

Managing Research in Higher Learning Institutions (HLIs) in Tanzania : A Systematic Review on the best Practices for using Artificial Intelligence

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ABSTRACT

This paper reports on the findings of a systematic review in relation to the research management practices in Higher Learning Institutions through the use of Artificial intelligence (AI) technologies such as ChatGPT in Tanzania. AI technologies have gained significant popularity in recent times. However, their integration into academic settings raises concerns, especially in terms of potential ethical considerations. The systematic review at hand used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to retrieve English records in Google Scholar under the phrase "ChatGPT in research". Eligibility criteria included the published research papers on ChatGPT and research practices. A total of 28 documents were retrieved. Only 20 documents met the inclusion criteria after full screening. The findings indicate that setting a code of ethics for using AI is paramount. Further research is needed in order to gain detailed insights into this new innovation and technology. It was concluded that ChatGPT in research has to be validated with other methods.

Keywords: ChatGPT, ChatGPT, artificial intelligence, Higher Learning Institutions, systematic review

INTRODUCTION

Research is one of the core functions of Higher Learning Institutions (HLIs). For this reason, an increased research management is an inevitable endeavour (Taylor, 2006). Management of research requires faculty members to be proficient enough across the whole spectrum (i.e, from conceptualisation of priority research problems, research proposals, ethical data collection, data analysis, manuscript writing, to dissemination of findings (Sawyer, 2004). However, literature on managing research practices, specifically during this Artificial Intelligence (AI) era is scarcely available. The rapid advancement of conversational technology, such as Artificial Intelligence (AI), has brought significant implications for various fields and research practices in particular. ChatGPT (Chat Generative Pre-Trained Transformer), released in November 2022, is one of the artificial deep neural networks with several parameters in the order of billions that has gained prominence in diverse aspects, including conducting research and paper writing (Rahman et al., 2023). In recent decades, however, AI has exponentially been developed and used, and modern society feels its effects on daily activities. As such, AI has also influenced the conduction of research and the publishing of scholarly works. This paper aimed to present a systematic review of the management of research practices using ChatGPT in HLIs research practices in Tanzania.

To date, researchers worldwide have increasingly relied on AI tools, such as ChatGPT, to support various aspects of research, including writing tasks and idea generation, assisting in increasing the efficiency and accuracy of the required output (Deng & Lin, 2023). However, the use of AI (i.e., ChatGPT) in academia and research remain controversial and raise a number of questions in terms of its impact on research quality, and integrity (i.e., bias-related issues). Evidence indicates that ChatGPT can limit individual's capabilities and can result in factual inaccuracies (Shen et al., 2013; Huh et al., 2023). This technology may furthermore exacerbate safety concerns and cyber-attacks (Deng & Lin, 2023). The question about how academia responds to ChatGPT remain unanswered. ChatGPT in research practices has strengths, weaknesses, opportunities and threats. Farrokhnia et al. (2023), for example, identify three strengths of ChatGPT: generating plausible responses, self-improving capability, and personalising real-time responses. This increases an opportunity to information access, facilitates personalised

and complex learning, and decreases teaching workload. Farrokhnia et al. (2023) assert that an introduction and use of ChatGPT has potential opportunities, particularly with regard to content generation, brainstorming ideas, reviewing literature and communication (i.e., language use). Literature suggests that ChatGPT in education is difficult to evaluate and therefore compromise higher-order thinking skills. Hong (2023) and Lund et al (2023) argue that a lack of understanding of the context and academic integrity issues and an increase plagiarism concern are some of the identified ChatGPT threats. Some people feel that ChatGPT in research practices reduces critical thinking (i.e., loss of human expertise), accelerates plagiarism, and produces inferior quality works. Empirical studies show that ChatGPT generate articles for publication and write scientific abstracts with cooked data that may not be detectable (Gao et al., [2022](#); Dowling & Lucey, [2023](#)). As such, some researchers in HLIs may be tempted to use AI in writing academic papers in order to get promoted. There have been some practices in HLIs with regard to managing research. One of the managerial practices is to limit or avoid copying a large amount of other people's work.

Ant-plagiarism policies have been developed various countries and Tanzania in particular. In 2015, for example, the Open University of Tanzania (OUT) came up with the Research Ethics Policy Guidelines. The policy stipulates that researchers should maintain the highest standards of honesty and integrity and that any form of research dishonesty—will be regarded as a serious offence. As such, Montenegro-Rueda et al (2023) argue that the situation is seen as uncontrolled. With the introduction and use of AI such as ChatGPT in research practices, if not checked, it is thought that the misuse of AI, such as ChatGPT, will likely affect the quality of education in HLIs. The fundamental question is: What should be the best practices in managing the utilisation of ChatGPT in HLIs research related practices? It has to be noted that researchers have different opinions on the current situation (Hong, 2023; Lund et al., 2023). Three research questions guided the review: How do HLIs use AI such as ChatGPT in research processes? How do HLIs manage research processes in ChatGPT? What is the general impact of ChatGPT on research processes in HLIs?

Methodology

The study was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)(Moher, et al., 2010). Systematic reviews are founded on the principle of a comprehensive literature search to identify the available quality literature with a replicable search strategy as completely as possible (Hirt et al., 2020). This review targeted literature and other rigorous information search (Newman & Gough, 2020). Four main steps were adopted. These include a search strategy, selection criteria, quality assessment, and data extraction. For this systematic search, a strategy was developed to identify relevant literature. The information source used was Google Scholar. The search terms used were ChatGPT and Research which spanned from the database from 2022 to 2023. Only peer-reviewed articles published in English were reviewed. The Google Scholar search yielded 28 records. In the present review, the selection criterion was based on the PRISMAstatement (Moher et al., 2009), in which the search mainly focused on mapping existing literature on ChatGPT in research. Table 1 shows the inclusion and exclusion criteria that were used.

Table 1 Inclusion and Exclusion Criteria

	Inclusion criteria	Exclusion criteria
1.	Peer reviewed articles published between 2022 and 2023.	Peer reviewed articles published before 2022.
2.	English Language Peer reviewed articles	Peer reviewed articles published in other languages rather English language.
3.	ChatGPT peer reviewed articles	Industry and other fields' peer reviewed articles.
4.	Academic journal articles	Non-academic journal articles

The study is based only on the original reviewed articles. To maintain the quality of the review, all duplications were examined. Abstracts of the articles were checked deeply to determine their relevance. A careful evaluation of each research paper was conducted at a later stage. One article in the non-English language was excluded from review. Furthermore, ten more articles were removed from review after the filtration of duplicate records. Twenty (20) peer-reviewed articles met the inclusion criteria. Information about the

use of ChatGPT in research was coded. Data from the peer-reviewed articles were extracted using a coding system developed by Bond, Buntins, Bedenlier, Zawacki-Richter and Kerres (2020). In the data extraction phase, 28 articles were identified, and the characteristics extracted were as follows:

1. The article must be the original and a peer-reviewed. Published reports were excluded.
2. The article must be in the English language, and it must be on ChatGPT and research.
3. The extracted articles were published between 2022 and 2023.

Search Results

The PRISMA guidelines are authoritative in guiding systematic reviews. They consist of a four-phase flow diagram and a checklist of items developed to help improve the reporting of systematic literature reviews and meta-analyses (Bond, et al., 2020). The PRISMA flow diagram forms an integral part of the methodological description of a systematic review (Haddaway, et al 2020) and outlines the identification, screening, eligibility and inclusion processes of items and reasons for study exclusion/inclusion. Twenty-eight articles were retrieved (See Figure 2). Then, the titles/abstracts were screened, followed by the exclusion of records published in languages other than English ($n = 1$). The records that fell outside the review (i.e., records addressing ChatGPT in a context outside research) were excluded ($n = 5$). The records published in non-academic sources (e.g., newspapers, magazines, internet websites, blogs) were also excluded from the beginning of the search. Once this was done, a full screening of the remaining records ($n = 22$) was undertaken. The thorough screening resulted in all 22 articles to be reviewed. However, two additional records were excluded due to the lack of access to full text as a subscription-based record. In this light, 20 reports were included in the study. The summary of the systematic review process is shown in Figure 2. PRISMA 2020 flow diagram for new systematic reviews, is shown in Figure 1. Ethical considerations were prioritized throughout the research process. The data extraction and synthesis were conducted in a manner that they respect the privacy, confidentiality, and anonymity and their authors. Ethical principles regarding the use of AI technologies were explored and discussed.

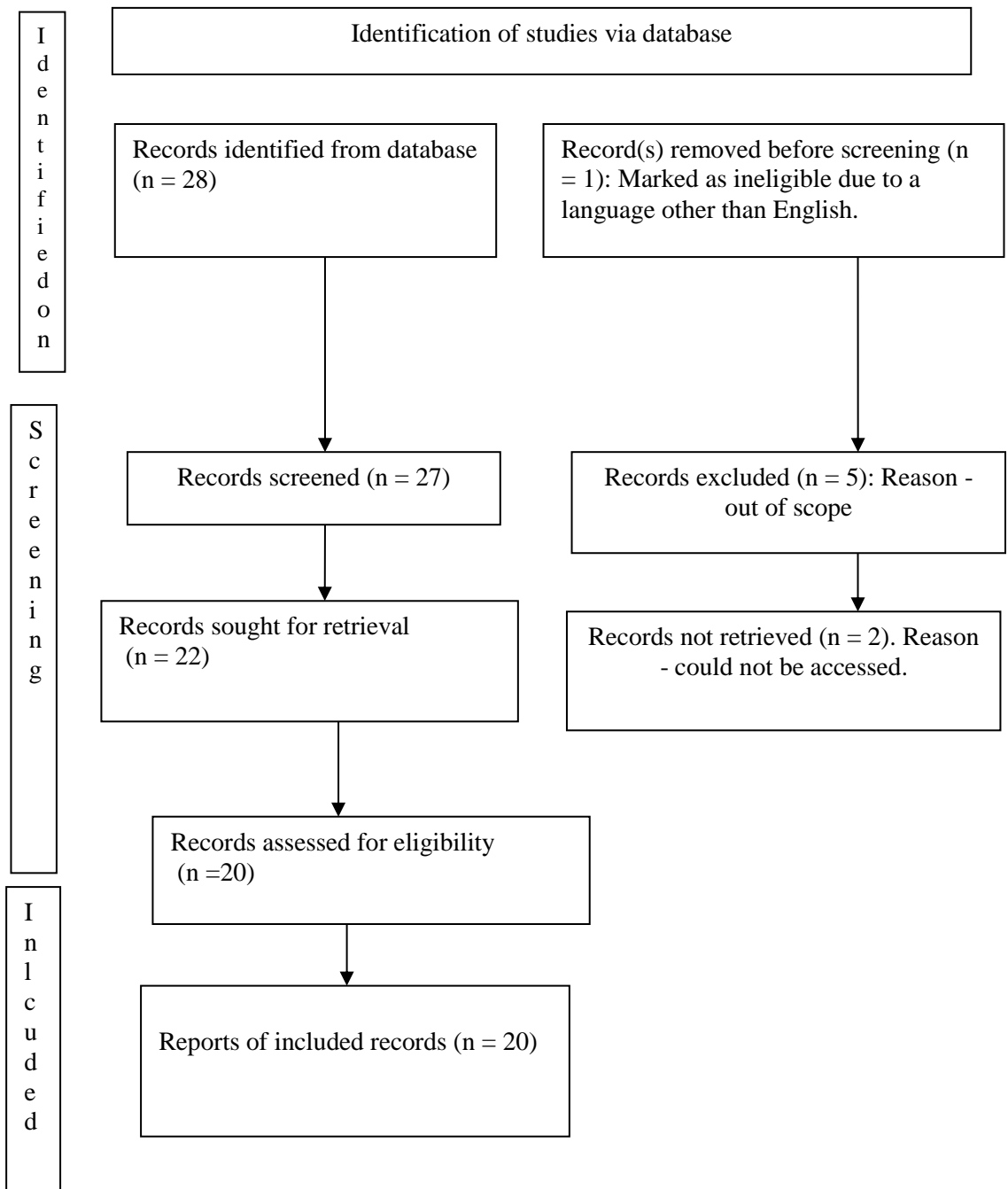


Figure 1: PRISMA Flow Diagram

Findings

This section presents the findings of the systematic review. The first part of this section briefly discusses the study characteristics, including trends and a list of the included records (See Table 3). The second part discusses the emerged themes. This systematic review was followed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review process involved the study selection, data extraction, and quality assessment of the included studies. Figure 1 shows the number of publications on ChatGPT applications in the research processes during the study period from 2022 to 2023.

Descriptive Characteristics of the Included Records

The findings show that there has been an increase in publications on ChatGPT since its introduction in November 2022. Based on the h-index, the top two publications on ChatGPT and research are Lund et al. (2023) and Salla (2023) with 118 and 64 citations respectively. Gottlieb (2023) research had not been cited yet (See Table 2). Of the 20 records, 4(20%) were published by Elsevier, 2(10%) Taylor and Francis, 2(10%) Emerald.com, 2(10%), and 2(10%) medrxiv.org. Even though ChatGPT was introduced in November 2022, all the records suited and included in this review were published in 2023. Table 2 shows the number of citations for each record and their topic of focus.

Table 2: Potential Impact of ChatGPT on Research Practices

Hong (2023)	11	ChatGPT offers major opportunities for education institutes to provide researchers with an array of research opportunities.
Homolak (2023)	14	ChatGPT is the inevitable disruptive technology. Thus, there is a need to discuss both the opportunities and risks of its use.
Peres et al. (2023)	4	It is important to continuously monitor and conduct research on the tools themselves.
Megahed et al. (2023)	7	Some results are misleading and wrong. Overall, the use of ChatGPT must be properly validated and used in conjunction with other methods to ensure accurate results.
Ivanov et al. (2023)	4	ChatGPT can do what researchers should do. Publishers need to be more receptive toward manuscripts that are partially generated by ChatGPT.

Sedaghat (2023)	4	Although ChatGPT has the potential to change research, further improvements of this application are needed.
Lund et al (2023)	118	ChatGPT has considerable power to advance research. However, it is important to consider how to use this technology responsibly and ethically.
Vaishya et al (2023)	10	Researchers are advised to fact check all statements provided, keeping in mind its limitations.
Sallam (2023)	64	ChatGPT does not qualify to be listed as an author in scientific articles. Setting a code of ethics to guide the responsible use of ChatGPT is needed.
Opara (2023)	4	ChatGPT delivers rapid and instantaneous response to search queries. However, there is lack of citations and references.
Xames et al (2023)	6	ChatGPT requires immediate attention such as AI authorship, unintentional plagiarism, nonexistent references, and threats of international inequalities. We conclude with optimistic expectations for ChatGPT adoption in research in the future.
Sok (2023)	7	There are risks related to academic integrity issues, unfair learning assessment, inaccurate information, and over-reliance on ChatGPT.
Mijwil et al (2023)	3	This article finds that the use of artificial intelligence applications in academic research may raise concerns about academic ethics, and the limited availability of technologies that can detect such violations poses a significant challenge to academic writing.
Rahimi et al (2023)	7	Excluding ChatGPT from scientific publishing may not be practicable with time, establishing ethical principles is essential before it could become a "co-author" in any scientific, published manuscript.
Zhu et al (2023)	14	It could generate false or fabricated information and ChatGPT training data extend to only 2021
Gottlieb (2023)	0	The scientific community to determine how best to incorporate ChatGPT into the research and publication process with attention to scientific integrity, adherence to ethical principles, and existing copyright laws.
Sabzalieva et al (2023)	7	The challenges related to ChatGPT are ethical implications in higher learning institutions.
Rahman et al (2023)	8	Considering the potential applications and consequences of ChatGPT, it is a must for the academic and scientific community to establish the necessary guidelines for the appropriate use of ChatGPT in research and publishing.
Hosseini et al (2023)	1	Given involved risks and unforeseen challenges, taking a thoughtful and measured approach in adoption of ChatGPT would reduce the likelihood of harm.

Farrokhnia et al (2023)	12	The use of ChatGPT, with its positive and negative impacts on education, including the research practices is still in its infancy and that implies the need for more empirical research.
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Source: Rahman et al. (2023)

The findings show that the use of AI (i.e., ChatGPT) in education related research was still in its infant stage. This implies the need for more empirical research. The major findings are illustrated in the underneath sections.

Best Practices on using AI such as ChatGPT in HLI Research Practices

Eleven (55%) records frequently mentioned proper management of research practices during the AI era. The findings imply that AI-era research practices must be managed by setting policies, guidelines and protocols. This is because plagiarism, nonexistent references, privacy, security, excessive copying, ethics and integrity, and over-reliance on ChatGPT are still problematic. Further evidence was identified in some publishers such as Springer-Nature, Taylor and Francis, and Elsevier (Rahman et al., 2023). Another significant finding was that more empirical research and discussions on the use of AI in research and scientific paper writing in HLIs need to be conducted. Five 5 (25%) records mentioned this concern. Since ChatGPT, which is in infancy stage in research practices; it is too early to judge. The findings suggest a need for further research in this particular area. It was revealed that the use of ChatGPT in HLI research practices requires multiple methods of triangulation. Four (20%) records mentioned the finding. The finding was associated with the argument that ChatGPT was misleading and wrong, provides inaccurate information, and hardly include citations and references. The findings imply that if ChatGPT is used in the research, researchers should verify the accuracy and reliability of any information provided. Therefore, researchers should refrain from relying on ChatGPT in different phases of their research trajectory

Discussion

In the current review, three major themes emerged from the available literature. The first central theme is that ChatGPT needs to abide by the code of ethics and guidelines. Specifically, the use of ChatGPT was listed in some sources as a tool that has the potential of plagiarism, lack of integrity and

over-reliance on ChatGPT (Lund et al., 2023; Sallam, 2023; Hosseini et al., 2023; Gottlieb, 2023; Rahimi et al., 2023; Mijwil et al., 2023; Sok, 2023). The cited references recognize that ChatGPT presents noteworthy prospects for educational institutions to furnish researchers with a diverse range of research avenues (Hong, 2023). Moreover, it is contended that the exclusion of ChatGPT from scholarly publishing may become impractical over time (Rahimi et al., 2023). On the basis of this, establishing ethical principles is an essential step before being entirely accepted in scientific research. As such, the ChatGPT cannot be avoided, but its use in research practices requires great attention. The reviews identified that the use of ChatGPT currently needs more empirical research and discussions (Homolak, 2023; Peres et al., 2023; Sedaghat, 2023; Farrokhnia et al., 2023). ChatGPT has potential limitations and opportunities in the research practices. Thus, it is necessary to discuss both the opportunities and risks of its use in research practices. Currently, ChatGPT does not qualify to be listed as an author in scientific articles (Sallam, 2023). However, other sources have suggested using ChatGPT as an author in some specified instances (Huh, 2023; Hisan, 2023). The disapproval of the inclusion of ChatGPT in the list of authors or co-authors is clearly explained in Springer–Nature (2023), Taylor and Francis (2023) and Elsevier (2023). Thus, using AI, such as ChatGPT, in research practices should be carefully used. The records indicate that ChatGPT must be appropriately validated and used with other methods to ensure accurate results (Megahed et al., 2023). Thus, researchers are advised to keep in mind their limitations (Vaishya et al., 2023).

Conclusions

Using ChatGPT in scientific research is inevitable. Considering the valid concerns in regard to the best practices of ChatGPT, the collaborative efforts between and among stakeholders is warranted in order to produce appropriate guidelines and regulations. The careful use of ChatGPT can minimize the potential future complications. If adequately implemented, ChatGPT can improve innovation in research practices to overcome challenges such as language barriers. A debate regarding the use of ChatGPT is recommended in HLIs. However, before the full adoption of ChatGPT in research practices, the HLIs context should be taken into consideration to prevent the negative impact of its potential misuse. There is a need to set guidelines for using

ChatGPT in research practices in higher learning institutions. The utility of ChatGPT in research practices should be performed ethically and responsibly while taking into account its potential risks and concerns. To minimize plagiarism and excessive use of ChatGPT in research practices, an interdisciplinary panel of reviewers can be employed to assess research ethics applications with elements of AI. HLIs research and publication bodies should integrate AI-related-related matters in their guidelines. More studies and discussions are needed to evaluate the content of ChatGPT, including its potential impact on scientific research. As previously identified, the current review examined the best practices for the use of ChatGPT in HLIs research practices. However, the quality of the studies included records can be variable and thereby compromise the generalizability of the results due to limited focus (i.e., Google Scholar, and the exclusion of non-English record). The exclusion of several records that could have resulted in missing relevant data. Despite being small, the swift growth of literature on the use of ChatGPT in research practices need further studies and reviews. Lastly, this systematic review was based on the screening and interpretation of a single author, which may limit the interpretability of the results. Therefore, future systematic reviews should consider collaborative work to improve the quality and credibility of results.

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