

Perception and Critical Thinking as Correlates of Artificial Intelligence Utilisation: A Case Study of University of Ibadan Undergraduates

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ABSTRACT

This study examined how perception and critical thinking ability influence the utilisation of Artificial Intelligence(AI) among undergraduates at the University of Ibadan, Nigeria.

A descriptive survey design of the correlational type was adopted, using a multistage sampling procedure, 642 undergraduates were drawn from various faculties. Data were collected through a structured questionnaire that measured undergraduates' perception of AI, their critical thinking ability, and their level of AI utilisation and Pearson's correlation and multiple regression analysis were used to analyse the data.

The results showed significant positive relationships between perception and AI utilisation ($r = .092$, $p < .05$), and between critical thinking ability and AI utilisation ($r = .094$, $p < .001$). Undergraduates reported positive perceptions and high levels of critical thinking. Regression analysis further revealed that only critical thinking ability ($\beta = .066$, $p = .002$) emerged as a significant independent predictor of AI utilisation, while perception did not solely predict utilisation when critical thinking was controlled for ($\beta = -.002$, $p = .940$). This suggests that while positive perception may encourage interest, critical thinking sponsors deeper and meaningful engagement with AI learning tools.

This study provides empirical evidence from a Nigerian university on the joint role of perception and critical thinking factors in AI usage, addressing a gap in African universities.

Universities should therefore include AI literacy and critical thinking into curriculum to prepare undergraduates for the future. They should provide support to undergraduates and skills to utilise AI appropriately.

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1. Introduction

The introduction of Artificial Intelligence (AI) into various aspects of society is rapidly transforming the global landscape, reshaping the way individuals learn, communicate, and solve problems. In the educational sector, particularly at the university level, AI learning tools have become instrumental in enhancing research, personalized learning, data analysis, and administrative efficiency (Chen et al., 2022). As such, undergraduates are increasingly expected not only to be aware of AI but also to effectively utilise its capabilities in their academic and everyday pursuits. However, the extent to which these technologies are utilised is often influenced by undergraduates' perception and critical thinking abilities.

Perception, as a cognitive and psychological factor, plays a critical role in shaping how individuals' approach and adopt new technologies. Undergraduates who perceive AI as beneficial and accessible are more likely to engage with it constructively. Conversely, misconceptions, fear of job loss, or ethical concerns may hinder acceptance, especially in regions where digital literacy is still emerging.

On the other hand, critical thinking ability is defined as the capacity to analyze, evaluate, and synthesize information. It has been identified as a key determinant in navigating complex technologies such as AI. According to Moustaghfir and Brigui (2024), individuals with strong critical thinking skills are better positioned to make informed decisions and adapt to rapidly changing digital environments. This suggests that undergraduates that possess digital literacy skills with critical thinking ability will be favorably disposed to using AI tools for their academic activities. In the African context, however, the development of critical thinking among undergraduates remains a challenge due to rote-based learning traditions and limited exposure to problem-solving curricula (Amevor, 2025).

Perception and critical thinking are the independent variable in this study is grounded in both theoretical and empirical considerations. Theoretically, the Technology Acceptance Model (TAM) posits that perceived usefulness and perceived ease of use are the most fundamental determinants of technology adoption (Davis, 1989) and these indicators have been commonly used across various researches on technology and its usage, this therefore, suits the support the dependent variable; utilisation of AI learning tools. Empirically, recent studies have established that undergraduates' perceptions of AI significantly influence their willingness to use AI tools (Omirali et al., 2025). However, perception alone does not account for proper usage, undergraduates must also have critical thinking ability to fact-check AI outputs critically. Critical thinking has been identified as a key determinant in using complex technologies and using AI responsibly (Facione, 2015; Yatani et al., 2024). In the Nigeria region, where surface learning and mechanical learning styles have limited the critical thinking ability of undergraduates (Amevor, 2025), understanding the role of critical thinking in AI utilisation is needed especially with the continuous growth in the numbers of AI learning tools to the educational setting.

Despite the growing presence of AI in higher education, there remains a knowledge gap in understanding how cognitive attributes such as perception and critical thinking intersect to influence AI utilisation among undergraduates. While international research highlights the importance of these factors, empirical studies from African universities and particularly in Nigeria are scarce. This study,

therefore, seeks to explore how perception and critical thinking ability determine the extent to which undergraduates in university of Ibadan, Nigeria engage with AI tools, thereby providing insights for educators, policymakers, and technology developers.

2. Statement of the Problem

The era of teacher-centered and conventional educational system of learning with little encouragement for undergraduates' participation in teaching and learning process is being globally challenged with the introduction of technology in education. Artificial Intelligence (AI) has brought untold changes in education, assisting undergraduates in information searching and retrieval, academic writing and research offering personal assistance, writing research paper.

Despite the increasing availability of AI learning tools, there appears to be a considerable gap in their effective utilisation among undergraduates, especially in developing countries. In many African universities, undergraduates often underutilize AI learning tools due to negative perceptions, or lack of the critical thinking skills necessary for effective usage.

In spite low level of AI adoption by undergraduates in some African countries, global research has identified the role of cognitive factors in technology adoption, especially on intelligent use of AI tools. However, without clear understanding of how psychological variables like perception and critical thinking can influence use of AI learning tools, efforts to integrate artificial intelligence into academic environments may be ineffective or underutilised.

Therefore, this study seeks to fill the knowledge gap by investigating the level to which perception and critical thinking ability could predict AI utilisation among undergraduates in universities.

3. Objectives of the Study

The main objective of this study is to investigate the extent to which perception and critical thinking ability correlate with the utilisation of artificial intelligence learning tools among undergraduates in university of Ibadan, Nigeria. The specific objectives are to:

- Ascertain the perception of Artificial Intelligence among the undergraduates;
 - assess the level of critical thinking ability of undergraduates in relation to AI utilization;
 - ascertain the extent of utilisation of Artificial Intelligence tools by the undergraduates;
 - determine the relationship between undergraduates' perception of AI and their utilisation of AI learning tools;
 - establish the relationship between critical thinking ability and the utilisation of AI among undergraduates.
 - find out the joint and relative contribution of perception and critical thinking ability to the utilisation of artificial intelligence among undergraduates
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4. Research Questions

- What is the perception of Artificial Intelligence among the undergraduates?
- What is the level of critical thinking ability of undergraduates in relation to AI utilization?
- What is the extent of utilisation of Artificial Intelligence tools by the undergraduates?
- What is the relationship between undergraduates' perception of AI and their utilisation of AI learning tools?
- What is the relationship between critical thinking ability and the utilisation of AI among undergraduates?
- What is the joint and relative contribution of perception and critical thinking ability to the utilisation of artificial intelligence among undergraduates?

5. Research Hypotheses

The following null hypotheses were tested at 0.05 level of significance;

H1: There is no significant positive relationship between perception and utilisation of AI learning tools among undergraduates.

H2: There is a significant positive relationship between critical thinking ability and utilisation of AI learning tools among undergraduates.

6. Literature Review

Perception plays a foundational role in the adoption of emerging technologies as undergraduates' understanding and attitude toward AI largely determine whether they will engage with it meaningfully. The apprehension of undergraduates resulting from lack of thorough understanding and potential benefits of use of artificial intelligence might engender a mixture of hope and fear. However, Baker and Smith., (2019) reveals that hope lies in the potential of artificial intelligence to personalise learning, provide 24/7 academic support, and prepare them for a technology driven future. In addition, Pikhart and Al-Obaydi (2025) stresses that there is also fear regarding the replacement of human teachers, misuse of personal data, and a potential decline in social interactions. According to Gerlich (2023), understanding and addressing these perceptions are crucial for maximising the acceptance and effectiveness of artificial intelligence in education. In the light of the diversities in undergraduates' perception about AI, there is need for a balanced approach that leverages artificial intelligence's potential while addressing its associated fears.

Studies have shown that undergraduates who perceive AI as beneficial and non-threatening are more likely to integrate it into their academic routines (Ominali et al., 2025). Similarly, positive perceptions of artificial intelligence's ability to enhance learning and adapt to users' preferences can positively impact its utilisation for educational purposes (Sumakul et al.,2022). In Africa, the

perception of AI is still evolving, with studies showing that many undergraduates lack comprehensive awareness of AI applications, limiting their willingness and ability to explore its full potential (Adarkwah et al., 2023).

Awareness of AI learning tools in Africa remains relatively low, with many undergraduates exhibiting limited understanding of AI applications beyond social media algorithms or digital assistants (Sanusi et al., 2023). Factors such as misinformation, lack of exposure, and limited integration into curricula contribute to these perception gaps.

In the context of artificial intelligence utilisation, critical thinking enables individuals to analyze, evaluate, and make informed decisions about the outputs and implications of artificial intelligence systems. Facione (2015) emphasizes that critical thinkers are better equipped to evaluate the ethical implications and practical limitations of AI tools. Low level of critical thinking may reduce undergraduates' ability to interpret, challenge, and maximize AI systems critically. Critical thinking is the process of thinking about ideas or situations in order to understand them fully, identify their implications, make a judgment, and/or guide decision making. This imply that undergraduates that can think critically would be able to critique the relevance of information retrieved with AI and make decisions on whether to use the information or discard it. Undergraduates who are taught these skills become critical thinkers who can move beyond superficial conclusions to a deeper understanding of the issues they are examining (Lai, 2011)

Critical thinking improves responsible and ethical use of artificial intelligence, especially in academic research, decision-making, and creative problem-solving. Undergraduates with higher critical thinking skills can detect misinformation, assess the credibility of AI outputs, and also avoid misuse. In contrast, limited cognitive engagement may lead to over-reliance on AI tools or superficial use without understanding underlying mechanisms. Current studies suggest a positive correlation between higher-order cognitive skills and the ability to engage with AI in a purposeful manner (Yatani et al., 2024).

The global academic sector is experiencing a growing usage of AI learning tools, including intelligent tutoring systems, plagiarism detection software, predictive analytics, and adaptive learning platforms (Ogalo and Mtenzi, 2025; Holmes et al., 2022). Despite this trend, studies show that actual usage among undergraduates is still inconsistent. In Nigeria, for instance, a study found that only 28% of surveyed undergraduates had used AI tools beyond social media or digital keyboards (Ezeanya et al., 2024). Factors such as poor internet infrastructure, lack of digital literacy, and inadequate institutional support contribute to the low utilisation. Fakuade et al. (2023) study on undergraduates' utilisation of Artificial Intelligence (AI) for learning revealed that undergraduates often use AI tools for learning. However, AI adoption emerged at various, high and low level of adoption.

Similarly, Onyeka et al. (2024) study carried out on undergraduates' use of AI tools has shown that a substantial majority of undergraduates (59.6%) use AI applications daily, with an additional 34.6% utilizing them weekly. This suggests a high level of integration of AI tools into the academic routines of undergraduates. However, undergraduates with negative or skeptical views about AI tend to avoid it, while those with optimistic perceptions are more proactive in exploring its possibilities (Nkedishu, and Okonta, 2024; Zawacki-Richter et al., 2019). Culturally-induced fears and socio-economic limitations often color undergraduates' attitudes toward AI in developing countries. Perception

influences the utilisation of artificial intelligence learning tools as affirmed by Gerlich (2023) which asserted that perception shapes individuals' trust in artificial intelligence technologies, influencing their acceptance or resistance to incorporating artificial intelligence into various aspects of their lives.

7. Theoretical Framework

This study used two theoretical framework to support each of the variables. First, the Technology Acceptance Model (TAM) proposed by Davis (1989) was adopted to explain undergraduates' perceptions and use of AI learning tools. TAM states that perceived usefulness and perceived ease of use are determinants of use toward technology adoption (Davis, 1989). The two indicators of this theory are; perceived usefulness and perceived ease of use. Perceived usefulness is shown in undergraduates' beliefs that AI learning tools boosts their academic effectiveness and improves their performance, while perceived ease of use is the user-friendliness, clear functionalities, and interface clarity of the AI learning tools. TAM provides a unified framework that explains both how undergraduates perceive AI learning tools and why they use it. The indicators; perceived usefulness and ease of use will be used to support these two variables in this study (Perception and utilisation of AI learning tools). Thus, treating them as conceptually different. The application of TAM to explain both perception and utilisation is well-established in the literature as several studies have successfully employed TAM to measure undergraduates' perceptions of technology and predict their utilisation of AI. This study follows the same established tradition.

John Dewey's (1933) theory of reflective thinking was adopted to conceptualise critical thinking ability. Dewey argued that true learning occurs when individuals move beyond passive acceptance of information to active inquiry, questioning, and evaluation. In this study, critical thinking is operationalised through three indicators: experience (connecting AI information to personal knowledge), reflective thinking (considering ethical implications and institutional policies), and quest for meaning (seeking additional resources, verifying claims, and ensuring outputs are meaningful).

In times when AI output is misleading or biased, positive perceptions without critical thinking ability may lead to misuse rather than empowering undergraduates; therefore, critical thinking complements TAM theory by assisting the undergraduates to question AI's output, verify its claims, and use it appropriately and ethically. While TAM predicts initial adoption and use, critical thinking helps in the depth of usage to make sure that undergraduates are not passive but active in the use of AI learning tools. Critical thinking ability in this research is indicated through three key indicators: experience (undergraduates connecting their personal experiences to AI-generated information and clarifying confusing outputs through real life issues), reflective thinking (undergraduates reflecting on AI prompts and considering the institution/ university ethical policy), and the quest for meaning (undergraduates seeking additional resources to deepen their support AI claims, determining what information is worth using, editing and rephrasing AI outputs, and going the extra mile to ensure their final answers are meaningful).

While TAM provides a foundational lens for understanding technology use, recent scholars have

called for theoretical extensions that accommodate the unique characteristics of AI learning tools and technologies. Unlike earlier technologies, AI tools are generative, adaptive in their decision-making processes and this has called for the development of AI- specific frameworks with indicators like trust, transparency, and ethical concerns (Glikson & Woolley, 2020; Kaur et al., 2024). While this study does not use this framework, their relevance is stated by incorporating critical thinking as a complementary construct. Critical thinking addresses the need for carefulness and evaluation when using AI learning tools and this is a dimension that TAM alone does not fully capture.

8. Methodology

8.1 Research Design

The descriptive research design of the correlational type was employed for the study. The design was considered appropriate because it enabled the researchers to obtain the needed primary data directly from the respondents. It was adopted because of its suitability in providing a way to answer the research questions and objectives and also for testing the hypotheses.

8.2 Population and Sampling

Multi-stage sampling procedure was adopted to select 684 undergraduates from the faculties in the university. A sample of 684 undergraduates were selected from the faculties in the university using multi-stage sampling procedure.

Multi-stage sampling was adopted for the study. Stage 1 involved stratifying the university into its 12 faculties, these include all faculties in the university. At Stage 2, a simple random sampling technique was conducted to select 8 faculties which is 50% of the 12 faculties. Stage 3 involved probability proportional to size (PPS) to determine the number of departments within each faculty, 50% of the departments was drawn from each selected faculty based on its undergraduate's population, this approach enhanced the generalizability of the findings across diverse undergraduates in their respective departments. At Stage four (4) the third year; 300 level undergraduates were purposively selected and this is presumed that they are familiar with the university system, and must have used varieties of artificial intelligence learning tools during the course of study.

8.3 Instrumentation

The instrument used for data collection was a self-developed structured questionnaire designed to get information on the three key variables of the study which are; perception of artificial Intelligence, critical thinking ability, and utilisation of AI learning tools among undergraduates of the University of Ibadan. The questionnaire was developed by the researchers following an indepth review of relevant literature on technology adoption, critical thinking, and AI utilisation in educational contexts. Existing instruments and established theoretical frameworks, particularly the Technology Acceptance Model (TAM) proposed by Davis (1989) and Dewey's (1933) theory of reflective thinking, guided the construction of items to ensure content validity and theoretical grounding.

The questionnaire was divided into four sections: Section A was used to collect data on demographic information (faculty, department, level of study, and gender); Section B consisted of eleven items measuring undergraduates' perceptions of AI learning tools, reflecting the two TAM dimensions of Perceived Usefulness and Perceived Ease of Use; Section C consisted of fifteen items measuring critical thinking ability, reflecting three indicators derived from Dewey's theory: experience, reflective thinking, and quest for meaning; and Section D consisted of eleven items measuring the frequency of utilisation of specific AI tools (QuillBot, Grammarly, ChatGPT, Brainly, Siri, Canva, Alexa, Coursera, Bing Chat, Turnitin, and Duolingo) on a five-point frequency scale.

Soft/electronic copies of questionnaire was administered to the respondents. It was also designed using google form, this was found suitable for the sampled size because the undergraduates of university of Ibadan are highly active digitally especially with the widespread of smartphones, laptops, tablets, therefore making an online instrument appropriate. Google form could easily reach the various faculties sampled in the university and this enabled the respondents to access the questionnaire remotely.

8.4 Validity and Reliability

To ensure the face and content validity of the questionnaire, the instrument was submitted to the researcher's supervisor and three lecturers in the Department of School Library and Media Technology, Faculty of Education, University of Ibadan. Their feedback and suggestions were incorporated into the final version of the instrument.

Prior to full administration, the questionnaire was pilot-tested on 30 undergraduates from the Faculty of Public Health, University of Ibadan. This faculty was purposively selected because it was not part of the main sample. The pilot test served to assess the clarity and interpretability of the items, determine the average time required for completion. The reliability of the instrument was established through internal consistency testing using Cronbach's alpha coefficient. The following reliability coefficients were obtained: Perception scale (11 items, $\alpha = 0.88$), Critical Thinking scale (15 items, $\alpha = 0.74$), and AI Utilisation scale (11 items, $\alpha = 0.88$). These coefficients exceed the acceptable threshold of 0.70 recommended by Nunnally (1978), indicating good to excellent internal consistency.

An introductory letter was collected from the Head of the Department of School Library and Media Technology, Faculty of Education, University of Ibadan, to introduce the researcher to the sampled departments and other necessary offices and to facilitate the proper distribution and collection of questionnaires.

8.5 Data Collection Procedure

The researcher alongside her research assistant, got permission from the Head of Departments, each department's class representative. The researcher got the contact of the class representatives, and the class representatives helped to share the electronic questionnaire and the type of data expected to be collected. Each class representative was well educated on the concepts of the study, nature of the questionnaire and the type of data expected to be collected.

A total of 684 copies of questionnaire were filled by the respondents out of which only 642 were found usable and useful. This represent a response rate of 93.9% which was considered adequate for the study. Out of the 42 that were not used, some were filled partially, some filled had missing demographic information, these were therefore considered unusable. 28 were not filled completely, 10 had bias in the response filled, had straight line response, some were filled by respondents in faculties and departments not sampled, 4 didn't fill in their gender and department, making a total of 42 responses that were excluded. Therefore, a total of 642 respondents were used for the research study.

8.6 Data Analysis

Pearson's correlation and multiple regression analysis were used to analyse the data. Regression analysis was used to determine the joint and relative contributions of the independent variables (perception and critical thinking) to the dependent variable (AI utilisation). No artificial intelligence tools were used for data analysis; all data collection, analysis and writing were conducted by the researcher. The researcher used artificial intelligence to source for papers and for reference formatting. After using the tool, the researcher reviewed and edited the work and take full responsibility for the final output.

8.7 Justification of Instrumentation

The researchers acknowledge that the decision to use self-reported questionnaire in this study was deliberate and contextually justified. Validated critical thinking instruments are often developed and common in this part of Nigeria. This study also focused on critical thinking as it applies specifically to AI utilisation and not general critical thinking ability. Lai (2011) argues that domain-specific critical thinking assessments are more appropriate when the focus is on how students apply critical thinking in a particular area of knowledge. Future studies should consider complementing self-reported measures with performance-based assessments to provide a more comprehensive evaluation of students' critical thinking abilities.

9. Results Analysis

Research question 1. What is the perception of Artificial Intelligence among the undergraduates?

Table 1 presents information on the perception of artificial intelligence learning tools among undergraduates of the University of Ibadan.

Table 1. Perception of Artificial Intelligence among the Undergraduates

S/N	Statement	SA	A	D	SD	Mean	Std Deviation
1	Overall, I found all AI apps interface	415	224	2	1	3.64	.496

	easy to use	(64.6)	(34.9)	(0.3)	(0.2)		
2	Learning to use the apps interface was easy for me	470	145	27	0	3.69	.546
		(73.2)	(22.6)	(4.2)	(0)		
3	My interaction with the apps interface was clear and understandable	397	229	12	4	3.59	.546
		(61.8)	(35.7)	(1.9)	(0.6)		
4	I found the AI apps to be flexible to interact with	384	239	12	7	3.56	.592
		(59.8)	(37.2)	(1.9)	(1.1)		
5	It was easy for me to become skillful at using AI apps	387	233	22	0	3.57	.561
		(60.3)	(36.3)	(3.4)	(0)		
6	It provided me with a lot of enjoyment and ease	468	171	2	1	3.72	.465
		(72.9)	(26.6)	(0.3)	(0.2)		
7	I found using the AI learning tools useful.	432	210	0	0	3.66	.474
		(67.3)	(32.7)	(0)	(0)		
8	Using AI apps enhanced my effectiveness in learning	385	255	2	0	3.60	.497
		(60)	(39.7)	(0.3)	(0)		
9	It enabled me to accomplish academic tasks more quickly	400	240	2	0	3.62	.492
		(62.3)	(37.4)	(0.3)	(0)		
10	It improved my course performance	403	237	2	0	3.63	.491
		(62.8)	(36.9)	(0.3)	(0)		
11	It increased my productivity in my coursework	415	224	1	2	3.64	.496
		(64.6)	(34.9)	(0.2)	(0.3)		
	Weighted Mean		3.62				

SA= Strongly Agree (4); A= Agree (3); D= Disagree (2); SD= Strongly Disagree (1)

Table 1 above indicates the perception of undergraduates towards artificial intelligence in University of Ibadan. Each perception is based on respondents' rating which indicates levels of agreement with the items. The perception with the highest mean score is: AI provided me with a lot of enjoyment and ease (3.72, SD = .465) and then followed by the perception that learning to use the AI apps interface was easy to use for me (3.69, SD= .546). The perception with the lowest mean score is: I found the AI apps to be flexible to interact with (3.56, SD = 0.594). The weighted mean score which is 3.62 is higher than the criterion mean of 2.50. Therefore, it can be concluded that the perception of undergraduates of university of Ibadan about using AI tools for educational purposes is positive.

Research Question 2. What is the level of critical thinking ability of undergraduates in relation to AI utilization?

Table 2 presents information on the level of the critical thinking ability of undergraduates in University of Ibadan.

Table 2. Level of Critical Thinking Ability of Undergraduates

S/N	Statement	SA	A	D	SD	Mea n	SD
		Experience					
1	When using AI I feel comfortable when asking questions/ information.	477	161	4	0	3.74	.455
		(74.3)	(25.1)	(0.6)	(0)		
2	I connect my personal experiences and information provided by AI learning tools.	399	211	32	0	3.57	.587
		(62.1)	(32.9)	(5.0)	(0)		
3	When using AI, I often clarify unclear and confusing information through my life	361	248	31	2	3.51	.605
		(56.2)	(38.6)	(4.8)	(0.3)		

4	experiences. My experiences influences my choice of information	382 (59.5)	247 (38.5)	13 (2.0)	0 (0)	3.57	.534
5	When using AI, I seek out additional resources to deepen my understanding of the information presented by AI.	361 (56.2)	244 (38)	37 (5.8)	0 (0)	3.50	.605
Reflective Thinking							
6	When using AI I reflect on the information provided.	382 (59.5)	221 (34.4)	27 (4.2)	12 (1.9)	3.52	.668
7	I consider the potential impact of the information provided on my life and academics.	357 (55.6)	282 (43.9)	3 (0.5)	0 (0)	3.55	.507
8	I consider the ethical implications of the information provided by AI	322 (50.2)	287 (44.7)	21 (3.3)	12 (1.9)	3.43	.651
9	AI do not always address the questions I ask.	138 (21.5)	156 (24.3)	76 (11.8)	272 (42.4)	2.25	1.211
10	I have to check for biases and misinformation in the information provided by AI	354 (55.1)	192 (29.9)	56 (8.7)	40 (6.2)	3.34	.880
The Quest for Meaning							
11	I have to think about how to present the information gotten from AI learning tools.	410 (63.9)	175 (27.3)	46 (7.2)	11 (1.7)	3.53	.704
12	I have to determine what information from AI is worth using.	340 (53.0)	237 (36.9)	62 (9.7)	3 (0.5)	3.42	.683
13	I often have to ruminate and think before using information gotten from AI	325 (50.6)	254 (39.6)	49 (7.6)	14 (2.2)	3.39	.722
14	I often have to edit and rephrase answers gotten from AI	370 (57.6)	187 (29.1)	39 (6.1)	46 (7.2)	3.37	.887
15	I always go extra mile, to ensure that my answers are meaningful.	369 (57.5)	264 (41.1)	9 (1.4)	0 (0)	3.56	.524
Weighted Mean		3.42					

SA= Strongly Agree (4); A= Agree (3) D= Disagree (2); SD= Strongly Disagree (1)

Table 2 above indicates the level of critical thinking ability of undergraduates when utilising artificial intelligence learning tools. The critical thinking ability with the highest mean score is: when using AI I feel comfortable when asking questions/ information (3.74, SD = .455) and then followed by 'I connect my personal experiences and information provided by AI learning tools.' (3.57, SD= .587). The critical thinking ability with the lowest mean score is: AI do not always address the questions I ask (2.25, SD = 1.211), this is low, it shows that many of the respondents do not agree to this, meaning that they believe, artificial intelligence learning tools address their questions effectively. The weighted mean score is 3.42 while the criterion mean is 2.50. Because the weighted mean is higher than the criterion mean, the critical thinking ability level of the undergraduates is high.

Research question 3: What is the extent of utilisation of Artificial Intelligence tools by the undergraduates?

Table 3 revealed the extent of use of artificial intelligence learning tools by undergraduates. As shown in Table 3, ChatGPT is the most frequently used AI tool with a mean score of 3.62 while Turnitin is the least frequently used AI tools with mean score of 2.72. Although the extent

Table 3. Extent of utilisation of Artificial Intelligence tools by the undergraduates

S/N	Items	Daily %	Weekly %	Monthly %	Once in a while %	Never %	Mean	Std. Deviation
1	Quill Bot	242 (37.7)	102 (15.9)	24 (3.7)	115 (17.9)	159 (24.8)	3.24	1.669
2	Grammarly	220 (34.3)	135 (21.0)	75 (11.7)	47 (7.3)	165 (25.7)	3.31	1.610
3	ChatGPT	284 (44.2)	135 (21.0)	63 (9.8)	17 (2.6)	143 (22.3)	3.62	1.585
4	Brainly	198 (30.8)	96 (15.0)	56 (8.7)	34 (5.3)	258 (40.2)	2.91	1.744
5	Siri	192 (29.9)	79 (12.3)	50 (7.8)	74 (11.5)	247 (38.5)	2.84	1.718
6	Canva	137 (21.3)	143 (22.3)	35 (5.5)	78 (12.1)	249 (38.8)	2.75	1.641
7	Alexa	145 (22.6)	123 (19.2)	37 (5.8)	100 (15.6)	237 (36.9)	2.75	1.634
8	Coursera	189 (29.4)	98 (15.3)	26 (4.0)	38 (5.9)	291 (45.3)	2.78	1.777
9	Bing chat	189 (29.4)	94 (14.6)	57 (8.9)	67 (10.4)	235 (36.6)	2.90	1.699
10	Turnitin	148 (23.1)	100 (15.6)	63 (9.8)	105 (16.4)	226 (35.2)	2.72	1.610
11	Duolingo	181 (28.2)	88 (13.7)	70 (10.9)	97 (15.1)	206 (32.1)	2.91	1.642
Weighted Mean		2.97						

of use of the artificial intelligence learning tools by undergraduates varies across different artificial intelligence learning tools, the weighted mean of 2.97 is lower than the criterion mean of 3.0. This indicates that the overall level of AI tools utilisation among undergraduates is low.

Research Question 4: What is the joint and relative contribution of perception and critical thinking ability to the utilisation of artificial intelligence among undergraduates?

Table 4 presents the summary of multiple regression analysis showing the relative contribution of perception and critical thinking ability to the utilisation of artificial intelligence among undergraduates of the university of Ibadan.

Model	Unstandardized coefficients		Standardized coefficients	T	Sig
	B	Std. Error	Beta		
1 (constant)	1.483	.067		22.292	.000
Perception	-.001	0.17	-.002	-.075	.940
Critical thinking ability	.063	.018	.066	3.154	.002

a. Dependent variable: utilization of artificial intelligence learning tools

Note: $R^2 = .004$, $F(2, 639) = 4.27$, $p = .014$

As shown in Table 6, when both perception and critical thinking ability were entered simultaneously, only critical thinking ability emerged as a significant independent predictor of AI utilisation ($\beta = .066$, $t = 3.154$, $p = .002$). while perception was not statistically significant ($\beta = -.002$, $t =$

-.075, $p = .940$).

This finding suggests that while perception shows a significant relationship between perception and critical thinking ability with AI usage, and according to the table critical thinking ability contributed largely to the usage of AI. This implies that an undergraduate may have a positive perception about AI, but without critical thinking ability (reflective thinking, the quest for meaning and experience) he/ she is less likely to use AI learning tools. In other words, an undergraduates equipped with critical thinking ability are better positioned and more likely use and navigate AI learning tools regardless of their perception.

Hypothesis 1: There is no significant relationship between perception and utilisation of artificial intelligence tools among undergraduates of University of Ibadan;

Table 5 showing the Relationship between perception and utilisation of artificial intelligence among undergraduates.

	N	Mean	R	P	Remark
Perception	642	3.63	.092**	0.002	Significant
Utilisation of AI learning tools	642	2.97			

The results shown in Table 5 above indicate that the relationship between perception and utilisation of AI learning tools is weak, positive, and significant ($r = .092$, $p < 0.05$). Since P value which is 0.02 is lower than 0.05 level of significance, the null hypothesis that states : there is no significant relationship between perception and utilisation of AI learning tools is rejected. This implies that undergraduates with more positive perception of AI tend to use AI learning tools more frequently, although the relationship is weak.

H02 : There is no significant relationship between critical thinking ability and utilisation of artificial intelligence among undergraduates.

Table 6 showing the relationship between critical thinking ability and utilization of artificial intelligence among undergraduates.

	N	Mean	r	P	Remark
Critical Thinking ability	642	3.42	.094**	.000	Significant
Utilisation of AI learning tools	642	2.97			

It is indicated by the results provided in Table 6 that the relationship between critical thinking ability and utilization of AI is significant, positive, weak and significant ($r = .094$, $p < 0.05$). The significant p-value is 0.000 which is lower than the 0.05 level of significance. As a result, the null hypotheses that states that there is no significant relationship between critical thinking ability and utilisation of AI learning tools among undergraduates of university of Ibadan is rejected. This suggests that an increase in critical thinking ability will increase the utilisation of AI learning tools among undergraduates, that is, undergraduates with higher critical thinking ability tend to use AI learning tools more frequently.

10. Results and Discussion

This section presents the results of the study as stated in the research questions and hypotheses. All tables referenced in this section are presented in the accompanying TABLES.docx file.

10.1 Perception of Artificial Intelligence

Research Question 1: *What is the perception of Artificial Intelligence among the undergraduates?*

Table 1 presents information on the perception of artificial intelligence learning tools among undergraduates of the University of Ibadan. The results indicate that undergraduates hold a positive perception of AI learning tools, with a weighted mean score of 3.62, which is higher than the criterion mean of 2.50. The highest-rated item was "It provided me with a lot of enjoyment and ease" ($M = 3.72$, $SD = .465$), followed by "Learning to use the apps interface was easy for me" ($M = 3.69$, $SD = .546$). The lowest-rated item was "I found the AI apps to be flexible to interact with" ($M = 3.56$, $SD = .594$). Overall, the findings suggest that undergraduates at the University of Ibadan perceive AI learning tools positively, viewing them as useful, easy to use, and beneficial to their academic demands. This finding is in line with the Technology Acceptance Model (TAM), which posits that perceived usefulness and perceived ease of use are key determinants of technology adoption (Davis, 1989).

10.2 Level of Critical Thinking Ability

Research Question 2: *What is the level of critical thinking ability of undergraduates in relation to AI utilisation?*

Table 2 presents information on the level of critical thinking ability of undergraduates when utilising AI learning tools. The results indicate a high level of critical thinking ability, with a weighted mean score of 3.42, which exceeds the criterion mean of 2.50. The highest-rated item was "When using AI I feel comfortable when asking questions/information" ($M = 3.74$, $SD = .455$), followed by "I connect my personal experiences and information provided by AI learning tools" ($M = 3.57$, $SD = .587$). The lowest-rated item was "AI do not always address the questions I ask" ($M = 2.25$, $SD = 1.211$), indicating that respondents generally believe AI tools effectively address their questions. The three indicators of critical thinking which are; experience, reflective thinking, and

quest for meaning were all positively agreed to by the respondents. This suggests that undergraduates actively engage in reflective practices when using AI, such as connecting AI information to personal experiences, considering ethical implications, and seeking additional resources to fact-check AI responses.

10.3 Extent of Utilisation of Artificial Intelligence Tools

Research Question 3: *What is the extent of utilisation of Artificial Intelligence tools by the undergraduates?*

Table 3 reveals the extent of use of AI learning tools by undergraduates. ChatGPT was the most frequently used AI tool ($M = 3.62$), while Turnitin was the least frequently used ($M = 2.72$). The overall weighted mean score of 2.97 is slightly below the criterion mean of 3.0, indicating that the overall level of AI tool utilisation among undergraduates is low. While students reported positive perceptions and high critical thinking abilities, actual utilisation is limited. This suggests that other factors such as access to technology, internet connectivity, institutional support, and awareness of AI applications may play significant roles in determining usage or increased usage. This finding is consistent with previous studies that have reported low AI utilisation in developing countries despite positive attitudes (Ezeanya et al., 2024).

10.4 Joint and Relative Contribution of Perception and Critical Thinking Ability

Research Question 4: *What is the joint and relative contribution of perception and critical thinking ability to the utilisation of artificial intelligence among undergraduates?*

Table 4 presents the summary of multiple regression analysis showing the relative contribution of perception and critical thinking ability to AI utilisation. The results indicates significant ($R^2 = .004$, $F(2, 639) = 4.27$, $p = .014$), showing that the two predictors together explain a small but significant portion of the variance in AI utilisation.

As shown in Table 4, when both perception and critical thinking ability were entered simultaneously, only critical thinking ability emerged as a significant independent predictor of AI utilisation ($\beta = .066$, $t = 3.154$, $p = .002$). Perception was not statistically significant ($\beta = -.002$, $t = -.075$, $p = .940$). This finding suggests that while perception shows a significant joint relationship with AI usage (as seen in Table 5), its effect is largely accounted for by critical thinking ability. In other words, students' critical thinking capacity is the prevalent factor of AI tool utilisation, whereas perception alone, without critical thinking, does not independently predict continuous use when both factors are considered together.

10.5 Relationship between Perception and AI Utilisation

Hypothesis 1 stated that there is no significant relationship between perception and utilisation of AI learning tools among undergraduates.

Table 5 shows the relationship between perception and utilisation of AI learning tools. The results indicate a weak, positive, and significant relationship ($r = .092$, $p < .05$). Since the p-value (0.002) is lower than the 0.05 level of significance, the null hypothesis is rejected. This implies that undergraduates with more positive perceptions of AI tend to use AI learning tools more frequently, although

the relationship is weak.

10.6 Relationship between Critical Thinking Ability and AI Utilisation

Hypothesis 2 stated that there is no significant relationship between critical thinking ability and utilisation of AI learning tools among undergraduates.

Table 6 shows the relationship between critical thinking ability and utilisation of AI. The results indicate a weak, positive, and significant relationship ($r = .094$, $p < .001$). Since the p-value (0.000) is lower than the 0.05 level of significance, the null hypothesis is rejected. This suggests that undergraduates with higher critical thinking ability tend to use AI learning tools more frequently.

10.7 Summary of Findings

In summary, the key findings of this study are:

- Undergraduates at the University of Ibadan hold positive perceptions of AI learning tools.
- Undergraduates demonstrate high levels of critical thinking ability when using AI learning tools.
- Overall, AI tool utilisation among undergraduates is low, with ChatGPT being the most frequently used tool.
- Both perception and critical thinking ability show significant positive relationships with AI utilisation.
- Regression analysis reveals that critical thinking ability is the stronger and more significant independent predictor of AI utilisation, while perception does not uniquely predict utilisation when critical thinking is controlled for.

11. Conclusion

The study revealed that the perception of AI among the undergraduates was positive while their critical thinking ability was also high when it comes to application of AI. Undergraduates who had a more positive perception of AI were more likely to use these technologies into their academic activities. The study found that while undergraduates are generally aware of AI and have a positive perception of its potential, their utilisation of AI tools remains limited. The high-order cognitive ability of the undergraduates correlates with their use of AI learning tools for various purposes. It is evident from the findings of this study that perception and critical thinking ability of the undergraduates are among the key factors to be considered in understanding the adoption and use of Artificial Intelligence in education by the undergraduates. The regression analysis also indicated that although perception correlates with AI use, it is critical thinking ability that solely predicts sustained the usage. This implies that positive attitudes toward AI is insufficient; universities must encourage and teach critical thinking ability to drive meaningful AI usage. These findings emphasize the need for institutions to provide better support for the adding of AI into the curriculum and

ensure that undergraduates have the necessary resources and skills to use AI learning tools effectively.

While similar researches on AI use have been conducted in other parts of the world, this study contributes to the knowledge by providing empirical evidence from a Nigerian university system, a country where empirical research on AI utilisation is limited. The study's contribution to knowledge is not just in its theoretical findings but location specific. Therefore, providing significant knowledge and solutions to policymakers, educators, and technology developers in developing-country university systems like Nigeria.

12. Limitations of the study

There are several limitations on this research. The results may not be generally applicable due to the single institution focus and the demographic mix as the sample, which may not be representative enough. A larger size for future studies across various universities may be more generalized.

Furthermore, a cross-sectional design may limit the ability to establish causality between perception, critical thinking ability and the use of AI learning tools. Longitudinal or experimental designs will provide stronger evidence of the causal relationships between these variables. Also, employing mixed-method techniques that combine qualitative and quantitative methods will provide a deeper understanding of the variables.

Also, the use of self-developed structured questionnaire for critical thinking ability may not fully capture students' actual critical thinking performance, as self-reports are subject to social desirability and recall biases, therefore, future studies should consider using performance-based critical thinking assessments.

13. Recommendations

Based on the findings of this study, the following recommendations are made:

For knowledge content development, universities should not only teach how to use AI but also train undergraduates to critically evaluate AI-generated content, this will in turn make information produced by universities credible, novel, relevant and unbiased. Universities need to organise awareness programs and workshops to educate undergraduates about the various applications of AI in their academic and professional lives. This would dispel misconceptions associated with the use of AI and enhance the positive perception of AI learning tools by the undergraduates. In addition, the university must endeavour to review the curriculum by including AI and critical thinking and this must be strengthened with teaching and training the undergraduates on the use of AI. AI literacy and critical thinking would empower the undergraduates to make informed decisions about the use of AI learning tools.

Universities should facilitate discussions on the ethical implications of AI, encouraging undergraduates to think critically about AI's societal impact. This will equip undergraduates with the

tools to use AI responsibly and ethically in their academic and professional careers.

Specifically, universities should provide reliable internet access and computer laboratories with AI software and learning tools to ensure all undergraduate, regardless of socioeconomic background, have the access to these tools and to bridge digital divide. Universities should also organise practical workshops on AI literacy to teach ethical use and how to evaluate AI-generated content for accuracy, bias, and ethical implications.

Universities should also develop and disseminate university-wide guidelines on the ethical use of AI in academic work, clarifying what constitutes acceptable use, plagiarism, and academic integrity in the context of AI tools. Lecturers should be trained on how to incorporate AI tools in their teaching delivery and how to guide undergraduates' critical thinking while using AI learning tools.

Statements and Declarations

Author Contributions: Conceptualization, I.P.S. and A.S.O.; methodology, I.P.S. and A.S.O.; data collection, I.P.S.; analysis, I.P.S. and A.S.O.; writing—original draft preparation, I.P.S.; writing—review and editing, I.P.S. and A.S.O.; supervision, A.S.O. All authors have read and agreed to the published version of the manuscript.

All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: Not applicable. The study involved anonymous survey responses with no invasive procedures: however, ethical protocols were observed in line with the University of Ibadan's manual of writing.

Informed Consent Statement: While formal ethical approval was not required for this study as it involved anonymous survey responses with no invasive procedures, the researchers strictly followed the ethical guidelines outlined in the University of Ibadan's manual of writing. These guidelines include principles of voluntary participation, anonymity, confidentiality, and the right to withdraw from the study at any time without penalty. The researchers also made sure that no identifying information was collected from participants and above all informed consent was obtained from all participants involved in the study.

Conflicts of Interest: The authors declare no conflicts of interest.

Generative AI Use Statement: Generative AI tools were used in the preparation of this manuscript. The authors used ChatGPT-4 (OpenAI) minimally and reference management tools for literature search, identifying relevant papers, and formatting citations. No AI tools were used for data analysis, statistical computation, or manuscript drafting. All AI-generated suggestions were critically reviewed, verified, and edited by the authors, who take full responsibility for the accuracy, originality, and integrity of the final manuscript.

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