

ASSESSING THE FACTORS INFLUENCING THE UTILIZATION OF ARTIFICIAL INTELLIGENCE TOOLS IN LEARNING AMONG UNDERGRADUATE STUDENTS OF COMPUTER SCIENCE

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ABSTRACT The swift progress in Artificial Intelligence (AI) has notably altered the educational environment, particularly in fields such as Computer Science, where the integration of technology is essential. The study assessed the factors influencing the utilization of AI tools in education by computer science undergraduates. The research used a descriptive survey design to assess the factors influencing the utilization of AI tools in education by computer science undergraduates. There are two hundred and sixty-three (263) undergraduate students currently studying computer science at University of Africa, Toru-Orua in Bayelsa State for the 2023/2024 academic year. The study included all two hundred and sixty-three (263) undergraduate students who registered for the computer science program at University of Africa in Toru-Orua, Bayelsa State. The researcher employed a structured questionnaire to collect data from students about their utilization of AI tools. The validation of the questionnaire was conducted by experts in Educational Technology and Computer Science. Statistical data like frequencies, percentages, averages, and standard deviations were utilized to address the research questions. The research discovered that chatbots (e.g., ChatGPT) are the commonly utilized AI tool among computer science undergraduate students at University of Africa, Toru-Orua, Bayelsa State. The research also discovered that AI tool usage are influenced by technology, and institutional backing in learning among computer science undergraduates at the University of Africa, Toru-Orua, Bayelsa. The study recommended that institutions should conduct workshops and training sessions to provide students with the necessary skills for the successful utilization of AI tools.

KEYWORDS: Usage, Utilization, Artificial Intelligence, Learning, Computer Science

I. INTRODUCTION

Artificial Intelligence has made a strong impact in academics, as institutions globally are putting resources into AI-based technologies to enhance how education is delivered. Educational tools like intelligent tutoring systems, virtual assistants, and automated assessment platforms are commonly used to assist both teachers and students. For example, platforms like Coursera and edX use artificial intelligence algorithms to customize course suggestions according to how users interact and perform [1]. Likewise, Grammarly and GitHub Copilot support students in writing and programming, improving their skill development and efficiency [2]. The effective utilization of these tools is impacted by various factors such as technological infrastructure, digital literacy, and attitudes toward AI, despite their widespread availability. Research has indicated that students' recognition and belief in the simplicity of using AI tools greatly influence their willingness to incorporate them into their learning experience [3].

Furthermore, access to high-speed internet and modern computing devices is also crucial in influencing the level of AI utilization among students, especially in developing nations [4]. Computer Science undergraduates are in a special position to take advantage of AI tools, as these tools align well with the programming, data analysis, and system design focus of their curriculum. Yet, the success of these tools frequently depends on students' existing knowledge and their capability to incorporate them into their study

routines. One example is the use of advanced programming tools like DeepCode, which can greatly cut down on debugging time, but they do necessitate a basic comprehension of coding principles to work efficiently [5]. The cognitive advantages of AI tools, such as promoting critical thinking and problem-solving abilities, are widely recognized. Nevertheless, there are also concerns regarding excessive reliance on these tools, as they could hinder students' capacity to cultivate autonomous problem-solving skills [6]. In addition, the educational structure of AI-powered learning settings frequently impacts their acceptance and effectiveness. Students are more likely to accept tools that closely match course objectives and offer practical insights [7]. While many studies have focused on the overall implementation of educational technologies, there is a lack of research on the particular factors that impact the utilization of AI tools in Computer Science education for undergraduates. It is essential to comprehend these factors in order to enhance the design and implementation of AI tools, guaranteeing they cater to the specific requirements of Computer Science students. This research aims to fill this void by examining the impact of technological, socio-economic, cognitive, and pedagogical elements on the use of AI tools by Computer Science undergraduates.

AI tools in education have revolutionized traditional learning methods, providing a personalized, efficient, and adaptable learning experience. Owing to the intricate and ever-changing nature of computer science education, innovative methods of learning are essential, with a notable focus on tools like intelligent tutoring systems and AI-fueled assessment platforms [7]. Considering the significance of Computer Science graduates in fostering technological advancement, it is essential to evaluate the elements affecting the use of AI tools in their educational experience. This knowledge can assist educators, policymakers, and stakeholders in formulating strategies to increase access, improve learning outcomes, and equip students for the challenges of a swiftly changing technological landscape. Nevertheless, the inconsistent adoption and effective use of AI tools by undergraduate computer science students persist despite the many benefits. This brings up crucial questions regarding the influences on their usage. Numerous researches have pointed out that various factors influence the utilization of AI tools in education, such as students' tech skills, perceived ease of use, perceived usefulness, and the infrastructure that backs these tools [8] and [9]. Moreover, the level of student engagement with AI tools is influenced by socio-cultural factors, student attitudes, institutional policies, and the presence of training and resources. These factors become more complex for computer science students at the undergraduate level due to the fast pace of AI technology advancements, necessitating ongoing adjustments to unfamiliar tools and systems [10]. An urgent problem in this situation is the digital divide, which leads to inequalities in AI tool accessibility. Elements like cost, internet access, and technological infrastructure availability are frequently key in determining students' ability to effectively use tools [11]. Additionally, the ethical concerns and confidence of students in AI systems also impact their readiness to interact with such technologies [12]. Failure to recognize and tackle these obstacles could lead to the untapped potential of AI tools in improving computer science education outcomes. Despite the growing attention towards AI in education, there has been a lack of comprehensive research on the particular factors influencing the acceptance and utilization of AI tools among computer science undergraduates. Many studies mainly concentrate on the technical progress or practical uses of these tools, overlooking the user-centered viewpoint that takes into account students' experiences and difficulties. This gap in research shows the necessity for a thorough examination of the obstacles and facilitators of AI tool usage among this group.

Through examining these variables, the present research aims to add to the expanding pool of information on artificial intelligence in education and offer practical advice for teachers, policymakers, and tech experts. Comprehending these elements is essential for creating specific interventions that improve the accessibility, usability, and effectiveness of AI tools, leading to better learning results for computer science students. The purpose of the study was to assess the factors influencing the utilization of AI tools in education by computer science undergraduates.

Specifically, the study seeks to find out the:

- (a). The AI tools used by undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa State.
- (b). The factors that affect the use of AI tools in learning among the undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa.

II. RELATED WORKS

Authors in [13] investigated how final-year undergraduates utilize AI tools in their academic tasks. There were four hundred and sixty-seven (467) students who were enrolled in the computing faculty at the Sri Lanka Institute of Information Technology (SLIIT) and possessed library privileges. 100 students were chosen as the sample from the population using the convenience sampling technique. The research revealed that AI tools were utilized by 99% of college students for academic tasks. ChatGPT is the most commonly utilized AI tool at 94%, with Quill bot and Grammarly following closely behind. Students utilize artificial intelligence tools for the purpose of examining grammatical mistakes (73%), improving understanding of subjects (68%), and condensing information (67%). 52% of students believe AI hinders critical thinking, yet the majority do not view it as a form of cheating. Ninety percent (90%) of students state they are knowledgeable in ethical use of AI. [14] investigated how Saudi university students view artificial intelligence (AI) tools for academic writing. A study was carried out on 189 students who were skilled in English and were taking freshman academic writing classes. The research discovered that students commonly utilized ChatGPT, Grammarly, and Google Translate. Similarly, authors in [8] carried out research to examine the factors that impact students' willingness to use technology, such as AI tools, for educational purposes. The study found that perceived ease of use and perceived usefulness were the primary factors in predicting students' adoption of technology, as per the Technology Acceptance Model (TAM). This research highlighted the importance of user-friendly design and the tangible advantages of AI tools in promoting their adoption by students. Likewise, [9] examined university students' adoption of AI-powered educational technologies. The results showed that students' attitudes towards AI tools were greatly affected by self-efficacy, technological literacy, and peer influence. These observations highlight the importance of institutions offering training and establishing collaborative learning spaces to promote positive attitudes towards AI. Authors in [11] investigated how technological infrastructure influences students' ability to use AI tools. Their research discovered that inequalities in availability of gadgets, dependable internet, and support from institutions had a major impact on students' effectiveness in utilizing AI tools. These results are consistent with the issues surrounding the digital divide, which continues to hinder fair AI implementation.

A research conducted in [10] supported these results by investigating the difficulties and prospects of AI in higher education. The study found that expenses such as software licenses and hardware needs were major hindrances for students. It suggested that institutions should offer financial assistance or free use of AI tools to encourage inclusivity. Authors in [12] carried out a research study using a combination of methods to investigate the level of transparency and trust in educational tools enhanced by AI. The research discovered that the extent to which students trust AI systems greatly impacted their readiness to use such tools. It was considered crucial to establish trust by ensuring transparency in grading and feedback processes of AI systems. Furthermore, authors in [7] conducted a thorough examination of AI usage in higher education and found that students' internal drive and favorable views on new technology played a vital role in the effectiveness of integrating AI tools. The review emphasized educators' role in influencing students' views of AI tools by providing guidance and motivation. Another important factor that affects the implementation of AI tools is the ethical aspect. In their research, authors in [15] examined how students view privacy and ethical issues when using AI tools for educational purposes. The findings showed that students had concerns regarding data security and potential biases in AI algorithms. It was discovered that it was crucial to address these ethical issues in order to promote increased approval. Cultural influences were also discovered to impact the adoption of AI. An investigation carried out in [16] examined variations in student interaction

with AI tools across different cultures. The results showed that students hailing from collectivist societies were inclined to embrace AI tools with support from peers and faculty, whereas individuals from individualist cultures valued ease of use and personal gains.

III. METHODOLOGY

The research utilizes a descriptive survey method to assess the factors influencing the utilization of artificial intelligence (AI) tools in undergraduate computer science students' learning. This layout is appropriate for grasping patterns, connections, and viewpoints on the utilization of AI tools without altering the study variables. It allows for the gathering of information directly from participants about their experiences, beliefs, and difficulties with AI tools. 263 undergraduate students are currently enrolled in the computer science program at University of Africa, Toru-Orua Bayelsa State for the 2023/2024 academic session. These participants were chosen for the research due to their regular engagement with AI tools in their academic assignments and projects, making them appropriate subjects for the study. The study did not utilize a sample or sampling technique as all two hundred and sixty-three (263) undergraduate students enrolled in the computer science program at University of Africa, Toru-Orua Bayelsa State were included in the study. The main tool for data collection is a structured questionnaire, which was constructed by the researcher. The questionnaire consists of three parts: Section A: demographic data (level of study). Section B: The varieties of tools employed. Section C: Factors impacting usage, including constructs like: how easy it is perceived to use, perceived helpfulness, technology and infrastructure accessibility, institutional backing, student attitudes and skills, ethical worries, and confidence in AI tools. The tool is created utilizing a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) to maintain consistency and facilitate understanding.

Educational technology and computer science experts evaluated the questionnaire for content and face validity to verify its relevance and comprehensiveness. An experiment was carried out involving 30 students from an institution that did not take part previously. The Cronbach's Alpha test confirmed that the instrument is reliable with a score of 0.88, showing strong internal consistency. The collection of data took place during a period of three weeks. The researchers initially acquired ethical approval from the University of Africa in Toru-Orua Bayelsa State, as well as consent from the participants. The survey was conducted online via Google Forms for optimal outreach and convenient participation. Additional checks were performed in order to guarantee a high level of participation. Descriptive statistics like frequencies, percentages, mean, and standard deviations were employed to summarize the characteristics of students and their use of AI tools. The research follows ethical research guidelines. Participants were made aware that they could withdraw at any point without facing any consequences. Information was made anonymous in order to safeguard the identities of the participants. Before filling out the questionnaire, participants agreed to the terms electronically by signing a consent form. The data that was gathered was kept safe and could only be accessed by the research team. The following research questions guided the study:

- (a). What are the AI tools used that are frequently used by undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa State?
- (b). What are the factors that affect the use of AI tools in learning among the undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa?

IV. RESULTS AND DISCUSSION

The demographic information of the participants used in this study are presented in the Table 1:

Table 1: Number of Computer Science Students by Levels

Levels	Frequency	Percentage
100 level	108	41%
200 level	114	43%
300 level	41	16%
Total	263	100%

Table 1 shows the number of computer science students by levels. Table 1 shows that majority of the participants are from 200 level with 114 students (43%), followed by 108 participants (41%) in 100 level, followed by 41 students (16%) from 300 level. The data is represented in the bar chart below:

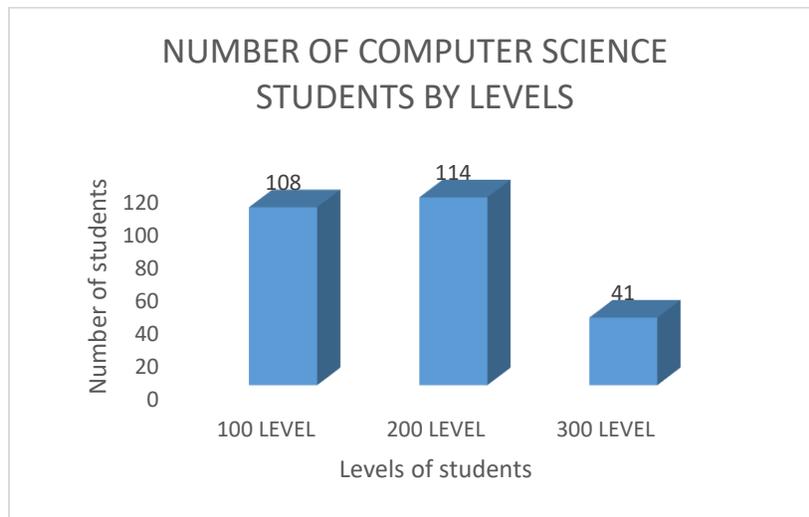


Figure 1: Number of Computer Science Students by Levels

A. RESEARCH QUESTION ONE

What are the AI tools used that are frequently used by undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa State?

Table 2: AI tools used by Undergraduate Students of Computer Science in University of Africa, Toru-Orua, Bayelsa State

Which AI tools do you frequently use in your studies?	Frequency	Percentage
Chatbots (e.g., ChatGPT)	187	71%
Intelligent Tutoring Systems	41	16%
AI-driven assessment platforms	11	4%
Code assistance tools (e.g., GitHub Copilot)	24	9%
Total	263	100%

Table 2 shows the AI tools used by undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa State. Table 2 shows that the AI tool, which is frequently used by undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa State is chatbots (e.g., ChatGPT) by 187 students (71%), followed by intelligent tutoring systems by 41 students (16%), followed by code

assistance tools (e.g., GitHub copilot) by 24 students (9%), followed by AI-driven assessment platforms. The data is represented in the chart below:

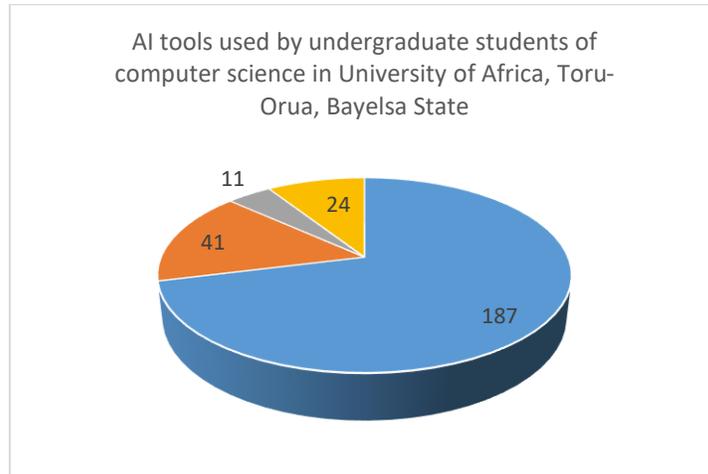


Figure 2: AI Tools used by Undergraduate Students of Computer Science in University of Africa, Toru-Orua, Bayelsa State

The findings of this study revealed that the AI tool, which is frequently used by undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa State is chatbots (e.g., ChatGPT). This finding is in agreement with the findings of [13], who investigated how final-year undergraduates in Sri Lanka Institute of Information Technology (SLIIT) utilize AI tools in their academic tasks. The study revealed that ChatGPT is the most commonly utilized AI tool.

B. RESEARCH QUESTION TWO

What are the factors that affect the use of AI tools in learning among the undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa?

Table 3: Factors Influencing AI Tool Usage in Learning among the Undergraduate Students of Computer Science in University of Africa, Toru-Orua, Bayelsa

S/N	Items	Mean	Standard Deviation
1.	I have access to the necessary infrastructure (e.g., internet, devices) to use AI tools effectively.	1.06	0.41
2.	The technical requirements of AI tools (e.g., high computational power) affect my ability to use them.	3.74	0.58
3.	The availability of AI tools are promoted and supported by my institution.	3.72	0.69
4.	The availability of AI tools is promoted and supported by my institution.	3.67	0.68
5.	Lecturers encourage and incorporate the use of AI tools in their teaching.	3.92	0.39
6.	I feel confident in my ability to learn and use new AI tools.	3.64	0.58
7.	I am motivated to use AI tools because of their perceived usefulness in my studies.	2.97	0.94
12	I trust AI tools to provide accurate and unbiased results	3.58	0.74
13	Ethical issues (e.g., plagiarism, biases) discourage me from using AI tools.	3.79	0.56
Grand Mean		3.25	0.59

Table 3 shows factors influencing AI tool usage in learning among the undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa. Table 3 shows that the grand mean 3.25, which is greater than the criteria mean of 3.25. This shows that technological factors, institutional support, students' attitudes and skills, ethical and privacy concerns are the factors influencing AI tool usage in learning among the undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa. The findings of this study revealed that technological factors, institutional support, students' attitudes and skills, ethical and privacy concerns are the factors influencing AI tool usage in learning among the undergraduate students of computer science in University of Africa, Toru-Orua, Bayelsa. A large number of students highlighted the importance of having access to infrastructure, including dependable internet, appropriate devices, and user-friendly AI tools, in order to effectively implement new technologies. Numerous students pointed out that the demanding computational needs and subscription fees prevented them from regularly using AI tools. These results coincide with [11] focus on the digital divide as an ongoing obstacle in technology-based education. Students' willingness to adopt AI tools was strongly influenced by their opinions on the practicality and importance of these tools. Several students believed that AI tools improved their learning by providing personalized feedback, simplifying difficult tasks, and enhancing problem-solving skills. This discovery supports the idea presented by [7] on the significant impact of AI in education.

Yet, some students are worried about their competence in using AI tools, showing the necessity for programs to improve their skills and capabilities. Self-efficacy of students plays a crucial role in shaping their attitudes towards technology adoption through significant enablers such as intrinsic motivation and curiosity about AI technologies. Ethical implications and privacy concerns were important influences on students' confidence in AI tools. A lot of students have raised worries about their personal data being used inappropriately and the risk of biases in AI algorithms. These worries are in line with the results of [15], who emphasized the importance of transparency in data management and fairness in algorithms for building confidence in AI tools. The assessment of the elements influencing the utilization of AI tools in education by computer science students at the undergraduate level demonstrates a complicated interaction of technological, institutional, personal, and ethical aspects. These tools could greatly transform the field of education through personalized learning, increased efficiency, and promotion of innovation. Nevertheless, the acceptance and successful application of them is contingent on overcoming various crucial obstacles and facilitators. The research emphasizes that having access to technology and infrastructure, such as dependable internet connection and appropriate hardware, is a crucial need for utilizing AI tools successfully. Just as crucial are support systems within institutions, like training initiatives, support from teachers, and incorporating AI tools into the coursework. Additionally, the attitudes, self-efficacy, and motivation of students are significant factors in influencing their readiness to utilize such tools. Dealing with ethical and privacy issues, such as data security and algorithmic bias, is crucial for gaining trust and encouraging widespread acceptance.

V. CONCLUSION

In order for institutions to fully utilize AI tools in education, they must take a comprehensive approach. This involves creating a nurturing learning atmosphere, closing the technology gap, and dealing with moral dilemmas. By introducing specific actions, universities can equip students with the abilities and tools needed to fully utilize the advantages of AI technologies. In conclusion, the results of this research emphasize the importance of teamwork between students, teachers, policymakers, and technology companies in developing a diverse and creative educational environment. In order to guarantee fair access and significant impact in computer science education, it is crucial to consider and tackle the factors affecting the adoption of AI as it shapes the future of learning. Based on the findings, the study recommends that Institutions need to host workshops and training sessions to provide students with the necessary skills to utilize AI tools effectively. Educators need training in incorporating AI tools into teaching and helping students use them effectively. Institutions must promote the advantages of AI tools in improving academic performance through campaigns, seminars, and success stories. Universities need to create policies on the

appropriate use of AI, covering areas such as protecting data privacy, preventing plagiarism, and ensuring transparency in algorithms. Governments and institutions should offer financial aid or grants to support low-income students in accessing AI resources. Regular evaluation of the factors impacting the adoption of AI tools can assist organizations in recognizing discrepancies and taking proactive measures to bridge them.

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