www.ijte.net

Artificial Intelligence Enhanced Instruction: Reflection on Teachers and Students' Perceptions and Practices

Moabu Jimmy Chandafa
Mbeya University of Science and Technology (MUST), Tanzania

Fang Huang
Huazhong University of Science and Technology, China

To cite this article:

Chandafa, M.J. & Huang, F. (2025). Artificial intelligence enhanced instruction: Reflection on teachers and students' perceptions and practices. *International Journal of Technology in Education (IJTE), 8*(4), 1101-1128. https://doi.org/10.46328/ijte.1234

International Journal of Technology in Education
2025, Vol. 8, No. 4, 1101-1128 https://doi.org/10.46328/ijte.1234

Artificial Intelligence Enhanced Instruction: Reflection on Teachers and Students' Perceptions and Practices

Moabu Jimmy Chandafa, Fang Huang

Article Info

Article History

Received:
29 December 2024
Accepted:
1 August 2025

Keywords

Higher learning institutions
Artificial intelligence
Teaching and learning
Teachers
Students

Abstract

Artificial Intelligence (AI) has the potential to revolutionize education as it develops, offering dynamic, individualized, and effective learning experiences that might change teaching practices. However, there is still inconsistency and limitations in the integration and use of AI in Tanzanian universities. Therefore, the study delt to investigated how Tanzanian higher learning institutions' teachers and students perceived and used AI-enhanced instruction. The study used pragmatic paradigm, mixed methods approach and exploratory sequential design. These approaches were crucial for data triangulation and offered a deeper comprehension of AI perceptions and practices. By combining these two data sources, the researcher was able to fully capture the scope and complexity of the research topic, producing a more solid and trustworthy findings. 240 participants from four universities participated in the study, including 200 students and 40 teachers. Teachers and students were chosen for the study using both random and non-random selection procedures. Data was gathered via questionnaires, focus groups, and interviews. The Statistical Package for the Social Sciences used to analyse the quantitative data, while thematic analysis technique used to analyse the qualitative data. The results showed that perceptions on the usage of AI-enhanced instruction differed between teachers and students. The study found that while AI has great potential to improve education in higher education, its integration necessitates a comprehensive strategy and the development of an ethical AI usage culture. Additionally, teachers' and students' AI practices concentrated on using Grammarly AI, Bing AI, ChatGPT, Quill bolt, and Bard AI. The study recommends that, the government and educational stakeholders should provide professional development programs for teachers and students in order to successfully integrate AI. They should also create explicit policies to address ethical issues and make sure that AI tools enhance rather than replace the crucial human component of teaching and learning.

Introduction

The capacity of digital devices to adjust to new environments, handle evolving situations, solve issues, respond to inquiries, formulate plans, and carry out a number of other tasks that need a certain level of intelligence typically

present in humans is known as artificial intelligence (Holmes et al. 2022). Machine learning, knowledge-based systems, computer vision, robotics, natural language processing, automated planning and scheduling, and more are all included under the umbrella term artificial intelligence (AI) (Cardona, Rodríguez, & Ishmael, 2023). Adaptive learning systems, which are part of AI, change how educational content is presented according to students' learning requirements (Taskin Bedizel, 2023). More inclusive educational practices are made possible by this adaptable flexibility, which is especially advantageous for various student groups, including those with special educational needs (Holmes et al. 2022).

Additionally, AI can help to create intelligent teaching systems that offer students real-time help and guidance thus improving the educational process (Onesi-Ozigagun et al. 2024). Students may learn abstract content more quickly and effectively with the aid of these tools, which can provide explanations, feedback, and tips. For example, turnitin is a popular AI tool in education that does more than just identify plagiarism. Turnitin employs artificial intelligence (AI) to provide students written comments and assist them in developing their abilities (Kolhar & Alameen, 2021). Grammarly for grammar checking, and Coursera for AI-powered tailored course suggestions and assessments (Tamilselvi et al. 2023). Mendeley for maintaining and distributing research articles, Otter AI for transcribing, DALL-E for image generation, Copyscape for plagiarism detection, ChatGPT for content generation and question responding and Gradescope for grading (Sagın et al. 2024). Castillo-Segura et al. (2023) found that there are also programs such as QuillBot for paraphrasing, Elicit and Perplexity for automating literature reviews, SciSpace for research collaboration, Wordtune for writing help, and Consensus for summarizing study findings. In addition, Tamilselvi et al. (2023) exposed some other noteworthy tools such as Canva for design, Adobe Express for creative projects, TutorMe for online tutoring, Code Copilot for programming help, Image Generator for creating visual content, Scholar GPT for academic related research, and CreativeWriting Coach for improving writing abilities.

The capacity to customize learning experiences for every student is one of the many potential advantages of the AI technologies discussed above in the field of education. Platforms with AI capabilities are able to evaluate student performance data and offer tailored assistance and comments (Crompton & Song, 2021). Learning results may be improved by increasing student motivation and engagement through this individualized strategy. Furthermore, AI can assist in pinpointing the areas in which students are having difficulty and provide focused interventions to aid them (Crompton & Song, 2021). Increasing the efficacy and efficiency of instruction and assessment is another possible advantage of using AI tools in education. Teachers and students can devote more time to other facets of teaching by using AI-powered grading systems to provide students feedback on their work more quickly and consistently (Dilmurod & Fazliddin, 2021).

Moreover, AI is capable of analysing student data to find trends and patterns that guide instructional decisions and enhance the efficacy of education (Crompton & Song, 2021; Dilmurod & Fazliddin, 2021). Furthermore, Zhang and Aslan (2021) noted AI tools used in the education industry, including chatbots, expert systems, intelligent tutors, machine learning, personalized learning, and visualization. AI in education has the potential to improve administrative procedures, the teaching and learning environments, and more (Irfan & Murray, 2023). Teachers may now do their tasks more rapidly and efficiently due to the introduction, expansion, advancement,

and widespread of technology adoption in the practice of education, particularly AI (Chen, Chen & Lin, 2020). With AI, students can have a learning companion, teacher, or tailored learning assistant that can help them navigate the wide range of learning options. Additionally, it might document the student's progress and interests in a learning record that is safeguarded by a blockchain (Kenchakkanavar, 2023). Even if conventional educational institutions throughout the world are more resilient to technology advancements, artificial intelligence in education has faced a number of obstacles in its development. AI was expected to transform education by personalizing instruction through tutoring programs (Kaplan, A., & Haenlein, 2020). Likewise, Fontanilla et al. (2023) pointed out that AI technology might speed up the teaching and learning process while improving student learning. The occasional reduction in unnecessary labour will free up more time for teachers to focus on giving students meaningful learning experiences. Higher education institutions can benefit greatly from AI in terms of teaching and learning, but there are hazards and ethical issues associated with its usage, such as data protection, academic dishonesty, and privacy issues (Kolhar & Alameen, 2021).

Academics and other staff members at higher education institutions have also expressed some concern that AI may replace them in their jobs. Furthermore, Niu et al. (2023) discovered that teachers saw the employment of AI as a beneficial tool due to its many benefits, which include a wealth of high-quality mini-structure films and evaluation tools. Similarly, Estonian study by Chounta et al. (2021) found that teachers had relatively limited knowledge of AI and its potential applications. They also saw it as an opportunity to learn. According to a poll conducted in the USA by Billy and Anush (2023) revealed that the majority of teachers believed that artificial intelligence will never be able to match human creativity in the classroom. They also made it clear that although this kind of technology may effectively assist teachers, it cannot take the place of human teachers entirely. Teachers in India had a positive attitude on the use of AI in the classroom since it helped them in improving their teaching methods (Mandal & Mete, 2023). In 2023, Barret and Pack conducted a study which found that teachers believed AI to be a more useful for brainstorming and outlining learning content thus teachers and students are supposed to develop autonomous critical thinking to guarantee they have skills and approaches for handling diverse challenges. This implies that AI should be employed to a certain level without compromising the quality of education. Hostetter et al. (2023) noted that teachers who had previously used ChatGPT or other AI technologies expressed stronger agreement than those who had not. In a Malaysian study on the use of AI in education, Zulkarnain and Yunus (2023) found that despite a number of challenges, teachers expressed a favourable opinion of AI integration due to the technology's dynamic features and effectiveness. This indicates that because AI has several capabilities that allow consumers to multitask and save time, scholars have found its usage to be beneficial. The Shirin (2022) research, conducted in Bangladesh, found that teachers have limited knowledge of artificial intelligence (AI) and its educational benefits. Nonetheless, they considered it a possible educational opportunity. According to Saudi Arabian study by Alijohani (2020) teachers supported the use of AI in the classroom. Teachers firmly supported the constructive use of AI in the classroom and believed it to be a useful tool in the teaching and learning process. The study conducted in Indonesia by Widianingtyas, Mukti, and Silalahi (2023) found that majority of teachers were aware of AI technology and knew how ChatGPT might be utilized in a classroom. They suggested steps to advance understanding of and integration of AI in education in order to support the efficacy and efficiency of instruction. Even if some of the students had trouble using them, they have come to terms with the fact that this technology may aid them in their academic work and is beneficial

in education.

Also, there are disadvantages of using AI technology in educational setting that must be taken into account before adopting it these includes data bias, moral deskilling, moral agency, privacy concerns, and quality perceptions (Tundrea, 2020). The researcher suggested considering all ethical procedure for proper utilisation of AI in of higher learning institutions. According to Slimi and Carballido (2023), one of AI's drawbacks is its biased algorithms, which if used in educational settings, may affect students' admissions or grades. The comprehensiveness of the AI generated data, the accuracy of the information gleaned from such technology, and the fact that the information generated by such technological instruments is not always dependable or is occasionally biased are some of the additional challenges stated in the study by Akinwalere and Ivanov (2022). A Chinese study by Yuk and Hu (2023) found that the following issues were associated with the usage of AI; ethical quandaries, professional progression, privacy concerns, and social values. Developers, teachers, and other stakeholders must thus agree on the best ways to apply AI in higher education without sacrificing the standard of instruction. AlTkhayneh, Alghazo, and Tahat (2023) revealed that in order to guarantee that AI is utilized in educational settings, higher education institutions should address ethical and legal concerns including data protection and privacy. In addition, Saaida (2023) found that integrating and utilizing this technology in the context of higher education necessitates addressing ethical AI usage concerns including responsibility, transparency, and justice in addition to protecting data security and privacy. Similarly, Fontanilla et al. (2023) found that students over dependence on AI as a replacement for conventional teaching techniques rather than as supplementary learning tools has caused educators to have some concerns about implementing AI in the classroom. Furthermore, Pisica et al. (2023) noted that students now have greater opportunity to cheat in class since they may use this technology to find out the answers, especially during tests and examinations. Therefore, to guarantee that AI is utilized in academia as a learning tool in an ethical manner, teachers and students must get training on how to use it. Kelly, Sullivan, and Strampel (2023) found that the use of AI in academia may lead to copyright infringement or academic misconduct like plagiarism if educators and students are not trained on how to uphold academic integrity when using AI in their work. Additionally, Celik et al. (2022) revealed that teachers face a number of challenges while utilizing AI, including the technology's unreliability, technical capacity, and context-specific adaptability. Moreover, Onalapo and Onifade (2020) identified three barriers to the use of AI in African educational settings; that is security, techno-economic, and regulatory problems, along with associated data challenges. According to these studies, the three problems need to be fixed before AI to be used in African educational contexts. Slimi and Carballido (2023) revealed that among the issues with AI that universities must consider are privacy and dignity. Since AI has the potential to be used without restrictions and to violate human freedom, these problems ought to be covered by international law.

In addition, there is a number of issues surrounding the application of AI in academia that universities should take into account in order to maximize the technology's advantages while lowering any hazards. By providing dynamic, individualized, and effective learning experiences, AI has the potential to improve educational methods as it develops (Jones & Smith, 2020). However, generative AI adoption and integration in Tanzanian higher education institutions still unequal and restricted (Mugisha & Katembo, 2021; Zuberi et al., 2022). Although there are many potential advantages to this technology, including personalized learning paths, increased engagement,

and simplified content creation, little research has been done on the particular difficulties, perceptions, and practices associated with its use by teachers and learners in Tanzanian Higher learning institutions. This disparity is a significant obstacle to achieving generative AI's full potential in revolutionizing higher education teaching and learning (Singh, 2020). The use of conventional, lecture-based teaching techniques is still common in Tanzanian higher education, which frequently restricts teachers' capacity to adapt their lessons to the various requirements of their students and encourage active inquiry-based learning (Kalimani, 2021). From automating lesson preparation to creating tests and simulations, generative AI technologies have the potential to improve the development of educational material. However, teachers frequently lack the tools, institutional support, and training necessary to successfully implement these tools. Teachers' preparedness to integrate these innovations into their practice is further hampered by a lack of digital infrastructure, insufficient professional development in AI technologies, worries about job security, and ethical considerations around AI integration (Achieng & Mwita, 2022). Students also have particular difficulties and obstacles while attempting to use generative AI to enhance their education. There are rising worries about the influence on academic integrity because of the increased dangers of plagiarism and reliance on AI-generated content, even if generative AI might empower students by encouraging independent study, creativity, and problem-solving abilities (Mugisha & Katembo, 2021). Additionally, students' variable and frequently unequal adoption of these technologies is caused by differences in technical knowledge, internet access, and advice on their usage. Accordingly, there is a chance that generative AI would exacerbate already-existing educational disparities rather than lessen them, particularly in settings with limited resources like Tanzania (Jones & Smith, 2020). There hasn't been much empirical study done on teachers and students' experiences, perceptions, and practices around AI in Tanzanian higher education settings up to this point. This study offers insights required for creating plans that can support the successful, long-lasting, and inclusive adoption of AI in Tanzanian higher education by looking at the perceived advantages, constraints, and present practices around generative AI. In order to promote more significant and equitable educational achievements in Tanzanian higher education, this study aims to advance fundamental knowledge that may guide pedagogy, policy, and institutional support systems.

Research Questions

i. What are the teachers and students' perception toward the use of AI enhanced instructions?
ii. What are the teachers and students' practices when using AI enhanced instructions?

Conceptual Framework of the Study

One of the most important frameworks for researching how technology is accepted in a variety of fields, including education, is the Technology Acceptance Model (TAM). The Theory of Reasoned Action served as the foundation for TAM, which was created by Fred Davis in 1989 and especially modified to explain and forecast user behaviour related to information technology (Sharma et al, 2023). According to TAM, a person's decision to accept or reject a technology is primarily influenced by two fundamental constructs; perceived usefulness and perceived ease of use. The degree to which a person thinks that utilizing a specific technology would enhance performance at work is known as perceived usefulness (Sahin, F., & Sahin, Y. L, 2021). Perceived ease of use, on the other hand, refers

to how much a person think such technology would be effortless to use. These essential two factors perform complementary functions to influence users' perceptions about technology, which in turn influences their intention to utilize it and, ultimately, how they actually use it (Sharma et al., 2023).

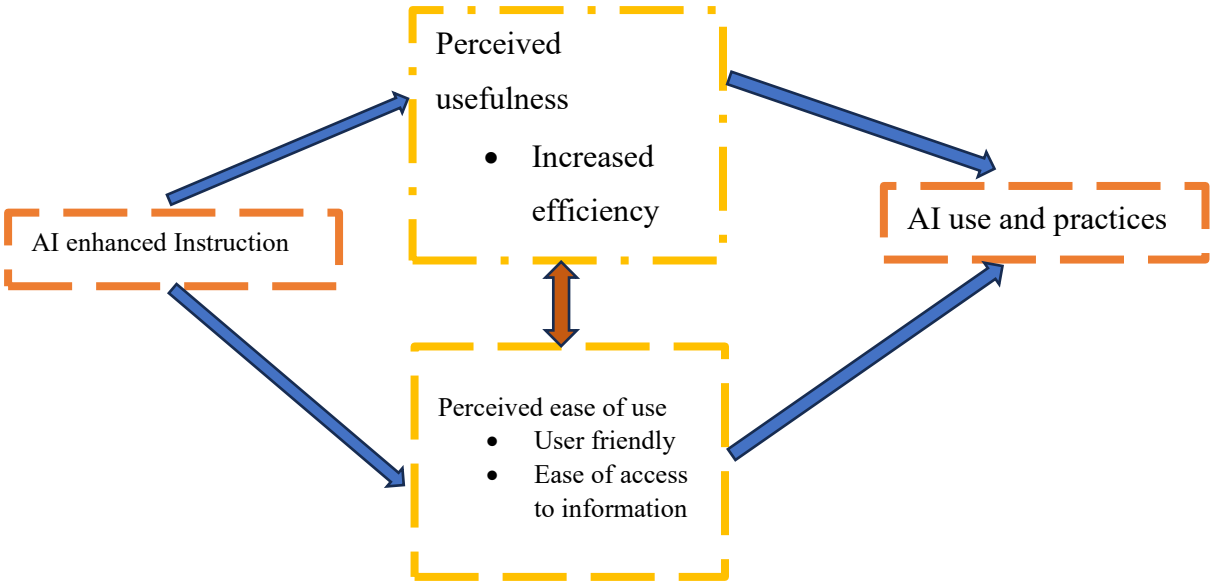

Figure 1. A Conceptual Framework Based on the TAM Model (2024)

Whether a teacher or student think a certain technology will improve their educational tasks or outcomes is measured by perceived usefulness. For instance, teachers in Tanzanian universities might be more inclined to employ generative AI if they think it will improve the efficiency of lesson planning, enable them to produce interesting content with little work, or assist in customizing learning experiences for each student's needs (Shal, T., Ghamrawi, N., & Naccache, H, 2024). In this regard, TAM offers a prism through which to examine if teachers and students actually believe that a technology tool might improve their instruction. Similarly, students are more likely to embrace generative AI technologies with enthusiasm if they think that these tools may help them learn by giving them individualized feedback or additional resources. As a result, perceived usefulness influences users' attitudes and inclinations to utilize technology by reflecting both its practicality and compatibility with their educational objectives.

The other fundamental element of TAM, perceived ease of use, which emphasizes the amount of work necessary to use a technology efficiently, is as significant. This concept is essential in learning environments, particularly since users' levels of digital literacy might differ greatly (Pal, D., & Patra, S, 2021). For example, teachers and students in Tanzanian universities may view generative AI as a burden rather than a beneficial addition to their academic lives if they have a hard time comprehending or using the technology. In this case, TAM's focus on usability emphasizes how crucial it is to create instructional technologies that are simple to use and available to users with different levels of technical proficiency (Sharma et al, 2023). Adoption barriers are decreased when a technology is seen as simple to use since it lessens cognitive strain and anxiety. On the other hand, users could not even try to incorporate a technology into their activities if they believe it is complicated or hard to learn (Sahin, F., & Sahin, Y. L, 2021). TAM therefore emphasizes the necessity for educational technology developers and

organizations to give user-friendliness first priority, particularly in contexts where a large number of users may lack sophisticated technical abilities or may be reluctant to embrace new systems without sufficient training and assistance.

TAM is extremely pertinent to educational settings, particularly in places like Tanzania where institutions of higher learning that have historically had minimal resources are implementing new technology. In these contexts, TAM is useful for investigating how teachers and students perceive and engage with new educational technologies, such generative AI (Sharma et al., 2023). Enhancing student involvement, expediting administrative procedures, and improving instructional delivery are common goals of educational technology. But only if the end users' teachers and students are prepared to embrace and successfully incorporate new technologies into their daily routines will these potential advantages become a reality. With the use of TAM's organized framework for analysing the main factors influencing acceptance, educators, administrators, and legislators may pinpoint certain areas where users may require assistance, instruction, or resources in order to effectively embrace a technology (Pal & Patra, 2021).

Furthermore, TAM in educational settings frequently includes research on students' adoption of technology, concentrating on how they see the convenience and use of new learning resources. For example, TAM assist in determining how students assess generative AI technologies used for educational purposes in terms of how they contribute to their study and learning activities (Pal & Patra, 2021). Students are more inclined to use AI tools if they believe they may enhance their academic achievement, offer insightful information, or facilitate self-paced learning. Furthermore, as students frequently utilize technology for study-related tasks that call for less technical assistance, usability becomes crucial for them (Şahin, & Şahin, 2021). In settings such as Tanzanian universities, where a large number of students are trained to become teachers, artificial intelligence (AI) may provide them experiences and abilities that they can apply in their own classrooms.

In general, TAM offers a strong and flexible framework for comprehending the uptake of technology in learning environments; it is especially pertinent to researching the use of generative AI in Tanzanian universities. For technology integration in education to be effective, this model highlights the necessity of user-centered design, suitable training, and supported infrastructure. Educational institutions may create a more favourable atmosphere for the adoption of cutting-edge technology that can improve learning outcomes and teaching efficacy by using TAM to better understand the requirements and perceptions of teachers and students.

Methodology

Philosophy of the Study

The study was based on the pragmatic philosophical viewpoint, which emphasizes the application of various techniques to fully solve research concerns. Using both qualitative and quantitative data to examine various aspects of the phenomena from many angles is made possible by pragmatics (Ngulube and Ngulube, 2022). This viewpoint is pertinent because it encourages the use of empirical data to investigate how teachers and students perceive and use AI in higher education. By striking a balance between rich, contextual insights and numerical

data, this dual method guarantees a comprehensive comprehension of the study subject. It also emphasizes both objective and subjective measurements.

Research Approach

In order to explore the topic in broad, the study employed mixed-methods research Approach. By collecting and evaluating both quantitative and qualitative data, this method enabled information triangulation and offered a deeper comprehension of the subject matter. By combining these two data sources, the study was able to fully capture the scope and complexity of the research topic, producing a more solid and trustworthy analysis (Amadi, 2023). In order to find insights and patterns that were not only visible with a single approach, it was crucial to use a combination of methodologies.

Research Design

The study employed an exploratory sequential design as a continuous roadmap to direct the process and offer a pertinent yet adaptable structure for locating, assessing, and incorporating primary quantitative and qualitative data. Prioritizing the collection of qualitative data to investigate a phenomenon and then obtaining quantitative data to elucidate any links or patterns discovered in the qualitative data was the aim of this approach (Taherdoost, 2022). In addition, this technique was chosen because it fits the goals established by the guiding research questions and the kinds of data that are accessible via the partnering platforms. In order to capture the granular details, broad patterns, and distinctive features of the various data types that, when analysed collectively, provide the insights and contextualization needed for a solid analysis, it was concluded that depending only on qualitative or quantitative data would not be adequate.

Research Area

The study looked into the perceptions and practices of teachers and students in four Tanzanian higher education institutions on the use of AI to raise educational standards. These include the Open University of Tanzania (OUT), Mzumbe University (MU), Catholic University of Mbeya (CUOM), and Mbeya University of Science and Technology (MUST). These colleges were selected due to their well-established reputation, abundance of resources, and strong emphasis on technology-related curricula. This study offers important insights into how AI can change Tanzanian higher education by examining the perceptions and practices of teachers and students in these institutions.

Sampling Methods and Sample Size

Teachers and third-year students enrolled in educational courses were the main focus. Students have a stronger awareness of the potential, perceptions, and practices of AI technologies since they were exposed to them extensively through experience-based learning. The study focused on teachers who were in education departments. It is anticipated that teachers in these fields would know more about artificial intelligence (AI) and

how it is being incorporated into teaching and learning.

Not even all third-year students could be included. The researcher employed probability sampling procedures in order to ensure students have an equal chance of participating in the study. Initially, the researcher was able to choose every third-year student according to their programs by using the cluster sampling approach. Students were then divided into two groups, or strata, within each cluster: males and girls. Students in each program were then chosen using a systematic sampling approach. To determine a sample frame number or a number to be chosen while students count, the researcher performed computations.

Ten teachers from each university made up the sample size. Teachers were sampled using simple random sampling technique in which all teacher had equal chance to participate in the study. We kept this sample size constant for every university to guarantee equal representation and enable fair comparisons between them. Each university makes an equal contribution to the general perception and practice of AI enhanced instructions, and the consistent sample size makes data collecting easier to handle and more methodical. Because the same number of teachers took part in interviews, it also streamlines the logistics of data gathering, increasing process efficiency and consistency. The study collected a variety of viewpoints from 10 teachers at each university, guaranteeing that the results include a wide range of experiences and viewpoints on the incorporation of AI in higher education.

Table 1. Participants Breakdown

Participants	Sample Size
Teachers (10 from each University)	40
Students (50 from each University)	200
Total sample size	240

Source: Field data, 2024.

Data Collection Methods

The study used focus groups, interviews, and questionnaire administration to collect quantitative and qualitative data. Each method was utilized to gather a comprehensive set of data from different perspectives, and its procedures and outcomes were described in this section.

Interview

Semi-structured interviews were used in the study to gather data. Semi-structured interviews were selected because the researcher sought to get first-hand information by delving further into participants' thoughts, experiences, and recommendations about perceptions and practices surrounding the use of AI in Tanzanian higher education institutions. Semi-structured interviews enabled the researcher to be more flexible in how they framed the questions and probed, which helped to minimize biases in the data gathering process. All colleges participated in a total of sixteen (16) interview sessions. To allow for extended interaction with the participants, each interview lasted 45 to 50 minutes. Participants were briefed on the study's purpose before to the interviews, and the

researcher recorded the interviews using digital recorders to ensure that the original data are retained and to get a verbatim description of the sessions. Every interview session was carried out with the participants' permission. To get the data ready for writing, editing, and review, field notes and participant conversations were transcribed.

Focus Groups Discussions (FGD)

Students' data was gathered using FGD. These focus group discussions (FGD's) enabled students to share their opinions about how they perceive and use AI. There were eight FGD's held at the chosen universities in all. For efficient data collection, the group size should be modest, ranging from four to ten members (Baig et al. 2020). Seven students were therefore chosen for each group using the simple random sampling technique to participate in FGD. Each discussion session lasted around 25 to 30 minutes and took place inside the classrooms after class hours. By giving everyone an equal chance to contribute, the researcher presented the subject and led the conversations through questions. A Tape recorder used to record all the views expressed by students during the discussions. The data gathered via focus group discussions (FGDs) used to confirm and enhance the data gathered from questionnaire and interviews.

Questionnaire

Teachers' and students' opinions and practices about the use of AI in education were gathered using a closed-ended questionnaire. Three main factors made it anticipated that the questionnaire would yield appropriate data for this study. First, the results of the questionnaire are often quite reliable and consistently generate results in most circumstances. Second, a questionnaire allows the researcher to get a lot of data in a reasonable period of time. Thirdly, the questionnaire allows respondents to freely express their opinions in a confidential environment (Kumatongo & Muzata, 2021). The researcher created the questionnaire for this study based on existing literature. Also, the questionnaire was created with assistance from other experienced researchers working in research undertakings. The questionnaire was created to address the research questions and represent the goal of the study.

Analysis of Data

Data collected from teachers and students via questionnaire was analysed using the Statistical Package for the Social Sciences (SPSS) V.21 software. Quantitative data from the questionnaires were analysed using descriptive statistics. Following the procedures described by Braun and Clarke (2022), thematic analysis used to examine the qualitative data from focus groups and interviews. In order to find parallels and discrepancies in the way AI is seen and used to improve learning at higher education institutions, this method entailed classifying the data, finding themes, and comparing these themes across other universities.

Quality of Data

Quantitative Data Validity and Reliability

Piloting the questionnaire ensured the reliability and quality of the quantitative results. This helped the researcher

to discover inconsistency and ambiguities before the final instrument (questionnaire) is used to gather data from selected higher learning institutions in Tanzania. Furthermore, the validity of the study instrument was ensured by distributing questionnaire questions to coworkers for verification that they measure the intended variables. To make sure the research findings represent the goal and aim of the study, some of the questionnaire items were changed, and those with ambiguities were removed.

Trustworthiness of Qualitative Data

Triangulation of data sources through the use of various data collecting methods helps to decrease participant response bias and assure the trustworthiness of the qualitative data. To see if there was agreement on the interpretation of the evidence, the researcher also employed peer debriefing. The researcher presented the research findings to colleagues for critical review, comments and constructive ideas which were taken to improve the study.

Ethical Consideration

By informing respondents beforehand about the study's purpose, the information being sought, its intended use, and the potential benefits and outcomes derived from the data gathered, ethical concerns were adhered. Confidentiality was further guaranteed by agreements between the researcher and the respondents that the information collected from them would only be used to fulfill the study's objectives and would not be shared without the respondents' approval. Additionally, in order to appeal to intellectual honesty, the sources of the information and resources used were recognized through references and in-text citations.

Findings

Respondents' Demographic Characteristics

The participants' demographics differed in terms of gender, age, educational attainment, and educational experience.

Teachers' Demographic Information

The sample was made up of teachers with a range of backgrounds, including male and female teachers with varying degrees of education and experience. The demographic characteristics of participants of this study are presented in Table 2.

Table 2. Demographic Characteristics of Teachers (N=40)

Demographic variable	Categories	N	%
Universities	U1	10	25%
	U2	10	25%
	U3	10	25%

	U4	10	25%
Gender	Male	25	62.5%
	Female	15	37.5%
Education level	Bachelor	10	25%
	Masters	20	50%
	PhD	10	25%
Teaching Experience	1-5 years	10	25 %
	5-10years	20	50%
	10 and above	10	25%

Source: Field data, 2024.

Table 2 represents teachers who completed questionnaire on the perceptions and practices of using AI in higher learning institutions. There were 15 (37.5%) female teachers and 25 (62.5%) male teachers. This suggests that both sexes were included in the study. Regarding educational attainment, 10 teachers (25%) had a bachelor's degree, 20 teachers (50%) had a master's degree, and 10 teachers (25%) had a doctorate. This suggests that participants had a solid understanding of AI-related topics as a result of their exposure to and education in academia. Additionally, 10 teachers (25%) had 1–5 years of teaching experience, 20 teachers (50%) had 5–10 years, and 10 teachers had experience of 10 years and above. This suggests that the participants had enough experience, making them valuable contributors to share their perspectives and AI-related practices.

Students' Demographic Characteristics

Students of various ages, both male and female, and with a range of features made up the sample. The demographic characteristics of participants of this study are presented in Table 3.

Table 3. Demographic Characteristics of Students (N=200)

Demographic variable	**Categories**	**N**	**%**
Universities	U1	50	25%
	U2	50	25%
	U3	50	25%
	U4	50	25%
Gender	Male	120	60%
	Female	80	40%
Age	15-20 years	120	60%
	20-25 years	70	35%
	25 and above	10	5%

Source: Field data, 2024.

Table 3 represents students who completed questionnaire on the perceptions and practices of using AI in higher learning institutions. There were 80 (40%) female students and 120 (60%) male students. This suggests that both

sexes were included in the study. In term of age group of students, students with 15-20 years were 120(60%), with 20-25 years were 70(35%) and with 25 years and above were 10(5%). This suggests that research participants were sufficiently developed to offer adequate knowledge on perceptions and practice pertaining to artificial intelligence in education.

Teachers and Students' Perceptions on the use of AI

The first research objective of the study intended to find out teachers and students' perceptions on the use of AI in enhancing teaching and learning instructions. Data were obtained from teacher's interview and questionnaire. In addition, data from the students were obtained through focus group discussion and questionnaire. The findings revealed that perceptions on the application of AI in education varied across teachers and students. Some of teachers and students perceive the use of AI in a positive way and other perceive the use of AI in a negative side. AI was seen by teachers and students as a way to enhance personalised and flexible learning experience, facilitate learning and academic activities, improve teaching strategies and student engagement, and provide access to high quality educational resources. On the other hand, some teachers and students perceived the use of AI as diminishing students thinking skills, plagiarism and related academic dishonesty as well as lack of knowledge and skills in using AI enhanced instruction.

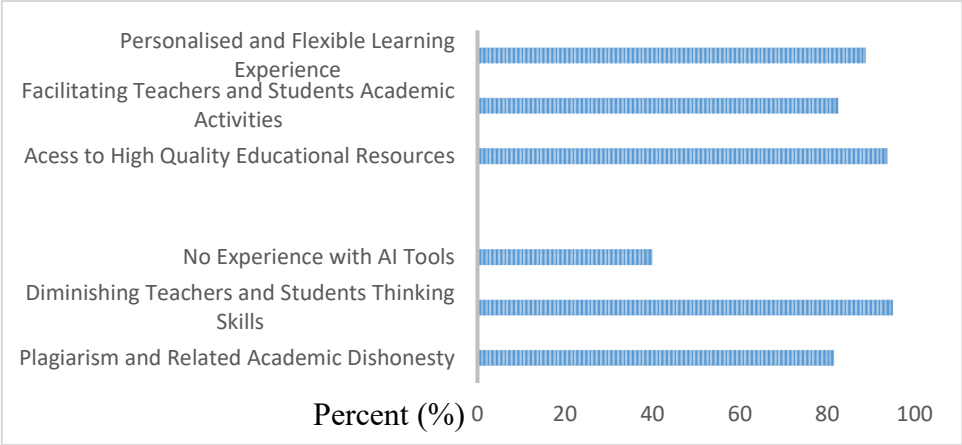

Figure 2. Summary of the Teachers and Students' Perceptions on the Use of AI Enhanced Instruction

AI Enhanced Instruction as a means for a Personalised and Flexible Learning Experience

The findings obtained from teachers' questionnaire revealed that 35(87.5%) agreed that AI enhances flexible and personalised learning experience while 5(12.5%) disagreed. In the same vein, students 180(90%) agreed while 20(10%) disagreed. This research suggests that AI improves personalised and flexible learning experience. It was discovered that AI makes learning flexible and individualized by adjusting to the demands, learning preferences, and speed of each unique learner. It provides real-time feedback, builds personalized learning pathways, and dynamically modifies material according to user performance. Additionally, teacher T1 clarified at the U1 interview that:

> AI is a new technology that has made learning easier for students and it encourage them to learn at their own pace. It encourages students to independently search various content and develop deep understandings even in the absence of guidance from teachers. This is undoubtedly a significant step in the direction of educational technology development (Interview, T1 at U1: October 21st, 2024).

Furthermore, U3 teacher (T4) held a similar opinion.

> Since students are the ones who bring information to the classroom in a digital age, the development of artificial intelligence (AI) has significantly advanced students' self-directed learning. Students are now more independent learners, and their contributions to the classroom are valued (Interview, T4 at U3: October 20th, 2024).

According to the teachers results, students may study at any time, from any location, and in a variety of ways using video, simulations, or animation, to suit their varied learning preferences. This method reduces achievement disparities, supports varying learning needs, and improves engagement.

Additionally, during the university U4 focus group discussion, students were seen stating:

> We often use AI technologies to learn on our own. Artificial Intelligence has made learning easier for us and gives us hints for future learning. We gather some of the subject information using ChatGPT and continue to investigate to gain enough understanding about the topic (FGD at U4: 16th October, 2024).

In addition, a University U2 students stated the following:

> Since this is a university education, we increase our understanding of the topic by supplementing it with ChatGPT information, which improves our individualized learning and adaptability to many subjects (FGD at U2: 18th October, 2024).

These teachers and students' data suggest that AI improves flexible and customized learning by using sophisticated algorithms to customize learning experiences to meet the individual needs of every learner. By analysing a student's preferences, shortcomings, and capabilities, AI can create personalized learning paths that offer just the appropriate amount of assistance and challenge (Mtebe, 2023). Based on student performance, adaptive learning systems, for instance, dynamically modify the level of difficulty of classes and offer materials or exercises that are specifically tailored to each student. AI also provides flexibility by making learning resources accessible through digital platforms at any time and from any location, which makes it perfect for remote learning or self-paced study.

AI Enhanced Instruction as a means of Facilitating Teachers and Students Academic Activities

The findings obtained from teachers' questionnaire revealed that 30(75%) agreed that AI facilitates teachers and

students' academic activities while 10(25%) disagreed. Similarly, students 170(90%) agreed while 30(15%) disagreed. These results demonstrate how AI revolutionizes academic activities by simplifying them and increasing their efficacy and efficiency. Time-consuming administrative duties like tracking attendance and grading are automated by AI. For instance, university U1 teacher (T2) made the following observation:

> Generative AI is now being utilized for academic tasks like grading and student attendance tracking. In addition, AI includes various features that enable plagiarism detection and content relevance checks. AI has, in fact, enhanced academic activities and made them more straightforward and precise (Interview, T2 at U1: October 20th, 2024).

Teacher T5 from university U2 had a similar perspective, stating that:

> AI makes it simple to do academic tasks like research. I often scan recent literature and paraphrase academic information using AI, namely ChatGPT. In this digital era, artificial intelligence (AI) has a lot to offer, and I urge academics and students to use it to better teaching and learning (Interview, T5 at U2: 14th October, 2024).

These results suggest that AI plays a significant role in supporting academic activities for both teachers and students. Automated grading methods, for instance, guarantee uniformity and equity while drastically cutting down on the amount of time needed to assess assignments and examinations. Teachers can find areas where individual students or the class as a whole may need more support by using AI-powered classroom management technologies that analyse student performance and produce insights. Instead of becoming bogged down by mundane activities, these technologies allow teachers to concentrate on more significant interactions with students, such as mentoring and encouraging critical thinking.

Additionally, students at University U1 added during focus group discussions that:

> Through ChatGPT, we learn how to produce educational projects and reports. With the help of ChatGPT's many features, we may ask as many questions as we like to obtain thorough instructions on how to complete these projects and any other assignments that the teachers provide. AI is a vital and significant tool for us since it improves information accuracy and reach (FGD at U1: October 17th, 2024).

Additionally, University U4 students shared a similar perspective on AI. They stated:

> The majority of our materials, especially ChatGPT, are produced by generative AI. These resources enhance the content created by teachers and help us comprehend the subject matter better. Additionally, we use AI to complete teacher assignments, research, and projects (FGD at U4: 13rd October, 2024).

These teacher and student findings imply that AI can benefit academic endeavours for both parties. AI-powered adaptive learning systems use real-time data analysis to generate personalized learning experiences, modifying

the content and level of difficulty according to each student's development. AI systems prioritize language-focused tasks while still challenging a student who excels in arithmetic but fails in language arts, for instance. Intelligent chatbots and virtual instructors offer immediate support, responding to inquiries and breaking down ideas as needed (Saaida, 2023). Students may study at their own speed and get answers to their questions right away because of the instant feedback, which fosters independence and confidence in their learning process. AI-driven augmented reality experiences and gamified platforms, according to teachers and students, make difficult subjects like physics and history more approachable and engaging. AI tools like text-to-speech, speech-to-text, and real-time translation give special needs students access to chances for engagement and comprehension that would not otherwise be possible. AI also monitors learning trends over time, giving teachers the information they need to create more effective interventions while also assisting students in identifying their areas of strength and weakness (Rizvi, 2023). Thoughtful AI integration improves academic operations and gives students access to individualized, interesting, and easily available learning possibilities.

AI Enhanced Instruction as a means for Teachers and Students to Access High Quality Educational Resources

The findings gathered from teachers' questionnaire suggested that 38(95%) agreed that AI aids teachers and students to have access to high quality educational materials whereas 2(5%) disagreed. Similarly, students 185(92.5%) agreed while 15(7.5%) disagreed. These findings show that, AI augmented instruction gives teachers and students with access to high-quality educational materials, altering the way information is provided and assimilated. For teachers, AI functions as a strong helper in collecting relevant, up-to-date materials customized to the unique demands of their classroom. AI-powered systems like digital libraries and content recommendation engines assess the curriculum and offer teaching aids such as videos, articles, and lesson plans that correspond with educational goals. This not only saves educators time but ensures they have access to diverse, high-quality resources that enhance lesson delivery and engage students more effectively. For example, Teachers T4 from university U3 said that:

> AI enables me to quickly create multimedia instructions, including animations, videos, and other tech-based materials. These resources are often interesting, and they help my students understand the content better. ChatGPT gives students an equal opportunity to participate in teaching and learning (Interview, T4 at U3: 19th October, 2024).

Furthermore, university U4 teacher (T3) added that:

> Since AI in education has advanced, my methods of instruction have evolved. At the moment, students like interacting with artificial intelligence (AI)-generated educational resources that make things easier for them to understand. Similar to this, AI tools give students access to well-organized and structured content (Interview, T3 at U4: 12th October, 2024).

According to the teachers' findings, artificial intelligence (AI) removes conventional barriers to learning by providing a multitude of resources tailored to each student's skills and interests. For example, adaptive learning

systems make abstract concepts more relatable by offering interactive resources like gamified activities, simulations, and real-world case studies. In order to accommodate diverse learning styles and aid students in better understanding difficult subjects, these resources frequently come in a variety of formats, including text, audio, video, and interactive exercises. Furthermore, AI systems guarantee that educational resources are up-to-date and correct, giving students a solid basis on which to enhance their knowledge. In a similar vein, U3 students shared some thoughts about how they view the application of AI. They stated the following:

> We are permitted to employ AI technologies like ChatGPT, especially at this university. We typically use AI tools to create notes and look up books and related references. In general, we can say that learning is easier these days and that we appreciate the advancements in science and technology (FGD at U3: October 20th, 2024).

Similarly, students during focus group discussion at University U2 noted that:

> To us its straightforward to make use of AI particularly when I want to understand anything that I didn't grasp well in the classroom. AI helps me to search for video, animations and other materials that supports the information learned in the classroom (FGD at U2: 22th October, 2024).

AI-enhanced instruction democratizes access to high-quality materials, making high-quality education available regardless of geographic or financial limits, according to teacher and student findings. By filling in the gaps in resource availability, open-source AI tools and platforms provide students in rural or poor places with top-notch educational content. Translation and accessibility capabilities enabled by AI further guarantee that non-native speakers or students with impairments may access the same high-quality materials as their classmates (Amadi, 2023). By harnessing AI in education, teachers and students alike can access a broader spectrum of engaging, relevant, and inclusive resources, elevating the overall teaching and learning experience. Given the aforementioned positive perception of teachers and students toward the use of AI enhanced instructions. The following are the negative perceptions exposed by teachers and students on AI.

AI in Diminishing Students and Teachers Thinking Skills

The integration of AI in education, while highly beneficial, inadvertently diminish the critical thinking skills of both students and teachers if not used thoughtfully. For students, reliance on AI for instant answers and solutions may reduce the need for independent problem-solving and deep analytical thinking. Without forcing students to engage in the cognitive processes of developing arguments, considering several alternatives, or synthesizing information, tools such as automated essay writers, math solvers, or even AI-driven research platforms frequently yield rapid results. 98% of students rely on AI resources, and they typically copy and paste assignments and exercises given by the teacher. Over time, this dependence might result in superficial learning, where students may understand the "what" but not the "why" or "how". Similarly, because they presently rely on generative AI, like ChatGPT, for every work assigned by the teacher, students assessed AI tools as reducing their thinking abilities by 95%. In an interview with a university U4 teacher (T2), the following was stated:

> There are advantages and disadvantages to technological advancement. Teachers and students are indeed held accountable by ChatGPT, especially when it comes to cultivating an inquisitive mindset. For example, students utilize AI tools for every activity offered by the teachers, now the question comes what are their contribution produced from their thinking.... (Interview, T2 at U4: 20th October, 2024).

In addition, teacher (T6) from University U1 mentioned that:

> Overreliance on AI means to generate incompetent persons, because there is no method by which I can avoid using AI tools and is tough for me to discourage students on using AI tools, I think we need to view this as a challenge and move on.... (Interview, T6 at U1: 14th October, 2024).

Findings from teachers' interview indicates that creative and critical thinking abilities may deteriorate if they unduly rely on AI to create classes, grade assignments, or offer feedback. For instance, while AI-generated lesson plans or automated grading systems might save time, they could lessen the teacher's involvement with the content and the intricacies of student work. The dependence on pre-designed templates or systems may inhibit teachers from innovating or adjusting their teaching techniques to specific classroom dynamics. This over-dependence can develop to a mechanical style of education, where the teachers function more as a facilitator of AI technologies than as an engaged and reflective participant in the learning process.

Furthermore, during Focused group discussion with students of U2 explained that:

> Although artificial intelligence (AI) technologies are available to aid in learning, relying too much on them might somewhat impair critical thinking abilities. It is preferable to learn how to use AI tools more effectively to encourage an inquisitive mindset in us (FGD at U2: 22th October, 2024).

It is clear from these results that teachers need to see AI as an adjunct to human intellect, not a substitute, in order to reduce these hazards. Students' critical thinking abilities may be preserved by encouraging them to utilize AI as a springboard for more in-depth research, such as confirming facts, evaluating AI-generated output, or pointing out the system's shortcomings. Similarly, teachers' professional development should focus on using AI to support their educational creativity and analytical engagement rather than to replace it. Both teachers and students will be able to maintain and improve their critical thinking abilities if AI usage is balanced with active and critical participation.

AI Plagiarism and Related Academic Dishonesty

Teachers gave it a rating of around 78%, while students gave it 85%. The emergence of AI-generated materials has brought about serious problems with plagiarism and academic dishonesty, radically changing how teachers and students approach academic integrity. Teachers and students may quickly develop complex material with AI tools like text generators, essay writers, and code makers, frequently avoiding the time and effort needed for academic assignments. Students may turn in work produced by AI as their own, which would undermine

individual responsibility and result in the acquisition of rudimentary knowledge. Due to students' failure to participate in critical thinking, investigation, and problem-solving all of which are essential for their intellectual development this abuse compromises the educational process. For instance, U3's teacher (T5) stated that:

> The majority of students' work is produced by AI and has a significant percentage of plagiarism. Students accept the text produced by AI as fact, without alteration or even paraphrase. Most of them have failed open tasks from teachers as a result of this (Interview, T5 at U3: 16th October, 2024).

In addition, teacher T2 from university U1 stated that:

> Teachers also heavily rely on AI-generated resources for instruction, however often fail to account for plagiarism concerns. Plagiarism and academic dishonesty are issues that arise when AI-generated work is copied and used. Teachers should get instruction on how to use AI-generated content more effectively (Interview, T2 at U1: October 13rd, 2024).

According to the aforementioned quote, plagiarism issues are exacerbated by AI's ability to create original content that avoids detection by conventional plagiarism detection systems. Even if the content doesn't explicitly replicate pre-existing sources, it is still academically dishonest to pass off AI-generated work as original. Furthermore, there may be a grey area in ethical academic practices if some students utilize AI to paraphrase or reword text without properly citing it. As it gets harder to tell the difference between real and artificial intelligence-generated work, this trend not only impacts individual students but also makes it harder for institutions to maintain fair grading criteria. In a similar vein, university U3 students stated in a focus group:

> We are aware that plagiarism exists, but we don't bother using paraphrasers or other AI techniques to better organize the work because we have too many tasks and assignments. Our high plagiarism rate causes us to fail in one way or another, and we occasionally receive fines for it (FGD at U3: 24th October, 2024).

According to teacher and student quotes, utilizing AI for education raises issues with academic dishonesty and plagiarism. Institutions must take proactive measures to address these issues, such putting in place cutting-edge AI-detection technologies, updating academic honesty policies to incorporate rules on the use of AI, and cultivating an integrity-based culture (Yu, 2024). Teachers can promote openness and educate students how to utilize AI responsibly, for as by using it to improve drafts or brainstorm ideas while acknowledging its input. Educational systems may adjust to the changing role of AI while maintaining academic integrity by highlighting the importance of effort, creativity, and intellectual honesty.

Teachers and Students' AI Practices

Overview of AI Tools and its Practices

Teachers and students were asked to explain the kinds of AI tools they use and the particular tasks they apply in

this section. Approximately 200 (83.3%) of the participants reported using Bing AI for academic purposes, such as identifying areas for improvement in paper manuscripts, summarizing literature, completing exercises, assignments, and creating teaching and learning resources. An additional 170(70.83%) utilize the Grammarly AI tool for language manipulation, including editing, paraphrasing, and grammar checking, and the QuillBot grammar AI tool for summarizing, editing, and paraphrasing papers. Approximately 180 (75%) of the respondents create various AI images, charts, diagrams, and other materials for teaching and learning using image generators. 160 (66.66%) of the respondents said they use Bard AI for language editing and modification, finding instructional resources, and gaining insight into problems. Furthermore, 175 (72.91%) of the respondents use AI Plagiarism Detector to check assignments and other academic-related work for plagiarism, while 230 (95.83%) participants use ChatGPT to find reading materials and teaching notes, gain insight into some new issues, and manipulate language in ways like summarizing documents, paraphrasing, and checking grammar.

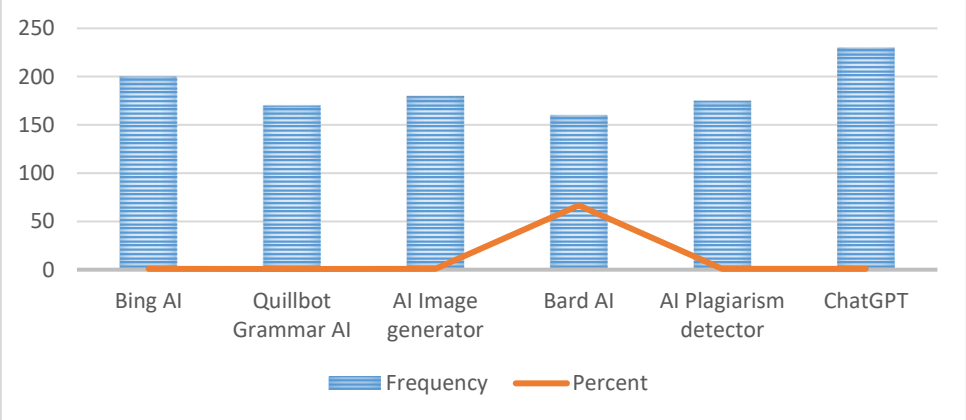

Figure 3. Summary of the Type of AI Tools Used and its Practices

Carrying out Scientific Practical and Online Tutorials

Teachers and students mentioned that they may perform experiments that mimic real-world situations in virtual labs driven by artificial intelligence. Teachers and students can conduct experiments in these laboratories using computers or mobile devices, negating the need for tangible laboratory supplies. For example, a student may be guided through the process of extracting DNA from a simulated material in a virtual Biology lab. Every step is tracked by the lab's AI system, which provides real-time feedback, fixes mistakes, and makes sure students comprehend the process and the underlying scientific ideas. Furthermore, University U1 Teacher (T2) stated that:

> I utilize AI to create protocols for doing tests. This gives me enough exposure to various experimental techniques and allows me to know how to conduct the tests. In a similar vein, there are several tutorials on prompts that I may use to help my students think (Interview, T2 at U1: 15th October, 2024).

Additionally, university U4 teacher (T3) noted that:

> I successfully use AI into my teaching methods since it enables me to choose as many lessons as I require to improve my students' comprehension of the material. Additionally, I may obtain useful videos and

> instructions on how to do tests using AI's feature (Interview, T3 at U4: 18th October, 2024).

These results suggest that AI is essential for tailoring scientific courses. By analysing performance data, intelligent tutoring systems (ITS) adjust to the unique learning styles and speeds of each learner. For instance, the AI may provide easier examples or extra tasks to help students who are having trouble comprehending a certain idea. On the other hand, more difficult issues might be presented to advanced students. These systems help teachers better customize their teaching methods by providing them with comprehensive data that emphasize each student's progress and areas that require improvement.

In addition, students mentioned the following regarding AI practices during the focus group discussion.

> We often utilize AI, namely ChatGPT, to look up online instructions and become acquainted with the many steps involved in doing scientific investigations. This makes it easier to comprehend and master many practical without the assistance of teachers (FGD at U2: October 20th, 2024).

Likewise, during the focus group discussion, students added:

> For online lessons and practical, ChatGPT is essential. We make the most of these new technologies to get fresh perspectives and investigate a range of scientific phenomena (FGD at U3: 24th October, 2024).

These AI-powered technologies work together to improve education in a number of ways. Regardless of their location or the resources available at school, students have access to state-of-the-art scientific learning possibilities. Particularly when replicating risky operations like chemical reactions, AI systems guarantee a secure and risk-free environment (Alotaibi, 2023). By accommodating a range of learning requirements and guaranteeing that each student may advance at their own speed, they also promote inclusion. By facilitating the administration of bigger groups and addressing individual learning gaps, these technologies help teachers improve classroom management.

AI Lesson Planning and Content Generation

The results showed that by analysing curricula, learning objectives, and student data, AI systems streamline the process of lesson preparation and content creation. The AI recommends organized lesson plans that support learning objectives based on themes or standards that teachers and students can enter. Teachers may save a great deal of time and effort by using these plans, which frequently contain activities, evaluation techniques, and dates. By suggesting age-appropriate content and tactics based on student achievement and curriculum requirements, platforms such as ScribeSense and Chalk aid in automating lesson planning. Additionally, the university U3 teacher (T2) stated:

> AI, in particular ChatGPT, is crucial to my lesson planning and content creation as I often utilize it to establish learning goals, choose pertinent teaching resources, and conduct assessment and evaluation.

> The information produced by AI is organized rationally and methodically to make it easier for students to grasp (Interview, T2 at U3: October 17th, 2024).

The University U2 teacher (T7) made the following observation:

> I use AI technologies to choose and arrange lesson plans and instructional materials. I choose the assignments, tests, and learning activities for my students. Similar to this, I utilize AI to evaluate students since it guarantees equitable evaluation and grading; in fact, AI is helpful in classroom operations (Interview, T7 at U2: 19th October, 2024).

AI's ability to personalize lesson preparation is very potent. Artificial intelligence (AI) systems can pinpoint areas in which students struggle and provide classes that fill those gaps by analysing individual or group learning histories. For example, if data indicates that students in a math class are routinely performing poorly on algebraic equations, the AI may suggest targeted exercises, more examples, or visual aids to help them grasp the material. Likewise, during the focus group discussion, students stated the following:

> With the use of ChatGPT video, simulations, animations, and photos, we may create our own educational resources that help us comprehend and learn more about the subjects we are studying. AI-generated material is well-structured and uses straightforward language (FGD at U4: October 25th, 2024).

Students from University U1 added the following to the same point:

> .... Specifically, we use AI teaching to choose learning tasks, complete assignments, and complete other teacher-provided classroom activities without relying on the materials of the teachers. Because ChatGPT is available to us, we are thoroughly enjoying the lesson (FGD at U1: 18th October, 2024).

According to these findings, both teachers and students utilize AI technologies to create a variety of educational materials, including practice questions, quizzes, multimedia presentations, and instructional films. Custom materials are produced in a matter of seconds by content generating systems such as Quizlet or OpenAI's GPT-based tools. The AI generates customized outputs based on the topic, level of difficulty, and format that teachers specify, such as multiple-choice exam questions or an explanation section (Aljohani, 2021). AI also adjusts reading materials' linguistic difficulty to accommodate various age groups or learning levels. In a similar vein, the resources produce information in several languages, encouraging inclusion in classes with various languages. In order to promote engagement and deeper learning, interactive components such as games or simulations are also developed.

Discussion

Teachers and Students' Perceptions on the Use of AI

The findings revealed that teachers and students have a varied perceptions with regard to the use of AI. This

indicates that teachers and students were exposed to both favourable and unfavourable perceptions on the application of AI. They perceive AI as improving their educational process, pointing to advantages including more individualized instruction, time savings, and easier accessibility (Billy and Anush, 2023). According to the statistics, students like the instant feedback that AI-powered grading systems give them since it enables them to recognize and quickly fix their areas of weakness. Additionally, AI tools' customisation helps accommodate different learning styles and speeds, which is especially helpful for people who might find it difficult to adapt to the one-size-fits-all nature of conventional teaching approaches (Billy and Anush, 2023). Students also emphasized the ease of use and involvement of AI technologies in their educational endeavours. One major benefit of AI is its capacity to offer on-demand help and support via chatbots and intelligent tutoring systems (Rizvi, 2023). Their confidence and drive are increased, and their learning efficiency is improved by this instant access (Silva and Janes, 2020). But teachers and students also voiced worries about the possible overuse of AI, which may weaken their capacity for critical analysis and problem-solving (Pratama et al., 2023). They fear that if AI technologies take over, they may lessen the importance of human connection in the classroom, which is essential for fostering emotional intelligence and soft skills. They are worried about the effects on their teaching methods and job security, even if they recognize the potential advantages, such as lessening the administrative load of grading and offering tailored feedback (Shrungare, 2023). Concerns regarding the ethical ramifications of AI usage in education are shared by educators and learners. They provide careful thought to matters like data privacy, security, and possible biases in AI systems (Li et al., 2024). They stress the necessity of precise rules and regulations to guarantee the ethical and responsible use of AI tools (Rizvi, 2023). Also, Yu (2024) found that because AI is a relatively new technology, teachers and students find it challenging to utilize, particularly in low-income nations like Tanzania. According to the study, teachers and students have a negative perception of the use of AI in education because of privacy concerns, academic laziness, plagiarism, a lack of clear policies to harness the use of AI in academic settings, and inadequate training on the use of such emerging technology.

Teachers and Students AI Practices

The results showed that both teachers and students agreed that using AI in the classroom improves their teaching methods. They said that because AI has made studying easier, both teachers and students may now devote more of their time to other academic pursuits. The study found that artificial intelligence (AI) practices help to create material and make online lessons easier. The results of the study also demonstrated the value of AI technologies in conducting insightful analytics, such as identifying trends in student enrolment and dropout rates. It has also been mentioned that AI can assist researchers in a variety of ways, and that these tools may be used to identify plagiarism. According to the study, teachers and students utilize a number of AI applications for their academic work, including Quill Bolt, Grammarly, Bard AI, and ChatGPT for language editing, paraphrasing, and searching for educational resources. The results showed that educators thought using AI in the classroom was simple, that is why most of them thought it was helpful. This has led to the widespread usage of AI in academia. According to a survey by Alotaibi (2023), the most popular AI tools in the practices of teachers and students were Grammarly, QuillBolt, and ChatGPT. These artificial intelligence (AI) technologies have helped teachers and students who struggle with writing, particularly with strengthening their language skills while writing formal letters, academic papers, and paraphrases. This has also allowed them to save time for other academic endeavours. AI is used by

educators for both teaching and administrative tasks. AI-powered solutions, like as learning management systems (like Moodle or Google Classroom), simplify administrative duties like performance evaluation, attendance tracking, and grading. By saving time, these resources enable teachers to devote more of their attention to mentorship and instruction (Komba & Ndidde, 2020). Teachers use AI in the classroom to provide personalized and interesting learning experiences. They can monitor each student's progress and offer tailored feedback thanks to adaptive learning platforms, which cater to a range of learning requirements. Additionally, complicated ideas are illustrated using AI-powered virtual simulations, which make abstract subjects easier to understand (Suleiman, 2021). AI is also beneficial to research methods as it helps with data analysis through tools like SPSS and Python libraries and maintains academic integrity with plagiarism detection software like Turnitin. Additionally, for professional growth and networking with academic communities throughout the world, educators utilize AI-powered platforms such as Coursera or LinkedIn Learning (Mtebe, 2023). Apps with AI capabilities, like Quizlet, Khan Academy, and Duolingo, offer personalized learning experiences that adjust to users' learning preferences and speed (Ahmed et al., 2022). Chatbots and virtual instructors provide students immediate clarifications and direction, which helps them grasp difficult subjects. Students also employ AI technologies to better their academic writing; Grammarly and QuillBot are two examples of systems that help students improve their vocabulary, grammar, and structure. For effective literature searches and software for data analysis in projects, students in research depend on AI-driven platforms such as Semantic Scholar (Ngowi & Selemani, 2022).

Conclusion

AI is typically seen by teachers and students as a potent instrument for improving teaching and learning, expediting administrative duties, and promoting student learning. Academic performance is improved, understanding is improved, and autonomous learning is facilitated by tools like ChatGPT, learning applications, writing helpers, and AI-powered virtual instructors. However, some teachers and students perceive AI use negatively, citing issues like plagiarism, a dependence on AI for academic work that is too great, and a decline in critical thinking abilities. In the end, even if AI has a lot of potential to improve education in universities, integrating it calls for a comprehensive strategy. This entails making infrastructural investments to bridge the digital gap, putting in place programs that increase teacher and student ability, and cultivating an ethical AI usage culture. It is imperative that stakeholders, educators, and policymakers work together to establish an environment that optimizes AI's advantages while minimizing its drawbacks. The results of this study provide the groundwork for future investigations into AI-enhanced education, especially in figuring out how to create locally tailored AI solutions that meet the unique requirements of various educational settings. Higher education institutions may use AI to empower teachers and students and promote innovation and quality in education by tackling the obstacles and seizing the possibilities.

Acknowledgement

We would like to thank the Tanzania Commission for Science and Technology for providing a research permission, as well as our colleagues from Mbeya University of Science and Technology and Huazhong University of Science and Technology for their assistance in reviewing our work.

References

Achieng, P., & Mwita, K. (2022). Ethical considerations in AI for education in East Africa. *Journal of Educational Technology, 15*(4), 45-58.

Ahmed, F., Selemani, J., & Komba, T. (2022). The Role of Artificial Intelligence in Higher Education: A Case Study of Tanzanian Universities. *African Journal of Education Technology, 18*(2), 45-67.

Akinwalere, S. N., & Ivanov, V. (2022). Artificial intelligence in higher education: Challenges and opportunities. *Journal of education*, *12*(1), 1-15

Aljohani, R. A. (2021). Teachers and students' perceptions on the impact of artificial intelligence on English language learning in Saudi Arabia. *Journal of Applied Linguistics and Language Research*, *8*(1), 36-47.

Alotaibi, A. H. E. (2023). The impact of AI-powered Grammarly on enhancing grammar proficiency among Saudi EFL students. *Remittances Review*, *8*(4), 76-87.

Al-Tkhayneh, K. M., Alghazo, E. M., & Tahat, D. (2023). The Advantages and Disadvantages of Using Artificial Intelligence in Education. *Journal of Education, 3*(6), 45-60.

Amadi, A. (2023). Integration in a mixed-method case study of construction phenomena: From data to theory. *Engineering, Construction and Architectural Management, 30*(1), 210-237.

Baig, U., Arsalan Hashmi, M., Babar Ali, S. and Zehara, S. (2020). Sequential exploratory approach. *Constructivist Grounded Theory, 16*(2), 284-302.

Barrett, A., & Pack, A. (2023). Not quite eye to AI: student and teacher perspectives on the use of generative artificial intelligence in the writing process. *International Journal of Educational Technology in Higher Education*, *20*(1), 59-80.

Billy, I., & Anush, H. (2023). A study of the perception of students and instructors on the usage of Artificial Intelligence in education. *International Journal of Higher Education Management*, *9*(2), 120-150.

Braun, V. and Clarke, V. (2022). Conceptual and design thinking for thematic analysis. *Qualitative Psychology, 9*(1), 3-10.

Cardona, M. A., Rodríguez, R. J., & Ishmael, K. (2023). Artificial Intelligence and the Future of Teaching and Learning. *Journal of technology in education, 4*(5), 23-35.

Castillo-Segura, P., Alario-Hoyos, C., Kloos, C.D., & Fernand, C. (2023). *Leveraging the potential of generative AI to accelerate systematic literature reviews: An example in the area of educational technology.* 2023 World Engineering Education Forum: Global Engineering Deans Council.

Celik, I., Dindar, M., Muukkonen, H., & Järvelä, S. (2022). The promises and challenges of artificial intelligence for teachers: A systematic review of research. *TechTrends*, *66*(4), 616-630.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: *Ieee Access*, *8*(9)*,* 75264-75278.

Chounta, I. A., Bardone, E., Raudsep, A., & Pedaste, M. (2022). Exploring teachers' perceptions of Artificial Intelligence as a tool to support their practice in Estonian K-12 education. *International Journal of Artificial Intelligence in Education*, *32*(3), 725-755.

Crompton, H. and Song, D. (2021). The potential of artificial intelligence in higher education. *Revista Virtual Universidad Catolica Del Norte,6*(2),1-4.

Dilmurod, R. and Fazliddin, A. (2021). Prospects for the introduction of artificial intelligence technologies in higher education: *An International Multidisciplinary Research Journal, 11*(2), 929-934.

Fontanilla, J. B., Bautista, K. H., Lactao Jr, M., Villacorte, M. A., & Santos, R. (2023). Educators' Perspectives on the Impact of Artificial Intelligence on Writing Competence. *International Journal of Multidisciplinary Research and Publications, 6*(6), 29-34.

Holmes, W., Iniesto, F., Anastopoulou, S. and Boticario, J.G. (2023). Stakeholder perspectives on the ethics of AI in distance-based higher education. *The International Review of Research in Open and Distributed Learning, 24*(2), 96-117.

Hostetter, A., Call, N., Frazier, G., James, T., Linnertz, C., Nestle, E., & Tucci, M. (2023). Student and Faculty Perceptions of Artificial Intelligence in Student Writing. *Journal of Education, 2*(3), 76-90.

Irfan, M., Murray, L., & Ali, S. (2023). The Role of AI in Shaping Europe's Higher Education Landscape: Policy Implications and Guidelines with a Focus on Ireland. *Research Journal of Social Sciences and Economics Review*, *4*(2), 231-243.

Jones, R., & Smith, L. (2020). AI in education: Opportunities and challenges for developing nations. *Educational Research and Development, 22*(1), 34-49.

Joshi, S., Rambola, R. K., & Churi, P. (2021). Evaluating artificial intelligence in education for next generation. *In Journal of Physics, conference Series, 3*(3), 78-90.

Kalimani, F. (2021). Teacher attitudes toward technology integration in Tanzanian universities. *Journal of African Educational Studies, 13*(2), 67-82.

Kaplan, A., & Haenlein, M. (2020). Rulers of the world, unite! The challenges and opportunities of artificial intelligence. *Business Horizons*, *63*(1), 37-50.

Kelly, A., Sullivan, M., & Strampel, K. (2023). Generative artificial intelligence: University student awareness, experience, and confidence in use across disciplines. *Journal of University Teaching & Learning Practice, 20*(6), 33-45.

Kenchakkanavar, A. Y. (2023). Exploring the Artificial Intelligence Tools: Realizing the Advantages in Education and Research. *Journal of Advances in Library and Information Science*, *12*(4), 218-224.

Kim, N. J., & Kim, M. K. (2022). Teacher's perceptions of using an artificial intelligence-based educational tool for scientific writing. *In Frontiers in Education,7*(1), 20-42.

Kolhar, M. and Alameen, A. (2021). University learning with anti-plagiarism systems. *Accountability in Research, 28*(4), 226-246.

Komba, T., & Ndidde, G. (2020). Technological Advancement and its Influence on Academic Delivery in Tanzania. *Journal of Educational Research and Development, 15*(4), 89-105.

Kumatongo, B & Muzata, K.K. (2021). Research paradigms and designs with their application in education. *Journal of Lexicography and Terminology, 5*(1),16-32.

Li, Z., Dhruv, A., & Jain, V. (2024). Ethical considerations in the use of AI for higher education*: 2024 IEEE 18th International Conference on Semantic Computing (ICSC), IEEE, 218-223.*

Mandal, R., & Mete, D. J. (2023). Teachers' and Students' Perception Towards Integration of Artificial Intelligence in School Curriculum: a Survey. *International Journal of Multidisciplinary Educational Research*, *12*(7), 5-15.

Mtebe, J. S. (2023). The Impact of Online Learning Platforms on Education in East Africa. *International Journal of Digital Education, 10*(3), 31-50.

Mugisha, R., & Katembo, S. (2021). Challenges of AI adoption in Tanzanian universities. *East African Journal*

of Educational Technology, *10*(1), 22-35.

Ngowi, H., & Selemani, M. (2022). Artificial Intelligence and Its Application in Student Research: Benefits and Challenges in Tanzania. *Journal of African Higher Education, 20*(1), 65-78.

Ngulube, P. and Ngulube, B. (2022). Are we there yet? mixed methods research in the South African. *Journal of Economic and Management Sciences, 22*(1), 120-150.

Niu, S. J., Luo, J., Niemi, H., Li, X., & Lu, Y. (2022). Teachers' and students' views of using an AI-aided educational platform for supporting teaching and learning at Chinese schools. *Education Sciences*, *12*(12), 8-18.

Onaolapo, S., & Onifade, T. (2020). Teaching and learning in the cloud: Prospects and Challenges of Artificial Intelligence for education in Africa. *In 10th annual international conference on sustainable development (ICSD) (pp. 1-9).*

Onesi-Ozigagun, O., James Ololade, Y., Eyo-Udo, N.L. & Ogundipe, D.O. (2024). Revolutionizing education through AI: A comprehensive review of enhancing learning experiences. *International Journal of Applied Research in Social Sciences, 6*(4), 589-607.

Pal, D., & Patra, S. (2021). University Students' Perception of Video-based Learning in COVID-19: A TAM Perspective. *International Journal of Human–Computer Interaction, 37*(10), 903–921.

Pisica, A. I., Edu, T., Zaharia, R. M., & Zaharia, R. (2023). Implementing Artificial Intelligence in Higher Education: Pros and Cons from the Perspectives of Academics. *Societies, 13*(5), 118.

Pratama, M.P., Sampelolo, R. and Lura, H. (2023). Revolutionizing education: Harnessing the power of artificial intelligence for personalized learning. *Journal of Education, Language Teaching and Science, 5*(2), 350-357.

Rizvi, M. (2023). Exploring the landscape of artificial intelligence in education: Challenges and opportunities. *2023 5th International Congress on Human-Computer Interaction, Optimisation and Robotic Applications (HORA), IEEE, pp. 01-03.*

Saaida, M. B. (2023). AI-Driven transformations in higher education: Opportunities and challenges. *International Journal of Educational Research and Studies,* 5(1), 29-36.

Sagın, F.G., Ozkaya, A.B., Tengiz, F., Geyik, O.G. & Geyik, C. (2024). Current evaluation and recommendations for the use of artificial intelligence tools in education. *Turkish Journal of Biochemistry, 48*(6), 620-625.

Şahin, F., & Şahin, Y. L. (2021). Examining the Acceptance of E-learning Systems during the Pandemic. *International Technology and Education Journal, 5*(1), 1–10.

Shal, T., Ghamrawi, N., & Naccache, H. (2024). Leadership Styles and AI Acceptance in Academic Libraries. *Journal of Academic Librarianship, 50*(2), 180-220.

Sharma, B. K., Kumar, V. V. R., & Bhatt, V. K. K. (2023). Factors Influencing E-learning Technology among Youth in India: An Extended TAM Model. *Management and Labour Studies, 49*(3), 504–526.

Shirin, A. (2022). Artificial Intelligence Technology on Teaching-Learning: Exploring Bangladeshi Teachers' Perceptions. *Embedded Self organising Systems*, *9*(4), 3-9.

Shrungare, J. (2023). AI in education: Crossroads. *The ACM Magazine for Students, 9*(3), 63-65.

Silva, A.D.O. and Janes, D.D.S. (2020). Exploring the role of artificial intelligence in education. *Review of Artificial Intelligence in Education, 5*(5),7-14.

Singh, N. (2020). Digital literacy and AI integration in African higher education: Issues and solutions. *Journal of*

Global Education, 5(3), 28-46.

Slimi, Z. & Carballido, B.V. (2023). Navigating the Ethical Challenges of Artificial Intelligence in Higher Education: An Analysis of Seven Global AI Ethics Policies. *TEM Journal,12* (2), 590-602.

Suleiman, A. M. (2021). Ethics and Artificial Intelligence: Implications for Higher Learning Institutions in Tanzania. *East African Journal of Ethics, 8*(2), 15-28.

Tamilselvi, C., Dhanasakkaravarthi, B., Devi, R., Ebenezer, A.S., Dhanwanth, B. And Mohanaprakash, T.A. (2023). A comprehensive study of AI-powered writing assistance tools and content spinning applications. *2023 7th International Conference on Electronics, Communication and Aerospace Technology (ICECA), IEEE, 1104-1111.*

Taskin Bedizel, N.R. (2023). Evolving landscape of artificial intelligence (AI) and assessment in education: a bibliometric analysis. *International Journal of Assessment Tools in Education, 3*(10), 208-223.

Tundrea, E. (2020). Artificial Intelligence in Higher Education: Challenges and Opportunities. *INTED2020 Proceedings*, *3*(5), 2041-2049.

Vivek, R., Nanthagopan, Y. and Piriyatharshan, S. (2023). Beyond methods: Theoretical underpinnings of triangulation in qualitative and multi-method studies. *SEEU Review, 18*(2), 3-11.

Widianingtyas, N., Mukti, T. W. P., & Silalahi, R. M. P. (2023). ChatGPT in Language Education: Perceptions of Teachers-A Beneficial Tool or Potential Threat?. *VELES Voices of English Language Education Society*, *7*(2), 279-290.

Yu, H. (2024). The application and challenges of ChatGPT in educational transformation: New demands for teachers' roles. *Heliyon*, *7*(5), 124-150.

Yuk Chan, C. K., & Hu, W. (2023). Students' Voices on Generative AI: Perceptions, Benefits, and Challenges in Higher Education. *Retrieved from https://ui.adsabs.harvard.edu/, on 27th Dec 2023.*

Zhang, K., & Aslan, A. B. (2021). AI technologies for education: Recent research & future directions. Computers and Education: *Artificial Intelligence, 2*(7), 100-125.

Zuberi, A., Mosha, D., & Mwakalukwa, L. (2022). Barriers to AI adoption in rural higher education institutions in Tanzania. *International Journal of Technology in Education, 19*(3), 201-215.

Zulkarnain, N.S., & Yunus, M.M. (2023). Primary teachers' perspectives on using artificial intelligence technology in English as a second language teaching and learning: A systematic review. *International Journal of Academic Research in Progressive Education and Development, 12*(2), 861–875.

Author Information

Moabu Jimmy Chandafa
https://orcid.org/0009-0006-3513-6938
Assistant Lecturer (Science Education)
Department of Technical Education
Mbeya University of Science and Technology (MUST), Mbeya
Tanzania

Fang Huang
https://orcid.org/0000-0001-9312-1837
Professor (Science Education)
School of Education
Huazhong University of Science and Technology
Wuhan
China
Contact e-mail: *fanghuang@hust.edu.cn*