57.8%) had low dependency, 21 (32.8%) had moderate dependency, and 6 (9.4%) had high dependency. In Chemistry, 35 (46.7%) had low dependency, 31 (41.3%) had moderate dependency, and 9 (12.0%) had high dependency. In Educational Management, 32 (46.4%) had low dependency, 30 (43.5%) had moderate dependency, and 7 (10.1%) had high dependency. In Pharmacy, 51 (43.2%) had low dependency, 60 (50.8%) had moderate dependency, and 7 (5.9%) had high dependency. In Economics, 30 (51.7%) had low dependency, 21 (36.2%) had moderate dependency, and 7 (12.1%) had high dependency. In Mechanical Engineering, 23 (57.5%) had low dependency, 15 (37.5%) had moderate dependency, and 2 (5.0%) had high dependency.

Faculty was also not significantly associated with level of AI dependency ($\chi^2 = 0.679$, $p = 0.712$). Among respondents in the medical faculty, 136 (48.2%) had low dependency, 118 (41.8%) had moderate dependency, and 28 (9.9%) had high dependency, while among those in the non-medical faculty, 157 (51.3%) had low dependency, 118 (38.6%) had moderate dependency, and 31 (10.1%) had high dependency.

Level of study was also not significantly associated with level of AI dependency ($\chi^2 = 1.991$, $p = 0.369$). Among respondents in the lower level, 126 (46.8%) had low dependency, 116 (43.1%)

had moderate dependency, and 27 (10.0%) had high dependency, while among those in the higher level, 167 (52.4%) had low dependency, 120 (37.6%) had moderate dependency, and 32 (10.0%) had high dependency.

Similarly, internet access was not significantly associated with level of AI dependency ($\chi^2 = 1.937$, $p = 0.380$). Among respondents with internet access, 289 (49.6%) had low dependency, 235 (40.3%) had moderate dependency, and 59 (10.1%) had high dependency, while among those without internet access, 4 (80.0%) had low dependency, 1 (20.0%) had moderate dependency, and none had high dependency.

Table 14: Association Between AI Use Behaviors and Level of AI Dependency

Category	Level of AI Dependency			χ^2	p-value
	Low Dependency (n=293) Freq (%)	Moderate Dependency (n=236) Freq (%)	High Dependency (n=59) Freq (%)		
AI Frequency					
Frequent	268 (91.5)	218 (92.4)	51 (86.4)	2.112	0.348
Infrequent	25 (8.5)	18 (7.6)	8 (13.6)		
Verification of AI Output					
Verifies	245 (83.6)	171 (72.5)	42 (71.2)	11.166	0.004*
Does not verify	48 (16.4)	65 (27.5)	17 (28.8)		
Modification of AI Output					
Modifies	158 (53.9)	149 (63.1)	39 (66.1)	8.381	0.05*
Does not modify	135 (46.1)	87 (36.9)	20 (33.9)		
Unethical use					
Yes	38 (13.0)	37 (15.7)	13 (22.0)	3.328	0.189
No	255 (87.0)	199 (84.3)	46 (78.0)		

***Statistically significant (p < 0.05)**

The association between AI use behaviors and level of AI dependency is presented in Table 4.13

There was no statistically significant association between frequency of AI use and level of AI dependency ($\chi^2 = 2.112$, $p = 0.348$). The majority of respondents reported frequent use across all dependency levels, including 268 (91.5%) among those with low dependency, 218 (92.4%) among those with moderate dependency, and 51 (86.4%) among those with high dependency.

Similarly, infrequent use was relatively low across all groups, with 25 (8.5%) among low dependency, 18 (7.6%) among moderate dependency, and 8 (13.6%) among high dependency.

There was a statistically significant association between verification of AI output and level of dependency ($\chi^2 = 11.166$, $p = 0.004$). The proportion of respondents who verified AI outputs decreased as dependency increased, from 245 (83.6%) among those with low dependency to 171 (72.5%) among moderate and 42 (71.2%) among high dependency. Conversely, non-verification increased with dependency, with 48 (16.4%) among low dependency, 65 (27.5%) among moderate dependency, and 17 (28.8%) among high dependency.

Similarly, modification of AI output was significantly associated with level of dependency ($\chi^2 = 8.381$, $p = 0.050$). A higher proportion of respondents with high dependency 39 (66.1%) and moderate dependency 149 (63.1%) reported modifying AI outputs compared to those with low dependency 158 (53.9%). In contrast, non-modification was more common among respondents with low dependency 135 (46.1%), moderate dependency 87 (36.9%), and high dependency 20 (33.9%).

There was no statistically significant association between unethical use of AI and level of dependency ($\chi^2 = 3.328$, $p = 0.189$). However, a gradual increase was observed across dependency levels, with 38 (13.0%) among those with low dependency, 37 (15.7%) among moderate dependency, and 13 (22.0%) among high dependency reporting unethical use. Conversely, non-unethical use was more common among respondents with low dependency 255 (87.0%), moderate dependency 199 (84.3%), and high dependency 46 (78.0%).

CHAPTER FIVE

DISCUSSION

5.1 DISCUSSION

Artificial intelligence (AI) has rapidly emerged as a transformative force in higher education, reshaping how students learn, access information, and complete academic tasks. In recent years, AI-powered tools, particularly generative AI, have become increasingly integrated into students' academic activities, offering opportunities for enhanced learning, improved efficiency, and personalized educational experiences. Evidence suggests that AI can support academic achievement by enabling faster access to information, improving engagement, and facilitating adaptive learning processes.⁵⁰

Despite these benefits, the growing use of AI in education has also raised significant concerns. Scholars have highlighted issues such as reduced critical thinking, overreliance on AI-generated content, academic integrity challenges, and the potential decline in independent learning skills.⁵¹

⁵² Furthermore, while AI enhances efficiency, its excessive use may lead to “cognitive offloading,” where students increasingly depend on technology rather than engaging in active thinking and problem-solving.

The increasing integration of AI tools in academic environments therefore presents a dual reality: on one hand, AI serves as a powerful educational support system; on the other hand, it introduces new challenges that may affect learning quality and student development. As such, understanding how students interact with AI, particularly in terms of usage patterns and dependency, is essential for guiding its effective and responsible use in higher education.

Against this backdrop, this study examined the use of AI among undergraduate students in the University of Benin, focusing on the types of tools commonly used, patterns of usage, levels of dependency, and factors contributing to such dependency. The discussion that follows interprets the findings of this study in relation to existing literature and highlights their implications for teaching, learning, and policy development in higher education.

The sociodemographic characteristics of respondents in this study reveal important insights into the population under investigation and provide a foundation for understanding patterns of artificial intelligence (AI) use among undergraduate students.

The majority of respondents were within the age group of 15–24 years, with a mean age of 22.73 ± 4.65 years. This reflects the typical age structure of undergraduate populations in Nigeria and globally, where most students are in early adulthood. This age group is particularly significant because it represents a digitally active generation that has grown up with access to information and communication technologies. Studies have shown that young adults are more likely to adopt emerging technologies such as AI due to their familiarity with digital tools and adaptive learning behaviours.⁵³ This may explain the high engagement with AI observed in this study.

Slightly more than half of the respondents were male, although the gender distribution was relatively balanced. This suggests that access to higher education and by extension, exposure to AI tools is not significantly skewed by gender in this context. Existing literature indicates that AI usage among students does not consistently differ by gender, as both male and female students demonstrate comparable levels of engagement when equal access to digital resources is available.

The ethnic diversity observed among respondents reflects the heterogeneous nature of Nigerian universities, particularly federal institutions that attract students from multiple regions. This diversity enhances the representativeness of the study and suggests that the findings may be generalisable across different cultural backgrounds. While ethnicity itself may not directly influence AI usage, cultural and educational exposure can shape attitudes toward technology adoption.

The distribution of respondents across various faculties and degree programs further highlights the multidisciplinary nature of the study population. Students from Pharmacy, Medicine, Physical Sciences, Arts, Social Sciences, and Engineering were all represented. This indicates that AI usage is not confined to technology related disciplines but spans across both science-based and non-science-based fields. Previous studies have shown that AI tools are increasingly integrated into diverse academic disciplines, supporting activities such as writing, research, and data analysis.⁵⁵

In terms of level of study, respondents were fairly distributed across different academic years, with a slightly higher proportion in the middle levels (200–400). Research suggests that students in higher levels of study tend to engage more with digital tools due to increased academic demands such as research work, assignments, and project writing.⁵⁴ This may contribute to increased exposure to and reliance on AI tools as students progress academically.

Religion was predominantly Christianity, reflecting the religious composition of southern Nigeria, particularly Edo State. While religion may not have a direct impact on AI usage, it provides contextual background for understanding the study population.

A key finding of this study is the near-universal access to the internet (99.1%) and high ownership of smartphones (98.6%) among respondents. This indicates a strong digital infrastructure among the study population, which is essential for AI adoption. Access to digital devices and reliable internet connectivity has been identified as a major determinant of technology use in education. According to UNESCO, disparities in digital access significantly affect the ability of students to utilize AI tools effectively, with improved connectivity leading to higher adoption rates.⁵³

The relatively lower access to laptops and tablets compared to smartphones suggests that mobile-based AI usage may be more prevalent among students. This aligns with trends in developing countries where smartphones serve as the primary medium for accessing digital learning tools and AI applications.

Overall, the sociodemographic profile of respondents in this study depicts a young, digitally connected, and academically diverse population. These characteristics create a conducive environment for the adoption and utilization of AI technologies in higher education. The high level of internet access and device ownership, in particular, provides a strong enabling factor for the widespread use of AI tools observed in subsequent sections of this study.

The findings from this study revealed a remarkably high level of awareness and utilization of artificial intelligence (AI) tools among undergraduate students. Nearly all respondents were aware of at least one AI tool, and the vast majority reported active usage. This reflects the rapid integration of AI technologies into higher education globally, where student engagement with AI has become almost universal. Recent global surveys indicate that between 86% and 95% of students now use AI tools in their academic work, highlighting the widespread adoption of these technologies in learning environments.⁵⁶

Among the various AI tools identified in this study, ChatGPT emerged as the most widely recognized, most commonly used, and most frequently used tool. This dominance is consistent with global trends, where ChatGPT has been identified as the leading AI platform among students, with approximately 66% of students reporting its use for academic purposes.⁵⁶ Similarly, other studies have shown that ChatGPT is extensively used for tasks such as generating ideas, drafting assignments, and explaining concepts, making it highly adaptable to academic needs.⁵⁷

Other AI tools such as Gemini, Claude, Meta AI and DeepSeek also demonstrated moderate levels of awareness and usage among respondents, while tools like Grammarly, Perplexity, and QuillBot had comparatively lower usage rates. This pattern suggests that students tend to gravitate toward multifunctional, conversational AI tools rather than specialized applications. Evidence from previous studies supports this observation, indicating that students prefer AI platforms that can perform multiple academic functions, such as writing, summarization, and research assistance, within a single interface.⁵⁸

The extremely high prevalence of AI usage observed in this study (98.1%) is notably higher than many global estimates, although it aligns with recent reports suggesting near-universal adoption among university students. For instance, studies have reported that up to 92% of students use AI tools for academic purposes, with a significant proportion engaging with these tools on a regular basis.^{58,59} This suggests that AI adoption among Nigerian undergraduates is not lagging behind global trends but may in fact be accelerating due to increased accessibility of free AI platforms and widespread internet penetration.

Among the small proportion of respondents who reported not using AI tools, the primary barriers identified were cost, lack of knowledge, preference for traditional methods, and privacy concerns.

These findings are consistent with existing literature, which highlights affordability, digital literacy, and trust as key factors influencing AI adoption. Studies have shown that although AI tools are widely available, limited knowledge of how to use them effectively and concerns about data privacy can hinder their uptake. ⁶⁰

In terms of academic usage, ChatGPT was again the most commonly used tool, followed by Gemini and DeepSeek. This reinforces the central role of generative AI in supporting academic activities. Research has shown that students primarily use AI tools for tasks such as summarizing academic materials, generating content, and assisting with research, which aligns closely with the findings of this study. ⁵⁸

Furthermore, the finding that ChatGPT was overwhelmingly the most frequently used AI tool (83.2%) highlights the growing dependence on a single dominant platform. This may be attributed to its ease of use, accessibility, and ability to perform a wide range of academic functions. Studies have shown that students are more likely to adopt AI tools that are user-friendly, freely accessible, and capable of delivering quick and relevant responses. ⁶¹

The absence of statistically significant associations between AI usage and most sociodemographic variables (such as age, sex, faculty, and level of study) suggests that AI adoption is widespread and relatively uniform across different student groups. This supports findings from global studies indicating that AI use in education is becoming increasingly democratized, with students across disciplines and backgrounds engaging with these tools. ⁶²

However, the significant association between internet access and AI usage observed in this study underscores the importance of digital connectivity as a key enabling factor. Students with reliable internet access were significantly more likely to use AI tools compared to those without access.

This finding is consistent with existing research emphasizing that access to digital infrastructure is a critical determinant of technology adoption in education.⁶³

Overall, the findings from this section demonstrate that AI tools, particularly generative AI platforms have become deeply embedded in the academic lives of undergraduate students. The high levels of awareness, widespread usage, and dominance of specific tools such as ChatGPT reflect a significant shift in how students access information, complete academic tasks, and engage with learning processes. These trends highlight the need for educational institutions to develop clear guidelines and policies to ensure the effective and ethical use of AI in academic settings.

The findings from this study demonstrate that undergraduate students utilize artificial intelligence (AI) tools extensively across a wide range of academic activities, with particular emphasis on research assistance, summarization of academic materials, and writing tasks. This pattern reflects the growing integration of generative AI into students' learning processes, where such tools are increasingly used to enhance efficiency and productivity. Similar studies have shown that students predominantly use AI for academic writing, information retrieval, and content summarization, indicating that these functions represent the core academic applications of AI technologies.⁶⁴

The high proportion of students using AI for research assistance (72.3%) and summarizing materials (69.7%) aligns with evidence that AI tools are frequently employed to simplify complex information and support independent learning. Research has demonstrated that students perceive AI as particularly useful for quickly accessing and synthesizing information, which helps reduce the time spent on traditional study methods (Vieriu, 2025). Additionally, AI tools

have been widely reported to support writing and grammar improvement, further reinforcing their role as academic support systems.⁶⁵

The frequency of AI use observed in this study, where over half of respondents reported daily usage, indicates a high level of reliance on these tools in routine academic activities. This is consistent with global trends showing that students interact with AI regularly, often integrating it into their daily study habits. Studies have found that students frequently use AI for ongoing academic support, including studying, exam preparation, and completing assignments, highlighting its role as a continuous learning aid rather than an occasional tool.⁶⁶

However, the findings regarding verification of AI-generated outputs raise important concerns. A substantial proportion of respondents reported that they only sometimes, rarely, or never verify AI outputs before use. This is problematic given that AI-generated content may contain inaccuracies, biases, or fabricated information. Research has emphasized that while AI tools provide rapid responses, they are not always reliable, making critical evaluation and verification essential for effective learning.⁶⁷ Furthermore, failure to verify AI outputs may contribute to the dissemination of incorrect information and reduce academic rigor.

Similarly, the inconsistent modification of AI-generated content observed in this study suggests that some students may rely heavily on AI outputs without sufficient critical engagement. This pattern aligns with findings from studies on human-AI interaction, which indicate that students with lower levels of AI literacy are more likely to accept AI-generated responses without substantial modification, while more experienced users tend to engage more critically with the content.⁶⁸

The findings on academic integrity are also noteworthy, as 15% of respondents admitted to using AI in ways that violate academic integrity. This supports growing concerns in the literature that AI tools can facilitate academic misconduct, particularly in the form of plagiarism or unauthorized assistance. Studies have highlighted that the use of generative AI in academic writing has blurred the boundaries of academic honesty, making it more difficult to distinguish between original and AI-assisted work.⁶⁹ Additionally, AI tools have been shown to enable students to generate complete academic content, raising ethical concerns about authorship and originality.⁷⁰

Despite these concerns, the overall pattern of AI usage suggests that students primarily view AI as a supportive academic tool rather than a complete substitute for learning. Many students use AI to complement traditional study methods, enhance understanding, and improve academic performance. However, the observed gaps in verification, modification, and ethical usage highlight the need for structured guidance on responsible AI use.

Overall, the patterns of AI tool usage identified in this study indicate widespread and frequent use across multiple academic tasks, with a strong emphasis on efficiency and convenience. While these tools offer significant benefits in supporting learning, their improper use, particularly in relation to verification and academic integrity, poses challenges that must be addressed through policy development, digital literacy training, and institutional regulation.

The findings from this study revealed varying levels of artificial intelligence (AI) dependency among undergraduate students across functional, cognitive, loss of control, and emotional domains. Overall majority of the respondents exhibited low AI dependency (49.8%), while a smaller proportion demonstrated high dependency (10.0%). This suggests that although AI tools are widely used, most students maintain a balanced level of reliance rather than excessive

dependence. Similar studies have reported that AI dependency among students often exists at moderate levels, reflecting its role as a supportive academic tool rather than a complete substitute for independent learning.⁶⁵

The findings indicate relatively high functional dependence on AI, particularly in improving learning efficiency and organizing academic work. A large proportion of respondents reported frequently using AI to enhance productivity, which aligns with existing literature showing that AI tools significantly improve academic efficiency by simplifying complex tasks and reducing workload.⁵⁰

However, the moderate levels of task delegation and reliance on ready-made answers suggest that students are not entirely dependent on AI for completing academic work. This reflects a hybrid learning approach where AI complements, rather than replaces, traditional study methods. Nevertheless, research has shown that increasing reliance on AI for task completion may gradually shift learning from active engagement to passive consumption, thereby affecting deep learning outcomes.⁷¹

Importantly, most respondents reported that they could manage complex academic tasks without AI, indicating that full dependency has not yet developed. This finding suggests that students still retain core academic skills despite frequent AI use.

Cognitive dependency was generally low among respondents, as most reported that they rarely relied on AI before thinking independently or experienced reduced analytical ability. This suggests that AI has not significantly replaced independent thinking for the majority of students.

However, a notable proportion reported occasional reliance on AI for thinking processes, indicating emerging cognitive dependence. According to recent research, when AI shifts from

being a supportive tool to a substitute for thinking, it can lead to “cognitive offloading,” where students rely on AI systems instead of engaging in active reasoning.⁷² This phenomenon may gradually weaken critical thinking and problem-solving abilities.

Additionally, studies have shown that excessive AI reliance is associated with reduced critical thinking and cognitive engagement, particularly when students depend on automated systems for answers rather than actively processing information.⁷³ Although such effects appear limited in this study, the presence of moderate responses suggests potential long-term risks if AI use becomes more intensive.

The findings on loss of control indicate that most respondents maintained control over their AI usage. The majority reported that they were rarely or never unable to reduce or stop using AI tools, suggesting that compulsive or addictive patterns of use are not yet widespread.

This aligns with existing studies indicating that while students frequently use AI, only a minority develop behavioural dependency characterized by loss of control.⁷⁴ However, the presence of some respondents who reported occasional difficulty resisting AI use suggests early signs of behavioural dependence.

Research has shown that increased reliance on AI can lead to habitual usage patterns, where students feel compelled to use AI tools for most academic tasks, potentially reducing their ability to function independently over time.⁷⁵ Therefore, while current levels of loss of control are low, there is a need for monitoring and guidance to prevent escalation.

Emotional dependency on AI was generally low among respondents, as most reported that they did not feel anxious, uneasy, or tense without AI. This suggests that AI has not yet become a psychological necessity for most students.

However, some respondents reported feeling calm and supported when using AI, indicating the development of positive emotional attachment to these tools. This finding is consistent with studies showing that AI can provide reassurance, reduce academic stress, and enhance confidence, thereby fostering emotional reliance.⁷⁴

While such emotional benefits can enhance learning experiences, excessive emotional dependence may lead to reduced self-confidence and increased reliance on external systems for validation. Literature suggests that overdependence on AI may weaken students' autonomy and self-efficacy over time.⁷¹

The overall pattern observed in this study indicates that AI dependency among students is predominantly low, with relatively low levels of cognitive, emotional, and behavioural dependence. This suggests that students are largely using AI as a supportive academic tool rather than a substitute for learning.

However, the presence of moderate functional dependence and emerging emotional reliance highlights the need for caution. Research has emphasized that while AI enhances efficiency and academic performance, excessive dependence may undermine critical thinking, creativity, and independent learning skills.^{71, 72}

Overall, the findings suggest that AI dependency among undergraduate students is still at a manageable level but shows early signs of progression. While AI serves as a valuable academic support system, there is a need to promote balanced usage, encourage critical thinking, and develop AI literacy skills to prevent overdependence.

Educational institutions should therefore focus on guiding students toward responsible AI use, ensuring that these tools enhance learning without replacing essential cognitive and academic skills.

The association between sociodemographic characteristics and pattern of use with the level of dependency provides a critical understanding of the factors associated with AI dependency.

This study revealed that age, sex, faculty, and degree program did not have any effect on the level of AI dependency. This indicates that the shift toward AI reliance is a universal phenomenon within the university, affecting students across all disciplines and backgrounds in a relatively uniform manner. This lack of demographic variance suggests that the "digital divide" in terms of gender or discipline is narrowing in the context of AI. This finding aligns with studies which shows that in environments with high institutional access, individual demographic factors become less predictive of technology adoption than perceived usefulness and ease of use.⁴¹

The findings from this study reveal significant associations between key AI usage behavioural patterns and the level of artificial intelligence (AI) dependency among undergraduate students. These behavioural patterns including frequency of use, verification of outputs, modification practices, and unethical use provide important insights into how students engage with AI and how such engagement shapes dependency levels.

The findings from this study showed no significant association with frequency of AI usage and level of dependency as frequent AI use was notably high across all dependency groups, though marginally lower among students with high dependency.. This pattern suggests that dependency is not solely determined by how often AI is used, but rather by the nature of its integration into academic workflows. This is consistent with a study showed that dependency on AI is closely

linked to perceived usefulness and reliance patterns rather than mere exposure, implying that students may develop dependency even with less frequent use if AI becomes their primary tool for problem-solving or decision-making.⁸²

A progressive decline in verification practices was observed as dependency increased, with students in the high dependency group being least likely to verify AI-generated content. This aligns with a study which found that students exhibiting higher trust in AI are less likely to engage in verification of output. Reduced verification reflects a shift toward passive acceptance of AI outputs, with students increasingly treating these systems as authoritative sources of information rather than tools requiring critical scrutiny.⁸³

Students with higher dependency were more likely to modify AI outputs compared to those with lower dependency, a pattern that at first appears counterintuitive. However, this may reflect a tendency among highly dependent students to engage more extensively with AI outputs in general including surface-level editing while still fundamentally relying on AI as the primary generator of their academic content. A study noted that while surface-level modifications may occur, students with high AI reliance often fail to engage in deep cognitive restructuring of AI-generated content, suggesting that modification without genuine critical engagement does not meaningfully reduce dependency.⁸⁴

Although the association between unethical use of AI and dependency level did not reach statistical significance, a clear directional trend was observed, with unethical use increasing progressively across low, moderate, and high dependency groups. This is consistent with a study showed that increased reliance on AI tools can lead to behaviours that prioritise efficiency over academic integrity, as dependency deepens and students grow more inclined to use AI to

generate complete academic outputs, thereby blurring the boundaries between legitimate assistance and misconduct.⁸⁵

Overall, these findings suggest that AI dependency is driven more by usage patterns than by a student's personal profile. The evidence linking dependency to decreased verification and increased unethical use points toward a potential decline in critical engagement. While AI serves as an efficient support system, these findings emphasize the urgent need for AI literacy programs that teach students not just how to utilize AI, but how to maintain cognitive autonomy and ethical standards while doing so.

5.2 CONCLUSION

This study examined the use of artificial intelligence (AI) among undergraduate students in the University of Benin, focusing on commonly used tools, usage patterns, levels of dependency, and factors influencing such dependency. The findings highlight the growing integration of AI into students' academic activities and its evolving role in higher education.

The study revealed that awareness and use of AI tools among students were extremely high, with generative AI platforms, particularly ChatGPT, emerging as the most dominant tools. This reflects the rapid global expansion of AI in higher education, where such tools have become central to academic support, including writing, research, and information retrieval .

Findings on usage patterns showed that students apply AI tools across a wide range of academic tasks, especially for research assistance, summarizing, assignment writing, and exam preparation, with many reporting frequent or daily use. This supports existing evidence that AI has become

embedded in students' learning processes, functioning as a routine academic aid that enhances efficiency and accessibility.

In terms of dependency, the study found that most students exhibited moderate levels of AI dependency, particularly in functional aspects such as improving efficiency and organizing academic work. However, cognitive, emotional, and behavioural dependency remained relatively low, indicating that students largely retain independent learning abilities. This suggests that AI is currently being used as a supportive tool rather than a replacement for thinking, although concerns remain about potential long-term effects such as reduced critical engagement and overreliance.

Overall, the study concludes that AI has become an integral part of undergraduate education, offering significant benefits in terms of efficiency, accessibility, and academic support. However, the increasing reliance on AI also raises important concerns regarding dependency, critical thinking, and academic integrity. As AI continues to shape the educational landscape, there is a need for deliberate efforts to ensure that its use enhances learning without undermining students' intellectual development.

In essence, while AI tools are widely adopted and beneficial to students' academic activities, maintaining a balance between AI-assisted learning and independent thinking remains essential for sustaining meaningful educational outcomes.

5.3 RECOMMENDATIONS

Based on the findings of this study and in line with global best practices on artificial intelligence (AI) in education, the following recommendations are proposed:

1. Development of Institutional Guidelines on AI Use

There is a need for the University of Benin to develop clear policies and guidelines on the acceptable use of AI tools in academic work. The study revealed uncertainty among students regarding institutional expectations, which may lead to misuse or overreliance. Global frameworks emphasize that institutions should establish ethical, transparent, and well-communicated policies to guide AI use in teaching, learning, and assessment. Similarly, UNESCO recommends structured governance frameworks to ensure responsible and safe integration of AI in education.

2. Integration of AI Literacy into the Curriculum

Students should be trained on how to use AI tools effectively, critically, and responsibly. AI literacy programs should include:

- Understanding AI limitations and risks
- Evaluating AI-generated content
- Ethical use of AI in academic work

UNESCO highlights the importance of equipping students with AI competencies and critical thinking skills to navigate AI-enhanced learning environments.

3. Promotion of Critical Thinking and Independent Learning

Lecturers should design teaching and assessment methods that encourage original thinking and problem-solving, rather than overdependence on AI tools. This can be achieved through:

- Open-ended assignments

- Oral presentations and defenses

- Practical and analytical tasks

This aligns with global recommendations that AI should enhance human capabilities rather than replace them.

4. Regulation of Academic Use of AI Tools

Institutions should implement mechanisms to ensure that AI is used in ways that do not compromise academic integrity. This may include:

- AI disclosure requirements in assignments

- Use of plagiarism and AI-detection tools

- Clear penalties for misuse

Research shows that lack of regulation can lead to ethical concerns such as plagiarism and overreliance on AI-generated content.

5. Workload Management and Academic Support

Since heavy workload and academic pressure were major drivers of AI dependency, universities should:

- Review academic workload structures

- Provide academic support services (e.g., tutoring, writing centers)

- Encourage effective time management strategies

Reducing excessive academic pressure can help limit overdependence on AI tools for task completion.

6. Training and Capacity Building for Lecturers

Lecturers should be trained on:

- How to integrate AI into teaching effectively

- How to detect misuse of AI

- How to guide students in responsible AI use

UNESCO emphasizes that teacher training is essential for the effective and ethical implementation of AI in education.

7. Encouraging Balanced and Responsible AI Use

Students should be encouraged to use AI as a support tool rather than a substitute for learning.

This can be achieved through awareness campaigns highlighting:

- Benefits of AI

- Risks of overdependence

- Importance of independent thinking

Global recommendations stress a human-centered approach, where AI complements learning without undermining students' intellectual development.

8. Future researchers are encouraged to adopt the AIdep-22 scale in studies assessing artificial intelligence dependency among students and other populations, as it offers a structured and multidimensional measure of AI dependence. Its use across diverse settings and populations will

further strengthen evidence on its reliability, validity, and generalizability. In addition, researchers should apply the instrument beyond validation studies to generate comparable data and deepen understanding of patterns of AI dependency.

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APPENDIX I

ARTIFICIAL INTELLIGENCE (AI) DEPENDENCY AMONG UNDERGRADUATED STUDENTS IN UNIVERSITY OF BENIN

Dear respondent, We are 600 level students at the School of Medicine, University of Benin, Benin City. We are conducting research to assess AI dependency among undergraduate students in the University of Benin. This questionnaire will aid as a tool for data collection in this research. Your sincere response will be helpful and the information given here will be appreciated and treated with utmost confidentiality.

SECTION A: SOCIODEMOGRAPHIC CHARACTERISTICS

1. Age in years as at last birthday _____
2. Sex: Male () Female ()
3. Tribe: Bini() Igbo() Esan() Hausa() Yoruba() others: _____
4. Faculty: Medicine () Basic Medical Science () Art () Physical Science () Education() Pharmacy () Social Science () Engineering()
5. Degree program: Medicine () Physiotherapy () English and literature () Chemistry () Education Management () Pharmacy () Economics () Mechanical Engineering
6. Level 100() 200() 300() 400() 500() 600()
7. Religion: Christianity () Islam () African Traditional Religion () Atheist () None ()
8. Which digital device do you currently have access to Smart Phone () Laptop () Tablet () None ()
9. Do you have access to Internet YES || NO

SECTION B: TYPES OF AI TOOLS COMMONLY USED BY UNDERGRADUATE STUDENTS

10. Which AI tools are you currently aware of? (Tick all that apply)
 ChatGPT DeepSeek Gemini Claude Meta AI QuillBot Grammarly

- Perplexity SciSpace AI Study Apps (Khanmigo, Socratic, Quizlet AI) AI Transcription Tools (Otter.ai, Whisper AI)
- Others (specify): _____

11. Do you make use of any AI-based applications? YES || NO
12. If No. 11 is No, What's your reason for not using AI? Not aware of AI tools Do not know how to use them Prefer traditional study methods Cost of paid versions Doubt about accuracy of AI responses Institutional restrictions Privacy or data security concerns Lack of reliable internet access
13. Which AI tools do you USE for academic purposes? (Tick all that apply)
- ChatGPT DeepSeek Gemini Claude Meta AI QuillBot Grammarly
 - Perplexity SciSpace AI Coding Assistants (e.g., GitHub Copilot) AI Study Apps (Khanmigo, Socratic, Quizlet AI) AI Transcription Tools (Otter.ai, Whisper AI)
 - Others (specify): _____
14. Which AI tools do you USE the most?
- _____

SECTION C: PATTERNS OF AI TOOL USAGE

15. What academic tasks do you use AI tools for? (Tick all that apply)
- Writing essays or assignments Summarizing textbooks or academic materials Grammar correction or proofreading Research assistance (finding academic information or references) Solving mathematical problems Coding and programming Data analysis or statistics Creating presentations (e.g., PowerPoint slides)
 - Others (please specify): _____
16. How often do you use AI tools for the following tasks? (Use scale: Never = 1, Rarely = 2, Sometimes = 3, Often = 4, Always = 5)

		Never	Rarely	Some-times	often	Always
A.	Understanding difficult topics or					

	concepts					
B.	Writing assignments					
C.	Checking or verifying answers					
D.	Finding learning materials or academic resources					
E.	Getting feedback or suggestions on academic work					
F.	Preparing for examinations (practice questions or explanations)					

17. How often do you use AI for academic works

Daily A few times a week Once a week Rarely Never

18. How often do you verify the accuracy of AI-generated information before using it ?

Always Often Sometimes Rarely Never

19. When using AI-generated content, how often do you submit it without modification or input of your own? Always Often Sometimes Rarely Never

20. Have you ever used AI tools in ways that might violate academic integrity policies (e.g., during tests/exams without permission)? YES || NO

SECTION D: LEVEL OF DEPENDENCY ON AI

How dependent are you on Artificial intelligence ? (Use scale: Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5)

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	FUNCTIONAL DEPENDENCE					
21.	I delegate almost all my academic tasks to AI because it performs them faster and better than I do					
22.	I rely on AI's functions (e.g., providing answers) to improve my learning efficiency					
23.	I can no longer manage complex academic tasks without the assistance of AI					
24.	Compared to doing it myself, I prefer to let AI gather information or organize content for me					
25.	In my studies, I excessively rely on the ready-made answers or solutions provided by AI					
26.	I feel inadequate in my studies without the support of AI					

	COGNITIVE DEPENDENCE	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
27.	I often ask AI for answers directly without thinking for myself first					

28.	After using AI, my ability to independently analyze and solve problems has declined					
29.	When faced with an academic challenge, I rely on AI instead of attempting to think it through on my own					
30.	After long-term use of AI, I find I've become mentally lazy and always want AI to think for me					
31.	I am accustomed to letting AI make judgments and decisions for me rather than fully trusting my own judgment					

	LOSS OF CONTROL	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
32.	I have tried to reduce my use of AI, but I have never succeeded for long					
33.	Once I start using AI, I often find it difficult to stop, even after spending a lot of time on it					
34.	I know I shouldn't rely on AI excessively, but I just can't control myself					
35.	I have almost no control over the frequency and duration of my AI use					
36.	I could complete tasks without AI, but I just can't resist using it					
37.	If I don't use AI for a period of time, I feel a strong urge to use it, sometimes even feeling					

	irritable					
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	EMOTIONAL DEPENDENCE	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
38.	I feel uneasy or insecure without the help of AI					
39.	Using AI to assist my studies makes me feel calm and relaxed					
40.	I would feel anxious and frustrated if I couldn't use AI for my studies					
41.	Whenever I encounter a difficult problem, my first instinct is to hope AI can help me; otherwise, I feel tense					
42.	Interacting with AI (e.g., via chat prompts) is a pleasant experience that makes me feel supported					

APPENDIX II

SAMPLING CALCULATIONS

A. Proportionate Allocation by Degree program

Degree program	Population (N)	Calculation	Sample Size (n)
Medicine	918	$(918/5569) \times 588$	97
Physiotherapy	636	$(636/5569) \times 588$	67
English & Literature	603	$(603/5569) \times 588$	64
Chemistry	711	$(711/5569) \times 588$	75
Economics	549	$(549/5569) \times 588$	58
Educational Management	649	$(649/5569) \times 588$	69
Pharmacy	1119	$(1119/5569) \times 588$	118
Mechanical Engineering	384	$(384/5569) \times 588$	40
Total	5569		588

Medicine (n = 97, N = 918)

Level	Population	Calculation	Sample
100	212	$(212/918) \times 97$	22
200	183	$(183/918) \times 97$	19
300	139	$(139/918) \times 97$	15
400	134	$(134/918) \times 97$	14

500	128	$(128/918) \times 97$	14
600	122	$(122/918) \times 97$	13
Total	918		97

Pharmacy (n = 118, N = 1119)

Level	Population	Calculation	Sample
100	191	$(191/1119) \times 118$	20
200	181	$(181/1119) \times 118$	19
300	184	$(184/1119) \times 118$	19
400	204	$(204/1119) \times 118$	22
500	193	$(193/1119) \times 118$	20
600	166	$(166/1119) \times 118$	18
Total	1119		118

English & Literature (n = 64, N = 603)

Level	Population	Calculation	Sample
100	182	$(182/603) \times 64$	19
200	126	$(126/603) \times 64$	13
300	142	$(142/603) \times 64$	15
400	153	$(153/603) \times 64$	16
Total	603		64

Mechanical Engineering (n = 40, N = 384)

Level	Population	Calculation	Sample
100	84	$(84/384) \times 40$	9
200	81	$(81/384) \times 40$	8
300	62	$(62/384) \times 40$	6
400	157	$(157/384) \times 40$	16
Total	384		40

Economics (n = 58, N = 549)

Level	Population	Calculation	Sample
100	148	$(148/549) \times 58$	16
200	140	$(140/549) \times 58$	15
300	124	$(124/549) \times 58$	13
400	137	$(137/549) \times 58$	14
Total	549		58

Chemistry (n = 75, N = 711)

Level	Population	Calculation	Sample
100	263	$(263/711) \times 75$	28
200	161	$(161/711) \times 75$	17
300	144	$(144/711) \times 75$	15
400	143	$(143/711) \times 75$	15
Total	711		75

Physiotherapy (n = 67, N = 636)

Level	Population	Calculation	Sample
100	123	$(123/636) \times 67$	13
200	123	$(123/636) \times 67$	13
300	127	$(127/636) \times 67$	13
400	263	$(263/636) \times 67$	28
Total	636		67

Educational Management (n = 69, N = 649)

Level	Population	Calculation	Sample
100	201	$(201/649) \times 69$	21
200	152	$(152/649) \times 69$	16
300	204	$(204/649) \times 69$	22
400	92	$(92/649) \times 69$	10
Total	649		69

APPENDIX III

INFORMED CONSENT FORM

ARTIFICIAL INTELLIGENCE DEPENDENCY AMONG UNDERGRADUATE STUDENTS IN UNIVERSITY OF BENIN, BENIN CITY, NIGERIA

NAMES AND AFFILIATIONS OF INVESTIGATORS:

UKPAI FORTUNE UKAIRO

IZENOSE LUCY UKPEBOR

Department of Public Health and Community Medicine,

University of Benin Teaching Hospital,

PMB 111 Ugbowo, Benin-Lagos Express Road,

Benin City, Edo State.

Email: ukairofortune@gmail.com izenoseUkpebor@yahoo.com

PURPOSE OF RESEARCH: To assess AI dependency among students in University of Benin.

PROCEDURES INVOLVED IN THE STUDY: In this study, questions will be asked to assess the level and determinant of AI dependency among undergraduate in University of Benin.

CONFIDENTIALITY: All data collected will be treated with utmost confidentiality. Students who volunteer to participate in this study will be given a unique study number, and data will be collected. Participants' information will be stored safely secured by codes in computers using only the study identification number. All those handling data will not at any time reveal participants' identity.

FINANCIAL COMPENSATION: There shall be no monetary compensation for participation in this study.

VOLUNTARY PARTICIPATION: Your participation in this study is entirely voluntary. If you desire to withdraw from this study at any time, no punitive measures will be meted against you for your withdrawal. Your refusal to participate or withdraw from the study will not involve any negative consequences or loss of benefits to which you are otherwise entitled.

RISK: It is not expected that any harm will come to you because of your participation in this study. The study does not entail any activity that would harm you.

BENEFIT: The study will help to assess the level and determinants of AI dependency among undergraduates in University of Benin.

FINANCIAL SPONSORSHIP: This study will be sponsored by the principal investigator.

The investigator may be contacted in case you have any clarifications to make.

The under-listed may be contacted in case you have any clarifications to make.

Ukpai Fortune Ukairo

Izenose Lucy Ukpebor

Department of Public Health and Community Medicine,

PMB 111 Ugbowo, Benin-Lagos Express Road,

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Cell: +2348142799197 +2348138929432

OR

Ethics and Research Committee,

University of Benin Teaching Hospital

Phone Number: +234 706 333 1337

APPENDIX IV

ETHICAL CLEARANCE



**HEALTH RESEARCH
ETHICS COMMITTEE (HREC)**

UNIVERSITY OF BENIN TEACHING HOSPITAL

P.M.B. 1111 BENIN CITY NIGERIA Telephone: 052-600418 Website: ubth.org

CHIEF MEDICAL DIRECTOR
Prof. (Mrs) I.N Ize-Iyamu

DIRECTOR OF ADMINISTRATION
Jim Uwadie, Esq

CHAIRMAN
Prof. (Mrs.) Antoinette N. Ofili



HREC OFFICE:

Committee email: ubthresearchethics@gmail.com

Registration Number:

NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/14865491272112

PROPOSAL TITLE: "ARTIFICIAL INTELLIGENCE DEPENDENCY AMONG UNDERGRADUATE STUDENTS UN UNIVERSITY OF BENIN"

PRINCIPAL INVESTIGATOR(S): UKAIRO FORTUNE UKPAI, UKPEBOR LUCY IZENOSE

DEPARTMENT/INSTITUTION: DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

DATE CONSIDERED: MARCH 18TH, 2026

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 18/03/2026 TO 17/03/2027. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY
REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI

SIGNATURE & DATE: *[Signature]* 18/3/2026

SUPERVISOR (S): PROF. C. A. ADELEYE



DECLARATION BY INVESTIGATOR(S):

PROTOCOL NUMBER (please quote in all enquiries)


Note that no participant actual or activity related to this research may be conducted outside of these dates and you are to furnish the committee with the research activities at the completion of the study. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual report to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.

Signature & Date: *[Signature]* 18-5-26

APPENDIX V

PLAGIAISM TEST FORM

INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)
Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria



CLEARANCE FORM

DATE: 15/05/2026

NAME: 12 ENOSE LUCY UKPEBOR

MATRIC NO: MED1807502


DEPARTMENT: MEDICINE

FACULTY: MEDICINE

SESSION OF GRADUATION: 2023/2024

[Signature]
Head Of Unit (IPTTO)

INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)
Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria



CLEARANCE FORM

DATE: 15/05/2026

NAME: UKPAI FORTUNE UKAIAO

MATRIC NO: MED1807501

DEPARTMENT: MEDICINE

FACULTY: MEDICINE

SESSION OF GRADUATION: 2023/2024

[Signature]
Head Of Unit (IPTTO)