Journal of African Education and Traditional Learning Systems (JAETLS)
E-ISSN 2633-2930 (Online); ISSN 2633-2922 (Print)
formerly
Journal of African Education (JAE)
E-ISSN 3049-9585 (Online); ISSN 3049-9577 (Print)
Indexed by EBSCO, COPERNICUS, ERIH PLUS and SABINET
Volume 5, Number 3, December 2024
Pp 139 - 152

Harnessing AI for Enhanced Learning in Zimbabwean Academic Institutions: Hurdles and Prospects

DOI: https://doi.org/10.31920/2633-2930/2024/v5n3a8

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Abstract

Since the early 2000s, public universities in Zimbabwe have increasingly integrated artificial intelligence (AI) into their academic systems. This acceptance has intensified over the last decade, as various institutions have established AI research centres, departments, and/or academic programs. This paper undertakes a methodological synthesis of existing research to examine the dualities of artificial intelligence: obstacles and advantages encompassing the utilization of AI in Zimbabwean higher education. AI is identified as a transformative tool that enhances learning by fostering student skills,

encouraging experiential learning, and creating an inclusive research culture. It has also contributed to institutional efficiency, particularly in the teaching and learning process. However, several challenges persist, for instance, AI developers often lack a deep appreciation of the learning sciences and pedagogical methods, crucial for implementing AI in educational settings. Additionally, concerns about the ethical implications and high costs associated with AI deployment have been noted. Addressing these challenges require continuous funding, the creation of a comprehensive national policy framework, and provision of extensive capacitation of the higher education professionals. These steps are vital components for creating an AI conducive environment in Zimbabwean higher education.This paper, therefore, recommends conducting localised research to identify specific challenges and opportunities encountered during AI adoption in Zimbabwe. Such research would foster collaboration among stakeholders and ensure that AI is developed and implemented responsibly, in alignment with local educational needs. To gain a more comprehensive understanding, future studies may employ a mixed-methods approach, using larger sample sizes to provide a broader, more nuanced insight into AI-powered education in Zimbabwe.

Key Words: *Artificial intelligence (AI), Educational technologies, E-learning, Higher education institutions, Integrative examinations*

Introduction

John McCarthy's ground breaking 1956 paper established Artificial Intelligence as a distinct field of study and there have been ups and downs in the field's development since experts and corporate executives lack knowledge and trust in the technology (Haenlein & Kaplan, 2019). Artificial intelligence refers to systems and applications that replicate human-like intelligence, encompassing capabilities such as observation, adaptation, and logical inference (Berendt, 2019). Shambira (2020) defines AI as an information processing system that performs tasks traditionally requiring human intelligence. While these definitions vary semantically, they converge on the central idea that AI represents modern advancements capable of replicating and enhancing human abilities across different business sectors. From these definitions, AI is not a singular technology, but a collection of systems tailored to support various human activities. Examples of AI tools commonly used in education, include Google Classroom, Google Scholar, grammar check software, chatbots like ChatGPT 3/4, Intelligent Personal Assistant

(IPA), and Closed-Circuit Television (CCTV) Systems (Rospigliosi, 2023).

In order to raise teaching standards and support cutting-edge research for sustainable development, AI applications are essential to the operation of postsecondary and higher education institutions (Morin, 2018). Zimbabwe's state universities have gradually incorporated AI since the early 2000s (Bangure, 2024). The growth of AI has been remarkable over the past decade, with the development of AI research centers, departments, and curricula at five state universities. Notable milestones include:

i **University of Zimbabwe (UZ):** Established the Department of Computer Science in 2001, later introducing AI courses and research areas.

ii **National University of Science and Technology (NUST):** Launched the Department of Computer Science and Engineering in 2004, with AI as a key research focus.

iii **Chinhoyi University of Technology (CUT):** Launched AI and Data Science initiatives in 2010 as part of the Computer Science and Engineering Department.

iv **Harare Institute of Technology (HIT):** Launched the IT and Engineering School in 2012, featuring AI-centric programs.

v **Midlands State University (MSU):** Launched the Department of Computer Science and Information Technology in 2015, focusing on AI research.

The public universities indicated above in Zimbabwe have been actively involved in AI research, collaboration, and innovation, achieving advancements in fields such as robotics, healthcare informatics, agricultural technology, and machine learning. While timelines may vary slightly, it is evident that public universities in Zimbabwe have steadily embraced AI to enhance teaching, research, and innovation, aligning with global trends and addressing local challenges (Simuka, 2024).

Problem Statement

Despite the hype regarding AI worldwide, there is no national policy clearly enunciating its implementation and judicious use in public institutions of higher learning in Zimbabwe. At the time of reporting researchers were full-time academic members of staff at a public institution of higher learning where no proper adoption of artificial intelligence and struggles with artificial intelligence were noted. The

Turnitin software used at one public university produces a similarity index report alongside an artificial intelligence percentage. Surprisingly, the institution does not have any policy in place to regulate the excessive use of AI software or tools by students. Past studies (Ocaña-Fernández et al., 2019; Harkut & Kasat, 2019; Fryer et al., 2019) were conducted on the artificial intelligence phenomenon, but they could not adequately address the challenge, and there is now a time-bound gap between them and this study. Accordingly, this study closes the time-bound gap and provides valuable insights, in terms of decision-making, when it comes to adoption and effectuation of AI tools. Researchers used an integrative review methodology to examine challenges and opportunities in adopting artificial intelligence in Zimbabwean higher education institutions. Hence, this goal was achieved by answering the following research questions:

i. What are the challenges of adopting artificial intelligence in higher education institutions?
ii. Which opportunities are found in Zimbabwean higher education institutions for adopting artificial intelligence?

The study gives valuable insight into decision-making when it comes to the adoption of artificial intelligence tools. Similarly, the study contributes to future research on using artificial intelligence in higher education institutions, both locally, regionally, and globally.

Theoretical Framework

A theoretical framework is a comprehensive analysis of existing theories that acts as a guide for constructing research arguments (Vinz, 2023). Theories employed by researchers in a study aid in explaining phenomena, establishing connections, and making predictions. Therefore, to achieve theoretical triangulation for this study, researchers were guided accordingly by technology, organization, and environment theory and the technology acceptance model (TAM).

Technology-Organisation-Environment (TOE) Theory

Researchers suggested that the technology-organization-environment (TOE) theory was suitable for this study (Awa et al., 2017). As a result, the technology part of this theory represented the kind of software or technology, as well as its features, usability, and compatibility with other

technologies. The organisation's features include the organisation's size, nature of operations, culture, other owned resources, and organisational hierarchy. The environment resembles the external world of an organisation made up of marketplace conditions, regulation systems, and acceptable ways of behaving in social institutions (Li, 2020). An outline of the key tenets of this theory indicates applicability to different technology adoption and implementation because it is all-encompassing. More so, the theory applies to both qualitative and quantitative research methods. Equally, the theory resonates well with the integrative review methodology, which combines quantitative and qualitative research strands in one study.

Technology Acceptance Model

The technology acceptance model (TAM) is an information systems theory that explains how to persuade employees to adopt and use new technology in the workplace (Davis, 1989). TAM identifies two key factors influencing customers' acceptance of new technological products: perceived usefulness and perceived ease of use (Davis, 1989). The first factor, perceived usefulness, is the extent to which users believe a new technology product will help them perform their tasks more effectively. The second factor, perceived ease of use, is the extent to which users believe a new technology product will be easy to learn and use. The basic idea is that when users believe that a particular application will improve their efficiency and the application is easy to use; the adoption rate will be higher. Interestingly, information systems experts have extensively employed the approach to address the difficulty of organisations fostering acceptance of new information systems (Liu et al., 2015). TAM has also been used to investigate the factors that influence the adoption of big data efforts. For example, Soon and Samsudin (2016) used TAM to investigate the factors influencing widespread data uptake. Perceived usefulness and perceived benefit have been shown to influence big data adoption.

However, implementing artificial intelligence tools in higher education public institutions in Zimbabwe is hindered by obstacles such as resistance to change, insufficient training, and limited availability of essential resources. Therefore, it means that when management in organisations seeks to implement a specific policy to regulate the use of certain computer software or programs, they have to consult intended users so that they understand and believe in the usefulness of the given

technology product. Subsequently, a product that is easy to use and provides value to its users will not be met with resistance from its immediate end-users. As a result, this theory serves as a valuable insight for managers and employees when they consider implementing a technology that aims to enhance work efficiency. Thus, it is a crucial theoretical tool for predicting user behavior.

Empirical Literature Review

Various research efforts by international, regional, and local scholars explored the influence of artificial intelligence in higher education institutions. On the positive side, Fryer et al. (2019) stressed that AI provides a rich and enabling educational environment that further spurs students' interest in learning about other languages. Thus, through AI, higher education institutions can move away from cumbersome traditional methods of service delivery. Artificial intelligence enables proper management of teaching time. Other important benefits are quick report generation and a friendly learning environment (Obidile, 2023). In the opposite context, challenges associated with AI applications involve the need to plan carefully, design, and employ digital skills to train key staff (Ocaña-Fernández et al., 2019). Tertiary institutions, their staff members and other corporate business organisations are cynically sceptical about the spread of artificial intelligence, assuming that many jobs could be wiped off the labour market. The phenomenon revolves around science and technology, and some individuals lack confidence, and do not appreciate the formulas associated with AI. Moreover, this information systems application is new to developing countries (Harkut & Kasat, 2019).

The analysis of the cited research suggests that artificial intelligence can bring about numerous advantages if implemented and utilised wisely. Nevertheless, there is scepticism among some business people, and employees remain uncertain about the impact of artificial intelligence on their future employment prospects. Additionally, AI is relatively recent and not well-known or comprehended by countries in the third world. Therefore, additional research and ongoing training of employees on the value of AI in the corporate business world are significant.

Materials and methods

Researchers used the integrative review methodology to evaluate and analyse data from multiple sources, address the research questions posed

by this study, and present a thorough picture of the opportunities and challenges associated with implementing artificial intelligence in Zimbabwe's public higher education institutions.The methodology followed the compressed seven-step advice by Kutcher and LeBaron (2022) guidelines. Specifically, the steps involve selecting an idea and deciding the purpose of the investigation. Correspondingly, these two initial steps are evident in the introductory part of this article. The other steps concern literature search, arranging, and rating the information gathered. Finally, analysis and discussion are the last stages of this unique research methodology (Kutcher & LeBaron, 2022).

A scholarly survey of past research was done from three different sources made up of two databases and World Wide Web for Gray literature search. Significant search terms used were 'artificial intelligence challenges', 'opportunities in adopting artificial intelligence', 'higher education institutions', and 'AI tools. The phenomenon understudy is new to the Zimbabwean landscape and even in some regional and international circles. Therefore, the literature search conducted sought to provide an overview of the subject matter.

Literature search and review summarises the subject matter of interest and describes contemporary interrogation. Integrative literature review can be veritably helpful at the disquisition stage when researchers are developing ideas(McCombes, 2023). The subject matter is new in Zimbabwe, and researchers were keen to carry out further studies after the foundation created by the current exploration. To enjoy the benefits above and get new interpretations of the phenomenon, literature not more than five years old was utilised in this study (Smart, 2020). Searches from Sage Online and Taylor & Francis Online yielded 1220 results. Some articles were not accessible by researchers as they were not open access, and this gave a total of nine articles according to the search criteria adopted. On the same note, the World Wide Web was used to search for Gray literature related to the subject matter, and the search yielded two relevant results. The inclusion criteria for the utilised articles followed the route of not more than five years, relevancy to the study topic, full-text articles, and articles in the English language only. On the flip side, the rejection criteria were guided by irrelevancy to the research area, more than five years old, non-scholarly, and not in the English language. Accordingly, Table 1 presents the high-impact peer-reviewed articles in terms of the journal name and quantity.

Table 1: Peer reviewed publications and Gray literature sources on AI

Journal Publication	**Quantity**
American Journal of Medical Quality	1
Journal of Medical Education and Curricular Development	1
Digital Health	1
Journal of Dental Research	1
Innovations in Education and Teaching International	2
Learning, Media, and Technology	1
Interactive Learning Environments	1
Media Practice and Education	1
Gray Literature Search	
International Journal of Higher Education	1
Arabian Journal of Business and Management Review	1
Total	**11**

Source: Research Data, 2023

Methodological Approach Tagging of Research Articles

Researchers were keen to ensure that research findings would inform critical thinking about the adoption and proper implementation of AI in Zimbabwean tertiary institutions. As a result, the empirical approach used to provide evidence of the identified relationships between study constructs in past research was evaluated. The pattern depicted in Table 2 reveals that there is more nonempirical research than empirical studies conducted by scholars in this topical area. Nevertheless, all the eleven identified articles answer this study's research questions somehow. Hence, the results section categorically unpacks the findings according to the identified research questions.

Table 2: Investigation strategy systematic display

Study Authors	**Empirical or not**	**Research Method**
Farrokhnia *et al.* (2023)	Nonempirical	SWOT Analysis Review
Alhwaiti (2023)	Empirical	quantitative, non-experimental survey design, structured questionnaire, a sample of 350 academic staff
Nemorin *et al.* (2023)	Nonempirical	Analysis of AI discourse. Text mining and thematic analysis
Rospigliosi (2023)	Empirical	Editorial Paper
Cotton *et al.* (2024)	Empirical	Qualitative Research

Ellahham *et al.* (2020)	Nonempirical	Literature Review
Grunhut *et al.* (2021)	Nonempirical	Integrative Literature Review
Nadarzynski *et al.* (2019)	Empirical	Mixed Method
Schwendicke *et al.* (2020)	Nonempirical	Narrative Review
Aldosari (2020)	Empirical	Qualitative research methodology
Simuka (2022)	Nonempirical	Systematic Literature review

Source: Research Data, 2023

Results and Discussion

What are the challenges of adopting artificial intelligence in higher education institutions?

A survey of peer-reviewed articles and Gray source literature revealed a plethora of challenges to the adoption and implementation of artificial intelligence in higher education institutions in Zimbabwe. The challenges include a lack of appreciation of the technology and its application in educational institutions by anticipated users (Nadarzynski et al., 2019; Aldosari, 2020). It was observed that AI in tertiary institutions promotes plagiarism and laziness in circumstances where higher-order cognitive skills are demanded. Academic integrity is threatened because AI tools like ChatGPT have the potential to produce a lot of information that can be off topic (Gupta, 2023; Farrokhnia et al., 2023). The same tool (ChatGPT) has open access and subscription platforms, and this will mean, in practice, those who are financially challenged might not be able to utilise the tool as compared to the elite. Another interesting observation was resistance to change, as some professional employees are afraid to be replaced by machines to execute work tasks (Grunhut et al., 2021). The main causative agent of this resistance was misunderstanding brought about by poor communication in the workplace.

From the results obtained, it is evident that the technology applicable to education is not clearly understood by potential students and educators alike. The pattern depicted by the results is that students and educators need to know more about a novel idea to emulate it. Furthermore, they need to be educated on its pros and cons for easy adoption of the same. In sum, ignorance and lack of good financial standing are stumbling blocks at the initial stages of technology adoption.

Other challenges are secondary to the acceptance of artificial intelligence in higher education institutions. Researchers reckon that in less than three years, institution libraries will be rendered useless by the coming of artificial intelligence software. Students shall be excessively using artificial intelligence tools like ChatGPT to write their assignments and will abandon more hard copy textbooks. Tertiary education institutions will lay off many less qualified staff members as very few can work in the lecture rooms with the assistance of artificial intelligence tools.

Which opportunities are found in adopting artificial intelligence in higher education institutions?

Artificial intelligence offers abundant information in different disciplines to students and teachers in tertiary education institutions. Notably, there is improved efficiency in how work is done, for example by ChatGPT, well written essay/assignment can be produced quickly (Cascella et al., 2023). Journal article writing is now easy with ChatGPT, though the tool provides fictitious references, and the author must apply due diligence to the whole process. From a pedagogic point of view, learners' time to access certain information documents would be minimised. Equally, educators would be able to generate lesson plans and teaching material according to defined parameters (Schwendicke et al., 2020). The findings confirm the tremendous contribution artificial intelligence makes to practical online teaching, assessment, and evaluation techniques in higher education institutions. It was observed that the judicious use of artificial intelligence in teaching and assessment creates more time for other productive tasks in educational setups (Simuka, 2022). AI creates an asynchronous communication platform between students and lecturers, and it improves engagement and cooperation between the two parties. In a nutshell, artificial intelligence tools can improve work efficiency by reducing workload. Furthermore, AI can improve students' learning and academic performance. Ultimately, graduates stand better chances of employment in the corporate world when all things are equal.

Conclusion

The coming of artificial intelligence into the corporate world brought numerous advantages and challenges to the way institutions of higher learning operate. It is against this background that researchers and institutional leaders need to understand the pros and cons of AI in

institutions of higher learning very well. The study revealed a plethora of challenges in the adoption and implementation of artificial intelligence in higher education institutions. The challenges include a lack of financial strength and appreciation of the technology and its application in educational institutions by anticipated users. It was observed that AI in tertiary institutions promotes plagiarism and laziness in circumstances where higher-order cognitive skills are demanded.

Another interesting observation was hesitancy and resistance to change, as some professional employees are afraid to be replaced by machines in the execution of some work tasks. Subsequently, the results provide a possible response to the first question of this study. As a response to the second question of this study, it was revealed that artificial intelligence offers abundant information in different disciplines to students and teachers in tertiary education institutions. Notably, there is improved efficiency in the way work is done; for example, by ChatGPT, well-written essays/assignments can be produced in a fast manner. Writing journal articles is now easy with ChatGPT. From a pedagogic point of view, learners' time to access certain information documents would be minimised. Equally, educators could generate lesson plans and teaching material according to defined parameters. It was observed that the judicious use of artificial intelligence in teaching and assessment creates more time for other productive tasks in educational setups. AI creates an asynchronous communication platform between students and lecturers, and it improves engagement and cooperation between the two parties.

Recommendations

Drawing from the preceding benefits of AI, researchers implore Zimbabwean universities management to incorporate AI in all their aspects of operations to meet shifting global needs digitally. Government funding is needed to craft policies that assist in coordinating and implementing trustworthy AI. Training efforts and communication channels must be improved so that the proposed beneficiaries of artificial intelligence tools do not resist the change. Complex and continual confirmation that supports practical outcomes of AI application in tertiary institutions is inadequate. Furthermore, artificial intelligence technologies and principles are Western concepts foisted on countries in the Global South. It is advised that additional investigation be conducted in Zimbabwean universities to better understand the potential issues

associated with AI implementation. Local research would unite the different actors and blend technology principles into a conventional and accountable AI. A broader picture of the phenomenon would be revealed by pursuing a mixed methodology study with a larger sample size.

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