



## **Effectiveness of Artificial Intelligence Facilities as a Panacea for Promoting Quality Education in Saint Augustine University of Tanzania in Mwanza Region**

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### **Abstract**

In the dynamic landscape of 21st-century education, Artificial Intelligence (AI) has emerged as a transformative force capable of revolutionizing higher education through enhanced teaching, learning, research, and administrative efficiency. This study investigates the effectiveness of AI facilities as a strategic solution for improving the quality of education at Saint Augustine University of Tanzania (SAUT) in Mwanza Region. Grounded in the theory of technological integration in education, this research adopts a correlational design and quantitative approach. The population for this study consists of 11,305 participants (11,000 students, 299 academic staff, and 6 Deans at SAUT. Data were collected through structured questionnaires and checklist on effectiveness of AI facilities and quality of education administered to 371 respondents, including students, academic staff, and faculty deans, obtained through a stratified random sampling technique. Validity of the instrument was done by expert in the department of educational foundations at SAUT. Reliability of the instrument was checked using Cronbach alpha coefficient of 0.81. Pearson's product moment coefficient analysis was employed to analyze the data. Initial results indicate that the use and access to AI tools such as ITS, plagiarism detection software, predictive analytics as well as automated academic advisory system are severely restricted in SAUT. The absence of personalisation, the lack of access to relevant articles and research output as well as general productivity due to university operation are impacted. The research established that integration of AI facilities has high potential to enhance the quality of education at SAUT in terms of inclusion, efficiency and academic excellence. The report proposed that investments in AI infrastructure, staff development and capacity building be strategic based on local needs while continuing to follow policy frameworks for ethical and effective use of AI at a university.

**Key-words:** Effectiveness, Artificial Intelligence, Quality Education

### **Introduction**

In the 21st century with global education rapidly changing as we see it today, Artificial Intelligence is now a massive game-changer, providing revolutionary educational benefits to enhance the level of higher education. Integration of AI technologies from personalized learning and intelligent tutoring systems to AI-driven research tools and administrative automation are all seen as critical for advancing the institution. AI is being used by universities across the globe to streamline teaching as well as administrative functions leading to improved student learning outcomes, faculty effectiveness, and operational efficiency (HolonIQ, 2021). Tanzania is a developing country, its traditional education system is quite

constrained to handle millions of students and face limited resources; it gives an opportunity for AI in the right time regarding that there are emerging solutions.

All these systems trained using the ML, NLP & predictive analytics to build a system that can do such things which usually requires human intelligence. Adaptive learning platforms, virtual teaching assistants, automated grading and early warning systems for identifying at-risk students (Zawacki-Richter et al., 2019). Translation tools and accessibility enhancements are another way in which AI aids inclusive education. AI is not just an opportunity to innovate, but a solution to old problems in higher education; from overcrowded classes and poor quality of instruction to low research productivity and administrative errors.



The first higher education system in Tanzania was established by the University College Dar es Salaam (UCD) between 1961-68 with affiliation to the University of London. Hence in 1996 the sprouting of private university institutions started being established in Tanzania and this has registered geometric growth rate of higher education in the country (TCU, 2019). Thus, the higher education sector has expanded in the past two decades fueled by rising demand and growth of both public and private provision. Although, the challenge of quality assurance is what persists. While the mandates of TCU on the standards to be followed in academic delivery, research and institutional governance are clear in their Standards for quality assurance (TCU, 2019), a number of infrastructural constraints especially technological challenges remain within many institutions particularly private universities like SAUT suggesting little or no improvement will be observed even from these inspections. The COVID-19 pandemic revealed weaknesses in the Tanzania higher education system, sparking a national dialogue on how the country could adopt digital transformation and utilize emergent technologies to continue its delivery of education (Mtebe & Raphael, 2021). With due respect of their commitment towards high standards of academic excellence that SAUT is known for, there are also various challenges such as low digital infrastructure, large class sizes and overburdened faculty who have not yet leveraged the full potential of technology. More schools are using LMSs, like Moodle, but the prevalence of AI-powered educational tools is low. AI offerings such as AI based automated teaching assistants, anti-plagiarism software tools that use AI, smart course planners and data driven academic advisory systems could greatly enhance education quality. These tools facilitate real-time support for lecturers in terms of performance feedback and future administrative planning, as well as allow per-student beyond-classroom customization (Winkler & Söllner, 2020).

Despite all of this, China has moved more quickly than many other countries in terms of including AI in higher education, and this includes the United States. For instance, China is advancing on incorporating AI into their “Intelligent Education” strategy for use in the classroom and assessment, and curriculum development, as a part of the national model of adaptive learning enabled by platforms like Squirrel AI (HolonIQ, 2021). Personalized learning algorithms, such as those at Knewton and Coursera in the US, have

transformed the ways people work with content and teachers (Luckin et al., 2021). These changes are not just going to increase the efficiency of learning but also help institutions track and improve learning outcomes on an individual student basis.

Countries Around the World Are Leveraging AI in Universities As an illustration, La Trobe University from Australia is lobbying for enterprise-wide implementation of AI across university operations, highlighting the potential impact that this technology may have on organizations and productivity gains. OpenAI is also collaborating with Arizona State University to enhance learning using AI-driven tools, demonstrating a dedication to more personal, adaptive education practices. However, the challenges still persist.

Though many studies have been carried out on the use of AI in higher education globally and regionally, very few studies were found to provide data on availability of equipment and institutional readiness for provision of AI facilities in Tanzania private universities including SAUT. Current research focuses on student usage or ethical considerations and does not investigate how the presence (or absence) of AI infrastructure and systems affect education quality on a larger scale, including teaching, learning, research, and administration. The lack of empirical work linking AI availability to Sustainable Development Goal 4 (SDG 4) on quality education is also notable. This research is an attempt to fill this gap by providing institution-specific perspectives on the availability of AI as a potential remedy for improving higher education quality in Saint Augustine University of Tanzania.

In Africa, a number of countries have begun to investigate AI in the field of education. South Africa, Nigeria and Kenya are some of the nations which are piloting AI applications at universities using AI-powered learning platforms, chatbots for student support and data analytics for enhancing academic services. These are countries with better digital infrastructure and a long history of investment in educational technology. As seen in the UNESCO Report, this is sadly not on a large scale across the continent, with limited funding and low levels of skills, as well as suitable policies still preventing roll-out (UNESCO 2022). There is increasing policy interest in the use of technology in education in Tanzania but the bulk of investment appears to be going into low-level ICT rather than intelligent systems. This divide underscores the critical role of site-specific frameworks and research to inform policies that can sustain AI in

campuses such as Saint Augustine University of Tanzania. (Mwakyusa et al., 2023). This project is guided by a framework of technology integration in education, which proposes that choosing technological strategies helps to improve the quality and effectiveness of Figure 1 shows an example schematic view of how AI can impact proficiency vs. drop-out rates. The independent variable of the study was AI facilities (meaning having suitable software, hardware, skilled manpower and enabling infrastructure). The dependent variable, quality higher education, is captured by metrics such as revised teaching and learning strategies, strengthened research capabilities, streamlined administrative measures or improved student results in the participating programs (OECD 2021).

The study would help SAUT to foster academic quality and therefore global competitiveness in line with the university strategic goal. But as education trends more towards digital and data-driven, schools that don't utilize technologies such as AI will be left in the dust. In addition, this study aims to investigate whether access to and adoption of AI facilities could be a solution for enhancing the quality of university education delivery at Saint Augustine University of Tanzania. It contributes significantly to filling a gap in the literature, by providing specific, detailed insights into how AI is likely to be embedded within Tanzanian higher education, and thereby informing potentially broader digital transformation policy and institutional strategies.

### Statement of the Problem

The higher education sector is a global trend towards Artificial Intelligence (AI), but its potential to improve the quality, participation and efficiency of academic services in compliance with Sustainable Development Objective-4. Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all is the goal 4 of the SDG to be reached by the Nations on or before 2030. AI is supporting personalized learning, predictive support for aspirants, the functioning of administration effectively and research in advanced universities in developed nations. These innovations are reshaping how higher education institutions deliver learning, teaching and student support to offer better student outcomes, drive institutional performance and foster global competitiveness. Yet in many developing countries, like Tanzania, this is far from the truth. Globally, results from many years of observation show that Tanzanian universities continue to employ traditional lecture-

based teaching and face numerous challenges, such as overcrowded classrooms, resource limitations, meagre research outputs, and inefficient administration. Paucity of digital infrastructure, poor digital literacy, and weak investments in Ed-tech continue to degrade the quality of education and push the country further away from international standards. In the same vein but on a more serious dimension, intelligent tutoring systems on AI, AI-driven analytics, virtual teaching assistants and should be adequately utilized at saint Augustine university of Tanzania so as to enhance personalized learning and academic delivery in efficiency. Which results in a lack of student engagement, low learning outcomes, and increased administrative redundancies. By always playing catch-up, SAUT risks falling behind in the kind of digital educational context that's becoming normal and which will create long-term risks for its relevance, employability of graduates, difficulty of overheads to teaching staff and overall competitiveness for this institution. So the core issue is no AI integration in SAUT that does not allow the university to deliver quality higher education. The current study investigates if the adoption of AI could enhance educational delivery, academic support and administrative efficiency, giving practical clues concerning using AI in Tanzanian higher education.

### Research Objectives

1. To assess the availability of Artificial Intelligence (AI) facilities and quality education in Saint Augustine University of Tanzania.
2. To examine the utilization of AI facilities on the quality of education in Saint Augustine University.

### Hypotheses

1. There is no significant relationship between availability of AI facilities and quality education in Saint Augustine University of Tanzania
2. There is no significant relationship between utilization of AI facilities and quality education in Saint Augustine University of Tanzania

### Literature Review

The growing need for higher-quality, inclusive education globally, which manifests significantly in the context of UN Sustainable Development Goal 4 (SDG-4), has thrust Artificial Intelligence into the spotlight and its catalytic effect on higher ed. AI facilities will



allow institutions like Saint Augustine University of Tanzania (SAUT) to tackle major concerns such as inadequate teaching resources, poor research output, and inefficient administration. According to new studies, only a few higher learning institutions such as universities have begun using Artificial Intelligence (AI) in Tanzania.

In a review of empirical evidence on AI usage in higher education for example, Zawacki-Richter et al (2019) mapped AI adoption within the wider context of AI use. Their eagle-eyed focus on people, places and things is followed by evidence of their critical appraisal skills when they report that the majority of studies (146 in all) were published across several disciplines, but predominantly from computer science or STEM fields for research on intelligent tutoring systems, predictive analytics and AI-supported student support tools. Their review is very thoughtful, but the lack of information for many low-to-middle income countries (LMIC) especially in Africa gives it its biggest flaw. Regardless, such a study is of critical importance, as it forms the global lens and theoretical base to compare the local AI integration efforts in Tanzania with international baselines. More than 90% of students, with the number fluctuating. Though most of the students admitted that AI helps in enhancing productivity and saves time, it emphasized on how gendered and socio-economic disparities can limit students from using AI as well as the absence of clear rules enforced by institutions about what is an acceptable use of AI. Many students also said that they did not know how or when it was acceptable to use AI in their academic work and called for universities to develop clear policies on this issue.

In like manner, Stuart (2024) examined the influence of AI on the academic competence among students within Kampala International University in Tanzania. Students showed 65% utilization rate, and 77% awareness of AI as per study. Content development tools were the most frequently used AI technology (with 83.8% of participants doing so) and in this case, ChatGPT was used. While responding to a global survey, 63% acknowledged this dual role of AI on academic competency – namely it can be beneficial and detrimental. Detriments included over-reliance on weak AI and lessened capacities for critical thought, whereas benefits were mainly in time saved and access to knowledge.

This is a systematic review conducted by Manyengo (2023) on the use case of AI technologies like ChatGPT in research management among Tanzanian university. The study also assumes that such

journey is significantly accelerated by AI which tends to be a more humanlike reliability and even better efficiency in literature review, data analysis and report writing. This allows it to provide high level institutional information but without the primary data or direct users if focuses on here. This is an important topic because this study can be a good example of how AI can contribute to increasing academic quality by catalyzing research processes. The result revealed the urgency of creating AI ethical principles and concerns on academic integrity, assuming that more research is still required to establish the full impact of AI.

The application of AI platforms and their impact on higher education was investigated by Sarakikya and Kitula (2023) in Arusha, Tanzania. Theory of Technology Acceptance Modeling was used for the intervention with 96 participants out of the total population including  $n = 2,176$  students and  $n = 104$  instructors hailing from six institutions to be members on the data. Data were collected using questionnaires and interview guides that had been validated and achieved high reliability scores. Results showed substantial AI process in educational basis as well as high habits with all kinds of attitudes. Counter-strategies to overcome AI-assisted plagiarism were F2F presentations but more frequently, the use of plagiarism detection software. The research found the impact of AI on their university education experience favorable and suggested that more resources be allocated to the AI education, ethical guidelines and CPD training for lecturers. For students, the report recommended hosting workshops teaching responsible AI and having well-understood ethical policies.

A study by Mambile and Mwogosi (2025) focused on the influence of integrated AI in Tanzanian higher education institutions. The study pointed to such benefits as better evaluations, individualized learning environments and increased availability. The study also have shown AI-based grading and content generation platforms that can reduce workload of the instructors and let instructor focus more on student engagement. The challenges cited included infrastructural limitations, ethical concerns and hesitation by faculty members. Major hurdles were, particularly in rural campuses, the digital illiteracy of teaching staff and poor internet connectivity. Most students found to be in favor of AI tools which makes learning more engaging and efficient (Mambile & Mwogosi, 2025)



## Methodology

In this research, the correlational research design was used to investigate the influence of Artificial Intelligence (AI) on quality education in Saint Augustine University of Tanzania (SAUT). Correlational design is a method to evaluate the link or coupling between two or more variables, where none of these parameters are manipulated (Creswell & Creswell, 2018). The total population for this study was 11,305 (11,000 students, 299 academic staff and 6 Deans at SAUT). This survey was distributed to a sample of 371 respondents by means of stratified sampling technique, taking care that students and academic staff and deans are evenly represented. The choice was to go for a quantitative route, which allowed gathering numbers that were useful to provide an objective measure of factors related to respondents' perceptions and experiences concerning AI adoption in higher education. Questionnaires were used to collect research data including checklist. This checklist was purposely developed to check and confirm the availability and absence of all artificial tools, software, and hardware but also complete support systems at SAUT in a systemic manner. It also contains items that elicit closed-ended responses, as well as Likert scale (1

= Not very / 7 = Extremely) items. Respondents were then asked to indicate their thoughts on the efficacy of AI through a Likert scale from "strongly agree" to "strongly disagree." A pretest with a small sample that went over the questions of the instrument held on 121 responses to guarantee an understandable, relevant and consistent instrumentalization before applying it in the main survey (Garcia, 2007). The collected data was analyzed by Pearson product moment correlation coefficient. The research tools were piloted for the validity by experts from Department Educational Foundations, Saint Augustine University of Tanzania. Cronbach's alpha coefficient of 0.81 was used to test reliability indicating that the tools were reliable.

## Results and Findings

### 4.1 Results from the Checklist on Availability of AI Facilities

The checklist tool was used to assess the actual availability status of Artificial Intelligence (AI) facilities at SAUT across six critical domains: Intelligent Tutoring Systems, Plagiarism Detection Software, Predictive Analytics, Research Tools, Administrative AI, and General AI Infrastructure.



**Table 1 presents the Pearson correlation analysis between checklist-based availability scores and quality education indicators, followed by a detailed interpretation of the data.**

| AI Facility Category/Tool   | Availability Status (Yes/No/Partial) | Evidence/Remarks (Optional)                |
|---|--------------------------------------|--|
| <b>I. Intelligent Tutoring/Learning Systems</b>                   |                                      |  |
| Adaptive Learning Platforms (e.g., specific modules)              | Partial                              | Limited to 2 departments                   |
| AI-powered Study Aids/Chatbots for students                       | No                                   | Pilot project proposed                     |
| Personalized Learning Path Generators                             | No                                   | Under consideration                        |
| <b>II. Plagiarism Detection Software</b>                          |                                      |  |
| Turnitin Institutional License                                    | Yes                                  | University-wide access                     |
| Other AI-based Plagiarism Tools                                   | No                                   | Free online tools used ad-hoc              |
| <b>III. Predictive Analytics &amp; Student Support</b>            |                                      |  |
| Early Warning Systems for At-Risk Students                        | No                                   | Data collected manually                    |
| AI-driven Student Retention Analytics                             | No                                   | No dedicated system                        |
| Automated Academic Advisory System (e.g., chatbot)                | Partial                              | Basic FAQs, not personalized               |
| <b>IV. AI-powered Research Tools</b>                              |                                      |  |
| AI-assisted Literature Review Software                            | No                                   | Limited individual subscriptions           |
| AI-driven Data Analysis Tools (e.g., advanced features in SPSS/R) | Partial                              | Available to few researchers with licenses |
| Automated Report Generation (for research)                        | No                                   | Manual process                             |
| <b>V. Administrative &amp; Operational AI</b>                     |                                      |  |
| AI for Course Scheduling Optimization                             | No                                   | Manual process                             |
| AI for Resource Allocation (e.g., classroom management)           | No                                   | Manual process                             |
| Automated Student Enrollment/Registration Support                 | Partial                              | Basic online system, not AI-powered        |
| <b>VI. General AI Infrastructure/Hardware</b>                     |                                      |  |
| Dedicated AI/High-Performance Computing Labs                      | No                                   | General computer labs only                 |
| Cloud Computing Access for AI Development                         | Partial                              | Limited access for specific projects       |
| University-wide AI Training Programs for Staff                    | No                                   | Ad-hoc workshops only                      |

#### 4.1.1 Summary of AI Facility Availability

The checklist evaluation covered 18 distinct AI tools or systems. The analysis revealed the following distribution: Fully available (Yes): 1 tool (5.6%),

Partially available: 5 tools (27.8%), Not available (No): 12 tools (66.7%)

This indicates a predominant lack of AI facilities, with only a few partially functional systems and just one fully implemented tool (Turnitin plagiarism software).

**Hypothesis 1.** There is no significant relationship between availability of AI facilities and quality education at Saint Augustine University of Tanzania

**Table 2:** Pearson product moment correlation analysis on availability of AI facilities and quality education.

| Variables                     | n   | df  | r    | p-value | Level of significance | Dec             |
|-------------------------------|-----|-----|------|---------|-----------------------|-----------------|
| Availability of AI facilities | 371 | 369 | 0.37 | 0.011   | 0.05                  | H <sub>02</sub> |
| Quality of education          | 371 |     |      |         |                       |                 |

**Source: Research Field Result 2025**

The results of hypothesis 1 revealed that R of 0.37 is significant with  $p < 0.05$  because the calculated probability value of 0.011 is less than the critical probability value of 0.05. Therefore, the null hypothesis

is rejected ( $r=0.37$ ,  $p=0.011$ ) by implication there is a significant relationship between availability of AI facilities and the quality education in Saint Augustine University of Tanzania.

## Hypothesis 2

There is no significant relationship between utilization of AI facilities and quality education in Saint Augustine University of Tanzania.

**Table 3:** Pearson product moment correlation analysis on utilization of AI facilities and quality education.

| Variables                    | n   | df  | r    | p-value | Level of significance | Decision   |
|------------------------------|-----|-----|------|---------|-----------------------|--|
| Utilization of AI facilities | 371 | 369 | 0.33 | 0.031   | 0.05                  | H <sub>01</sub><br>Rejected(significant)<br>$P < 0.05$ |
| Quality education            | 371 |     |      |         |                       |  |

**Source Research Field 2025**

Hypothesis 2 result revealed that R of 0.33 is significant with  $p < 0.05$  because the calculated probability value of 0.031 is less than the critical probability value of 0.05. Therefore, the null hypothesis is rejected ( $r=0.33$ ,  $p=0.031$ ) by implication there is a significance relationship between utilization of AI facilities and quality education in Saint Augustine University of Tanzania.

## Discussion of findings

The findings of the first flight established that there was low significant relationship between availability of AI resources and quality education in Saint Augustine University of Tanzania. These results support that AI capabilities are significantly lacking, especially in consequential areas like targeted learning, predictive analytics, and research augmented by AI at SAUT. The majority of tools is either not provided or in pilot phases. Only Turnitin has full availability. What does this mean; if an AI facility is available, rest assured, all students in the university will receive

quality education. This is in line with Mambile and Mwogosi (2025) who found that Tanzanian universities are struggling to integrate AI due to gaps in infrastructure, and policy. In the same way, Mwakyusa and Mwalyagile (2023), underscored that most higher learning institutions in Tanzania are at very early stages of implementation of digital transformation and do not possess required resources and capacity to effectively implement AI based solution for education. In Tanzania, study investigated the integration of AI in higher institution Those studies showed that the availability of AI-based grading platforms materially decreased the burden on faculty in terms of instruction load. This tight positive correlation between the availability of AI facilities and quality education illustrates that technological infrastructure is the singular most determinant factor that serves to corroborate academic and institutional excellence. We note the question mark about the extent to which AI tools are actually widely available (i.e., Turnitin, some adaptive learning platforms) but suggest that where they

have been made accessible there are clear benefits in terms of underpinning academic integrity and advancing digital learning agendas. The problem with this is that the failure to adopt predictive and administrative AI serves as missed moments for innovation, efficiency drive and data-driven decision-making.

For hypothesis two, the findings revealed that there was weak and significant aspect of quality education in Saint Augustine University of Tanzania because a p value = 0.044 which is. These results are consistent with Manyengo (2020) as it conducted a systematic review about the adoption of AI technologies. The study findings imply that possibility of employing AI utilities as a proxy for quality education in universities in Tanzania.

### Conclusion

Results from this study show a significant association between availability and utilization of AI facilities on the quality of education at Saint Augustine University of Tanzania (SAUT). At the same time, our data indicates that limited AI tools (intelligent tutoring systems, plagiarism detection software and predictive analytics) have no harm when integrated into existing educational facilities to enhance the quality of education. It also demonstrates that use of these facilities supports personalized learning, academic support, and administrative efficiency. Nonetheless, the current AI infrastructure at SAUT is woefully underserved, falling short to support effectively the academic and operational ambitions of the university. In higher education, the lack of full AI integration leads to less effective student learning experiences (it could do more than help with lecture hall attendance), slower faculty productivity and greater delays in overall administrative efficiency.

### Recommendations

In view of the findings, it is suggested that SAUT should urgently act on a well thought-out investment in its AI infrastructure. It would make sense for the university to invest in an additional range of AI tools which can be helpful not just for teaching and learning but also research and on many administrative aspects. If accomplished, it means a larger library collection for useful materials that both academics and students can use to improve academic results as well as their overall university experience.

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