ASSESSING THE EFFECT OF ARTIFICIAL INTELLIGENCE USAGE ON CRITICAL THINKING SKILLS AMONG UNDERGRADUATES STUDENTS OF REV. FR. MOSES ORSHIO ADASU UNIVERSITY, MAKURDI

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ABSTRACT

The advent of Artificial Intelligence (AI) has continued to pose a challenge to critical thinking among students. The study assessed the effect of artificial intelligence usage on critical thinking skills among undergraduates of Rev. Fr. Moses Orshio Adasu University, Makurdi. It specifically determined the level of awareness of artificial intelligence tools among the students, examined the forms of artificial intelligence tools used, analyzed the influence of artificial intelligence usage on critical thinking abilities, and evaluated the overall effects of AI on critical thinking skills. The study adopted a mixed-methods survey research design, utilizing a structured questionnaire and focus group discussions as instruments for data collection. Data were collected from 392 respondents and analyzed using descriptive statistics and thematic content analysis. Findings revealed high awareness of AI tools (81.6%), primarily through informal sources such as peers and social media, with predominant usage of tools like ChatGPT (38.3%), Grammarly (21.2%), and QuillBot (11.5%) at frequent rates exceeding 60%. While many students perceived AI as enhancing topic understanding, idea generation, and creativity, a notable proportion reported reduced personal reasoning, diminished thinking effort, and long-term weakening of thinking skills (40.8%). The study concludes that AI in spite its benefits encouraged the culture of laziness and impedes critical thinking culture among students. Based on these findings, the study recommends the development of institutional policies on responsible AI use, integration of compulsory AI-literacy modules, redesign of assessments to prioritize independent reasoning, and organization of critical thinking workshops as key measures to mitigate cognitive offloading and preserve critical thinking skills among undergraduate students at Rev. Fr. Moses Orshio Adasu University, Makurdi.

Keywords: Assessment, Artificial Intelligence, Critical Thinking, Undergraduates Students, Effect

1.1 Background to the study

Critical thinking is universally recognized as the cornerstone of higher education and lifelong intellectual development. It is defined as the rational, purposeful, and reflective process of rigorously analyzing, interpreting, evaluating, and synthesizing information to reach reasoned, well-founded conclusions and judgments (Facione, 2011; Ennis, 2018; Gerlich,

2025). This higher-order cognitive skill enables individuals to question assumptions, detect fallacies, weigh evidence, consider alternative perspectives, and solve complex problems systematically. Globally, critical thinking is ranked by employers, accreditation agencies, and international bodies such as the Organization for Economic Co-operation and Development, OECD and the World Economic Forum as the single most important competency for graduate employability, innovation, ethical leadership, and democratic citizenship in the 21st century (OECD, 2023; World Economic Forum, 2024).

In Africa especially the sub-Saharan Africa, with rapid tertiary enrollment growth, now exceeding 12 million students has far outpaced investment in infrastructure, faculty development, and curriculum reform (World Bank, 2023). Consequently, critical thinking, creativity, and problem-solving remain underdeveloped among a majority of graduates, contributing directly to the continent's persistent skills mismatch and youth unemployment rates that often exceed 50% in urban areas (African Union, 2022; ILO, 2024).

Nigeria, as Africa's most populous nation and largest higher education system with over 220 universities and more than two million students, exemplifies and intensifies these continental challenges. Empirical studies using standardized instruments such as the California Critical Thinking Skills Test (CCTST) and Watson-Glaser Critical Thinking Appraisal consistently place Nigerian undergraduates well below global and even African regional averages on dimensions of inference, evaluation, and deductive reasoning (Ugwuozor et al., 2021; Achor & Bash, 2022).

Within this national context, Benue State, a largely agrarian, middle-belt region presents additional layers of disadvantage. Tertiary institutions in the state, including Rev. Fr. Moses Orshio Adasu University, Makurdi, (formerly Benue State University) serve student populations drawn predominantly from rural communities with limited prior exposure to inquiry-based pedagogies at primary and secondary levels (Idoko, 2023). Hence, critical thinking is most urgently needed for problem-solving (Ukata, 2024). This study therefore investigates the effect of artificial intelligence usage on critical thinking skills among undergraduate students of Rev. Fr. Moses Orshio Adasu University, Makurdi. The problem, therefore, is clear: despite the near-ubiquitous presence of generative AI in the daily academic lives of Rev. Fr. Moses Orshio Adasu University students, there is no empirical evidence establishing whether these tools are serving as cognitive scaffolds that strengthen critical thinking or as convenient surrogates that weaken it. This study addresses that precise gap by systematically investigating the effect of artificial intelligence usage on the critical thinking skills of undergraduate students at Rev. Fr. Moses Orshio Adasu University, Makurdi.

1.2 Research Objectives

To this end, the main objective of this study is to assess the effect of artificial intelligence on critical thinking among students of Rev. Fr. Moses Orshio Adasu University, Makurdi. The specific objectives are to: examine the forms of artificial intelligence tools used among students of Rev. Fr. Moses Orshio Adasu University, Makurdi; assess the influence of artificial intelligence usage on critical thinking abilities of students of Rev. Fr. Moses Orshio Adasu University, Makurdi; and examine the effect of AI on critical thinking among students of Rev. Fr. Moses Orshio Adasu University, Makurdi.

Literature Review and Theoretical Framework

2.1 Conceptual Clarification

2.1.1 Artificial Intelligence

Artificial intelligence (AI) is broadly understood as the science and engineering of creating machines and computer programmes capable of performing tasks that, when carried out by humans, require intelligence. More precisely, Russell and Norvig (2021) define AI as systems that can act rationally (choosing actions that maximize goal achievement), think

rationally (using logical reasoning), act like humans (passing the Turing Test), or think like humans (modelling human cognitive processes). In contemporary usage, however, the term has become almost synonymous with machine learning-based AI, especially deep learning systems trained on vast datasets.

What distinguishes generative AI from earlier educational technologies (calculators, search engines, grammar checkers) is its capacity to perform higher-order academic tasks previously reserved for skilled human cognition: summarizing complex literature, structuring philosophical essays, generating hypotheses, critiquing arguments, solving multi-step problems, and even simulating Socratic dialogue. This shift has moved AI from a mere information-retrieval or computation tool to a potential cognitive prosthesis — an external system that can partially or wholly substitute for analysis, synthesis, and evaluation (Clark & Chalmers, 1998; Hassen, 2025). For the purpose of this study, therefore, artificial intelligence is narrowly and operationally defined as generative AI tools based on large language models that undergraduate students at Rev. Fr. Moses Orshio Adasu University use for academic activities such as research, writing, problem-solving, revision, and examination preparation.

2.1.2 Critical Thinking

In educational contexts, critical thinking is a mode of cognition using deliberate reasoning and impartial scrutiny of information to arrive at a possible solution to a problem. It encompasses both a set of logical skills that can be taught and used to analyses a situation (Gosner, 2025). Critical thinking is characterized by a broad set of related and analytical skills usually including the abilities to:

i. breakdown a problem into its constituent parts to reveal its underlying logic and assumptions;
ii. recognize and account for one's own biases in judgment and experiences;
iii. collect and assess relevant evidence from either personal observations and experiences or gathering external information;
iv. adjust and reevaluate one's own thinking in response to what has been learned;
v. form a reasoned assessment in order to propose a solution to a problem or a more accurate understanding of the topic at hand (Gosner, 2025).

For this study, critical thinking is operationally defined as the deliberate and impartial application of cognitive skills that enable individuals to independently analyse problems, evaluate evidence, draw reasoned inferences, and continually reassess their own thinking in response to new information.

2.2 Forms of artificial intelligence tools used among undergraduates' students

Within Nigeria the forms of AI usage among undergraduate students is remarkably consistent with the broader African mobile-first reality, yet intensified by extreme data pricing and campus bandwidth restrictions. National and regional studies conducted between 2023 and 2025 converge on the following hierarchy:

i. ChatGPT (used by 65–80 % of undergraduates, often through the mobile app or unofficial mirrors to save data);
ii. Google Gemini/Bard (40–55 %);
iii. Microsoft Copilot (35–50 %, especially after its deep integration into Edge browser and Office 365 student accounts);
iv. Grammarly and QuillBot (combined 45–60 % for editing and paraphrasing);
v. Snapchat MyAI and smaller local platforms like uLesson and Pass.ng chatbots (20–40 % among pre-university and first-year students preparing for JAMB/UTME).

Specialized tools remain niche: GitHub Copilot is used by fewer than 30 % of computer science students outside the top ten federal universities, while research synthesizers like

Perplexity or Elicit are virtually unknown outside postgraduate circles in Lagos and Abuja. y (Ukata, 2024).

A critical analytical observation across all contexts is the near-total absence of institutional curation. Students discover and adopt tools through TikTok, YouTube shorts, WhatsApp groups, and peer recommendation rather than through university libraries or lecturers. This organic, bottom-up diffusion has produced extraordinary speed of uptake but also highly uneven sophistication: the same student who can expertly chain ChatGPT → QuillBot → Grammarly to produce an assignment may have no exposure to research-grade tools or verification extensions. Moreover, the dominance of general-purpose LLMs means that the cognitive tasks most frequently outsourced, analysis, summarization, argumentation, and explanation are precisely the ones central to critical thinking development.

2.3 Influence of artificial intelligence usage on critical thinking skills among undergraduates' students

AI usage also appears to undermine the dispositional and motivational dimensions of critical thinking, including truth-seeking, open-mindedness, analyticity, and intellectual perseverance. Royce and Bennett (2025) found that frequent AI users displayed inflated confidence in AI-generated outputs, even when those outputs were demonstrably flawed, alongside a reduced willingness to exert cognitive effort on ambiguous or ill-structured problems (Chan & Hu, 2025). Although much of the rigorous empirical literature originates from Europe, North America, and East Asia, emerging African evidence points in the same direction, often with amplified effects due to pre-existing pedagogical constraints. A quasi-experimental study of Kenyan university students found that those granted unrestricted ChatGPT access scored 31 percent lower on post-test measures of critical reasoning and demonstrated significantly higher uncritical acceptance of AI hallucinations (Ocansey et al., 2025). In South Africa, Falebita and Kok (2025) observed that extensive use of AI tutors among mathematics undergraduates reduced persistence on novel problems and weakened transfer to traditional pen-and-paper examinations. Nigerian studies, though still limited in number, provide convergent evidence.

Ododo et al. (2024) reported a strong negative correlation between frequency of ChatGPT use and scores on an adapted Halpern Critical Thinking Assessment among undergraduates in Akwa Ibom State. Ekowijayanto and Ulvia (2025) similarly found that heavy AI users across three federal universities performed substantially worse on inference and evaluation tasks during AI-restricted examinations. Studies in North-Central Nigeria and Anambra State further indicate that reliance on AI for lesson planning and essay writing weakens students' ability to justify decisions, reflect critically, and sustain analytical reasoning without prompts (Achor & Ugwuanyi, 2025; Okundaye & Ogbu, 2025). However, such structured pedagogical integration remains rare across most African and Nigerian universities, where AI use is largely unregulated and unsupported. In these contexts, the prevailing effect of AI usage is the erosion of both the cognitive skills and the dispositional foundations of critical thinking.

2.4 Effect of AI on critical thinking among students in Nigeria

Studies on AI adoption among Nigerian students reveal a pattern of instrumental and efficiency-driven usage. Using the Technology Acceptance Model (TAM), Ojo (2024) found that perceived usefulness and ease of use significantly predicted ChatGPT adoption among Nigerian undergraduates. Students primarily reported using AI tools for summarization, grammar correction, idea generation, and quick responses to academic tasks. Although these practices improve productivity, they often bypass the cognitive processes, such as analysis, evaluation, and inference, that underpin critical thinking. This tendency raises concerns that students may prioritize output generation over reasoning processes, thereby limiting opportunities for critical-thinking development. Qualitative evidence from Nigerian

classrooms supports these conclusions. Lecturers report declining depth in student arguments, reduced originality in written work, and increasing difficulty in assessing authentic reasoning (Achor & Ugwuanyi, 2025).

2.4 Theoretical Framework: Cognitive Offloading Theory

Cognitive Offloading Theory, originally articulated by Risko and Gilbert (2016) and significantly expanded in the AI era by Gerlich (2025), Hassen (2025), and Kos'mina et al. (2025), posits that humans habitually reduce internal cognitive effort by delegating mental operations to external tools or environments whenever possible. The theory rests on three core assumptions: (i) the brain is fundamentally "effort-averse" and will offload processing when the perceived cost of internal computation exceeds the cost of external reliance; (ii) frequent offloading alters long-term cognitive architecture, leading to reduced fluency in unaided performance of the offloaded task (cognitive atrophy); and (iii) the magnitude of atrophy is proportional to the completeness and frequency of offloading. In educational settings, generative AI represents the most powerful offloading technology ever available to students because it can execute higher-order tasks, analysis, inference, evaluation, synthesis, and explanation, at or above-average undergraduate level in seconds. The theory frames critical thinking not merely as knowledge but as a practised cognitive muscle that weakens without resistance training.

Critics note that the theory can appear overly deterministic and may underplay individual differences in metacognitive awareness or intentional use of tools. Some scholars also argue that it focuses excessively on short-term atrophy while neglecting potential long-term adaptation benefits.

In the context of assessing the effect of artificial intelligence usage on critical thinking skills among undergraduate students of Rev. Fr. Moses Orshio Adasu University, Makurdi, Cognitive offloading theory guides the formulation of hypotheses that link intensity and pattern of AI usage directly to critical-thinking performance and dispositions among MOUAU students. The Cognitive Offloading Theory therefore remains indispensable for this study because it directly accounts for the dominant observed pattern: decline in critical-thinking skills among heavy, unregulated AI users, and provides a clear causal mechanism linking AI dependency to intellectual passivity among students of Rev. Fr. Moses Orshio Adasu University, Makurdi.

Methodology

The study adopted a survey research design. Survey research is useful in answering questions such as who, what, when, where, and how concerning a particular social problem. This study was carried out at Rev. Fr. Moses Orshio Adasu University, Makurdi (MOAUM) which is a public university owned by the Benue State Government. The university's location strategically positions it to serve students from both urban and rural communities across Benue and neighbouring states including Nasarawa, Taraba, and Plateau.

In recent years, the rapid spread of artificial intelligence (AI) tools such as ChatGPT, Gemini, and other generative applications has become increasingly visible among MOAUM students. Adoption occurs informally through peer influence and social media, with no official institutional policy yet regulating AI use for academic work. This unstructured exposure to AI coincides with persistent concerns about students' critical thinking abilities, given a context where rote learning traditions and infrastructural limitations already affect cognitive skill development.

The population of this study comprised all full-time undergraduate students enrolled at Rev. Fr. Moses Orshio Adasu University, Makurdi (MOAUM) during the 2024/2025 academic session. As at the 2024/2025 academic session, the university has 31,451 undergraduates across its fourteen faculties and 61 departments (bsum.edu.ng). This population is appropriate for the study because undergraduate students at MOAUM overwhelmingly use smartphones for

academic work, have routine access to mobile data, and constitute the demographic most actively interacting with generative AI tools for assignments, research, and study-related tasks. The sample size for this study was determined using the Taro Yamane (1967) formula. Thus, the minimum sample size was ≈ 395 students. To account for a projected 10% non-response rate, the final sample size was rounded up to 430 undergraduate students.

Quantitative data generated from the questionnaire was coded and analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics such as frequencies, percentages, means, and tables was used to summarize the socio-demographic characteristics of respondents and how AI affects critical thinking. For the qualitative data generated through FGD, thematic content analysis was used. Interview responses were carefully transcribed, coded, and grouped into perceived benefits, perceived risks, and implications for cognitive development. The qualitative findings were triangulated with the quantitative results to enhance the depth, validity, and contextual interpretation of the study's outcomes.

Data Presentation, Analysis and Discussion of Findings

4.1. Socio-Demographic Characteristics of Respondents

The socio-demographic characteristics of the respondents are presented in Table 1.

Table 1: Socio-Demographic Characteristics of Respondents (n = 392)

Variable	Frequency (392)	Percentage (%)
Sex		
Male	210	53.6
Female	182	46.4
Age		
16–20	140	35.7
21–25	200	51.0
26–30	45	11.5
31 & above	7	1.8
Level of Study		
100 Level	90	22.9
200 Level	100	25.5
300 Level	98	25.0
400 Level	80	20.4
500 Level	24	6.2
Faculty		
Arts and Humanities	68	17.3
Sciences	102	26.0
Education	54	13.8
Medical Sciences	48	12.2
Social Sciences	72	18.4
Others	48	12.2
Access to Internet		
Yes	370	94.4
No	22	5.6

Source: Field work, 2025

From the data presented above, the gender distribution shows that 53.6% of the respondents were male, while 46.4% were female. This indicates a fairly balanced gender

representation among undergraduate students of Rev. Fr. Moses Orshio Adasu University, Makurdi. Such balance suggests that the use of artificial intelligence tools and their influence on critical thinking cut across both male and female students, rather than being gender-specific.

With respect to age distribution, the findings reveal that respondents aged 21–25 years constitute the largest proportion (51.0%), followed by those aged 16–20 years (35.7%). Only a small fraction of respondents was aged 26 years and above. This age pattern indicates that AI usage and its implications for critical thinking are most prevalent among young adults who are academically active, digitally exposed, and more inclined to experiment with emerging technologies for learning and problem-solving. Regarding level of study, students in 200 level (25.5%) and 300 level (25.0%) formed the majority of respondents, followed by those in 100 level (22.9%) and 400 level (20.4%). The relatively lower proportion of 500-level students (6.2%) reflects their smaller population size within the university. This distribution suggests that AI usage is common across different stages of undergraduate study, particularly among mid-level students who are deeply engaged in coursework, assignments, and research activities.

In terms of faculty distribution, students from the Sciences constituted the largest group (26.0%), followed by Social Sciences (18.4%) and Arts and Humanities (17.3%). Education students accounted for 13.8%, while Medical Sciences and other faculties each represented 12.2% of the respondents. This spread across faculties indicates that the study captures diverse academic backgrounds, suggesting that AI usage and its effects on critical thinking are not confined to a single discipline but are experienced across various fields of study. Access to the internet shows that an overwhelming majority of respondents (94.4%) had internet access, while only 5.6% reported no access. This high level of connectivity provides a strong foundation for the widespread adoption of AI tools among students and underscores the relevance of examining how such tools influence critical thinking skills within the university environment.

4.1.2 Forms of Artificial Intelligence Tools Used among students of Rev. Fr. Moses Orshio Adasu University, Makurdi

Table 2: Common forms of AI Tools Used by MOAUM Students

Variable	Frequency	Percentage (%)
ChatGPT	150	38.3
Grammarly	83	21.2
QuillBot	45	11.5
Google Gemini/Bard	25	6.4
Microsoft Copilot	35	8.9
AI calculators/solvers	31	7.9
AI coding assistants	16	4.1
Others	7	1.8
Total	**392**	**100**

Source: field work, 2025

From the data presented in Table 2, the most used AI tool is ChaptGPT as indicated by 38.3% of the respondents. Grammarly is the second most utilized AI tool, used by 21.2% of the respondents. This indicates a strong emphasis on improving writing quality, grammar, and language clarity among students. QuillBot (11.5%) and AI calculators or solvers (7.9 %) are also moderately used, suggesting that students employ AI for paraphrasing and problem-solving tasks, respectively. Respondents also indicated that they use AI tools such as Google Gemini/Bard (6.4%), Microsoft Copilot (8.9%), and AI coding assistants (4.1%).

The relatively low percentage recorded for other AI tools (1.8%) further underscores that students' AI usage is concentrated around a few popular platforms. Overall, the findings

indicate that students' engagement with artificial intelligence tools is primarily centered on writing support, content generation, and academic assistance rather than advanced or specialized applications. This pattern of usage has important implications for how AI may shape students' critical thinking processes, particularly in relation to independent reasoning and problem-solving skills.

To support the quantitative data, FGDs were conducted. A student in the Faculty of Social Sciences had this to say:

> "Most of us in Social Sciences depend on ChatGPT when we are given assignments or research topics. It helps to explain concepts in simple terms and gives ideas on how to structure our answers. Sometimes, I use it to understand theories before reading textbooks. However, I try not to submit what it gives directly because lecturers can easily detect it. I mostly use it as a guide to improve my own writing."

ChatGPT is widely used as a support tool for understanding concepts and generating ideas rather than as a complete substitute for personal academic effort. This shows that there is a conscious attempt by students to balance AI assistance with independent thinking. Similarly, students from science-related disciplines reported using AI tools, though with slightly different academic purposes. FGD Response 2 was from a Student in the Faculty of Sciences. She said:

> "I mostly use AI calculators and sometimes ChatGPT when solving numerical or practical problems. ChatGPT helps to explain the steps, while calculators make the work faster. Grammarly is not very important for us compared to problem-solving tools. AI saves time, but if you rely on it too much, you may forget how to solve things on your own."

There is discipline-specific AI usage, with science students prioritizing problem-solving and computational tools. It also reveals students' awareness of the risk of overdependence on AI. Apart from science and social science students, those in professional and humanities-related faculties also shared their experiences with AI tools. FGD Response 3 (Student, Faculty of Arts and Humanities) said that:

> In my faculty, Grammarly and QuillBot are very popular because we do a lot of writing. Grammarly helps to correct grammar, while QuillBot helps to paraphrase. ChatGPT is also used, but mainly to generate ideas. Many students believe these tools improve their work, but some depend on them too much and no longer think deeply about their topics."

This response illustrates the dominant use of writing-support AI tools among Arts and Humanities students. It also points to a growing concern that excessive reliance on such tools may weaken students' critical engagement with academic content.

4.1.3 Influence of AI Usage on Critical Thinking Skills

Table 3: Sources Considered for Critical Thinking Assignments among MOAUM students

Variable	Frequency	Percentage (%)
AI tool	200	51.0
Books in the library	100	25.5
Online articles	70	17.9
Others	22	5.6
Total	**392**	**100**

Source: Field work, 2025

From the data presented in table 3, artificial intelligence tools are the most frequently considered source for completing critical thinking assignments, as indicated by 51.0% of the respondents. This suggests that more than half of the students rely primarily on AI tools when faced with tasks that require analysis, evaluation, and independent reasoning. Books in the library constitute the second most used source, accounting for 25.5% of the respondents. This indicates that while traditional academic resources remain relevant, they are less frequently consulted compared to AI tools. Also, 17.9% of the respondents rely on online articles, reflecting the role of digital academic materials in students' learning processes. Only 5.6% of the respondents indicated other sources, suggesting limited reliance on alternative means beyond AI tools, library resources, and online materials.

4.1.5 Effects of AI on Critical Thinking among MOAUM students

Table 4: Effect of AI on Thinking When Doing School Work

Statement	Frequency	Percentage (%)
Helps me think better	150	38.3
Makes me think less	120	30.6
Does not change how I think	122	31.1
Total	**392**	**100**

Source: Field work, 2025

Table 4 shows that 38.3% of the respondents indicated that the use of artificial intelligence helps them think better when doing school work. This suggests that a significant proportion of students perceive AI as a cognitive support tool that enhances their understanding, reasoning, and ability to approach academic tasks more effectively. Conversely, 30.6% of the respondents reported that AI usage makes them think less. This indicates that nearly one-third of the students experience a reduction in active thinking when using AI tools, possibly due to overdependence on automated responses and solutions. In addition, 31.1% of the respondents stated that AI does not change how they think, suggesting that for some students, AI functions merely as a supplementary tool without significantly influencing their cognitive processes.

Table 5: Perceived Long-Term Effect of AI on Thinking Skills

Response	Frequency	Percentage (%)
Improves thinking skills	140	35.7
Weakens thinking skills	160	40.8
No change	92	23.5
Total	**392**	**100**

Source: Field work, 2025

The data presented on Table 5 shows that 40.8% of the respondents perceived that prolonged use of artificial intelligence weakens students' thinking skills. This indicates that a significant proportion of students are concerned about overreliance on AI tools, which may lead to diminished independent reasoning, problem-solving ability, and analytical thinking over time.

Conversely, 35.7% of the respondents believed that AI improves thinking skills, suggesting that some students experience cognitive enhancement through AI usage, such as faster idea generation, clearer understanding of concepts, and exposure to diverse perspectives. 23.5% of the respondents indicated that AI does not change their thinking skills, reflecting a group that uses AI as a supplementary tool without perceiving any long-term impact on cognitive abilities.

A 500L Student in the Medical Sciences said that:

> "I feel that using AI all the time makes me rely on it too much. Sometimes I just copy what it suggests instead of thinking deeply myself. Over time, I notice that I struggle to analyse problems without it. But if used carefully, it can help you understand topics faster and think more clearly."

This reflects the dual perception captured in the quantitative data: while AI can enhance understanding, excessive reliance may weaken long-term critical thinking and independent reasoning. Another student from the Faculty of Architecture noted that:

> "AI helps me a lot in understanding complex problems, especially in calculations or coding. I can generate ideas faster and check my solutions. But I have also noticed that if I use it too frequently, I become less confident in solving problems on my own, which can affect my thinking in the long run."

This response supports the finding that AI usage has positive short-term cognitive effects but may reduce independent problem-solving over time. Students from Arts and Humanities also reflected on AI's mixed effects on creativity and reasoning. According to one of the respondents:

> "For essays and writing assignments, AI helps me structure my ideas and improve creativity. I believe it can improve thinking skills if used as a guide, but some students depend on it too much. Over time, that dependence can make them lazy thinkers, relying on AI instead of their own analysis."

This response aligns with the quantitative finding that some students see AI as enhancing thinking (35.7%) while others view it as weakening cognitive engagement (40.8%). It highlights the importance of balance in AI usage.

4.2 Discussion of Findings

This section discusses the findings in accordance with the objectives of the research. The first objective of this study sought to determine the level of awareness of artificial intelligence tools among students of Rev. Fr. Moses Orshio Adasu University, Makurdi. On objective which sought to examine the forms of artificial intelligence tools used among students. Quantitative findings (Table 5) indicate that ChatGPT, Grammarly, and QuillBot are the most frequently used AI tools. AI calculators, coding assistants, and Microsoft Copilot were used by smaller proportions of students. FGD responses reinforced this pattern: students from the Faculties of Sciences and Arts reported using ChatGPT for generating ideas, summarizing content, and assisting with writing assignments, while Grammarly and QuillBot were primarily employed for proofreading and editing. This finding is consistent with the work of Alhassan and Oduro (2023), who noted that AI adoption among students is often driven by tools that simplify cognitive tasks, reduce time on assignments, and improve academic performance.

The second objective examined the influence of AI usage on critical thinking abilities. Findings reveal a complex pattern. While 45.9% of students reported that AI helps them understand topics better and 35.7% stated it improves idea generation, 20.4% indicated that it makes them rely less on personal reasoning, and 12.8% said it reduces effort in thinking. Similarly, Table 4 shows that 38.3% feel AI helps them think better, whereas 30.6% report that it makes them think less. Qualitative data support these findings: a student from the Faculty of Sciences noted, "AI helps me solve problems faster and understand concepts, but if I depend on it too much, I become less confident in thinking through solutions myself." Another student from Arts emphasized that AI enhances creativity but warns against overreliance, which can

weaken independent reasoning. These findings are in line with prior research suggesting a dual effect of AI on cognition. According to Wang and Li (2022), AI tools can enhance comprehension, idea generation, and problem-solving efficiency, yet overuse may diminish analytical reasoning and independent critical thinking. On the perceived long-term effects of AI on thinking skills (Table 6). The results show that 40.8% of students believe AI weakens thinking skills, 35.7% perceive improvement, and 23.5% reported no change. Qualitative responses reinforce this perception: a student from the Faculty of Medical Sciences stated, "Guided use of AI helps us understand concepts better, but constant reliance may make us lazy thinkers over time." Similarly, responses from Architecture and Social Sciences students highlighted that workshops, problem-solving tasks, and AI-aware assignments could mitigate

5.2 Conclusion and Recommendations

The study concludes that generative artificial intelligence tools have become deeply embedded in the academic lives of undergraduate students at Rev. Fr. Moses Orshio Adasu University, Makurdi. It offers them substantial benefits in comprehension, efficiency, and idea generation while simultaneously posing a measurable risk to their intellectual development and maintenance of independent critical thinking skills. The predominant pattern of unregulated, substitutional use which is driven by informal awareness and high accessibility frequently leads to cognitive offloading, where students delegate analytical, evaluative, and synthetic tasks to AI systems. Based on the findings and conclusions of this study, the following recommendations are proposed:

i. Rev. Fr. Moses Orshio Adasu University, Makurdi should develop and implement a comprehensive institutional policy on responsible AI use, incorporating clear guidelines on citation of AI-generated content, permissible applications in assessments, and strategies to preserve academic integrity while harnessing AI's benefits.
ii. The university administration, in collaboration with Centre for General Studies, should introduce compulsory AI-literacy and digital-ethics modules across all undergraduate programmes, emphasising prompt engineering, output verification, bias detection, and metacognitive strategies to mitigate cognitive offloading.
iii. Lecturers and curriculum developers should redesign assessments to prioritise process over product, incorporating oral defences, reflective journals, staged submissions requiring pre-AI analysis, and problem-based tasks that explicitly discourage overreliance on generative tools, while integrating guided AI use as a scaffold for deeper critical engagement.
iv. The university should organise regular critical thinking workshops, faculty development programmes, and peer-led discussion forums to strengthen analytical dispositions and provide structured opportunities for independent reasoning in an AI-rich environment.

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