Exploring graduate students' perception and adoption of AI chatbots in Zimbabwe: Balancing pedagogical innovation and development of higher-order cognitive skills

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Abstract

This research paper explores the perceptions and adoption of AI chatbots by graduate students in Zimbabwean universities. The study aims to understand the potential benefits and challenges of adopting AI chatbots in the education sector and its impact on developing higher-order cognitive skills. The study used qualitative methodologies, including field interviews, to analyze the data. The findings suggest that graduate students have a positive attitude towards AI chatbots because they enhance their learning experience, enable them to overcome skill gaps, and aid in test preparation. Furthermore, the study revealed that AI chatbots foster the development of higher-order cognitive skills by augmenting traditional lectures, test preparation, and personalization. However, challenges include plagiarism, outdated information, and financial constraints associated with AI chatbots. The study recommends that AI companies offer discounts to graduate students to enable them to access AI chatbot tools and that universities develop referencing systems allowing students to acknowledge using AI chatbots as sources.

Introduction

Artificial intelligence (AI) has become widespread in our everyday lives. Preliminary investigations indicate that incorporating AI chatbots into educational settings yields advantageous outcomes for students across multiple domains, including active and constructive learning and creative and social learning (Bii, 2013). Chassignol et al. (2018) believe that AI has a transformative impact on the field of education. Using AI systems and chatbots in education is a potential avenue for advancement (Kooli, 2023). According to Chan and Tsi (2023), integrating AI in educational settings offers valuable enhancements to the teaching and learning processes without being perceived as a substitute for traditional methods. Chatbots are emerging as a novel form of automation, gradually gaining recognition at institutions in Zimbabwe. Graduate programs are vital to Zimbabwe's educational framework; incorporating chatbots to augment the learning experience is a pivotal advancement. As Chang et al. (2023) suggest, incorporating AI chatbots into educational settings has been shown to facilitate and enhance students' self-regulated learning. Pillai et al. (2023) argue that using artificial intelligence and teaching bots in higher education can be attributed to various variables. The authors employ a mixed-method methodology to examine several characteristics, including perceived ease of use, perceived usefulness, interactivity, personalization, perceived intelligence, and anthropomorphism. The integration of chatbots in academic libraries holds significant importance, as Kaushal and Yadav (2022) emphasized, particularly in enhancing research endeavors and facilitating scholarly collaboration. According to Rahim et al. (2022), perceived trust and performance anticipation are the primary factors influencing students' reliance on AI chatbots. In his study conducted in 2021, Malik examines the utilization of chatbots in the context of education. He explores the significance of perceived convenience and improved performance in accepting and integrating chatbots among university students.

However, the higher education industry in Zimbabwe continues to face noteworthy obstacles, including issues related to financial resources and the ability to access educational opportunities. According to Teferra et al. (2013), the issue of funding is a substantial obstacle to the advancement of higher education in Zimbabwe. Furthermore, the rural environment presents barriers to accessing, participating in, and achieving higher education (Nenji & Ndofirepi, 2020). Nevertheless, there has been a notable transition towards incorporating technology within education. According to Isaacs (2007), Zimbabwe has implemented a comprehensive national ICT policy that specifically emphasizes the integration of ICTs within the education sector. Following Tsokota and Solms (2013), it is recommended that the government implement computerization of its processes and establish a favorable climate that enables the private sector to utilize ICT efficiently. The study by Kujeke et al. (2012) examine the difficulties encountered by universities in Zimbabwe when effectively employing ICT for administrative and instructional purposes. The authors highlight the importance of enhancing infrastructure and providing training opportunities for faculty members and students to address these obstacles.

AI chatbots are emerging as a prominent ICT form in Zimbabwean institutions. Lin and Yu (2023) argue that using chatbots in educational settings is a burgeoning area of interest in educational technology research due to its numerous benefits. According to Michel-Villarreal et al. (2023), tailored learning experiences have been found to enhance students' involvement with the learning process. Furthermore, it has been shown that chatbots can offer students prompt feedback, hence enhancing the overall quality of the learning experience (Wang et al., 2023).

Ravankar et al. (2016) underscore the significance of problem-finding skills in teaching problem-solving skills. Furthermore, the study by Lee et al. (2019) examines the extent to which critical thinking and problem-solving abilities are present among undergraduate students in technical fields, emphasizing the necessity for enhancing these skills. Hence, it is imperative to utilize instructional approaches that facilitate the cultivation of cognitive abilities at an advanced level. Incorporating AI chatbots into graduate programs offers a distinct potential to harmonize instructional innovation by cultivating higher-order cognitive abilities.

Implementing and using AI chatbots in Zimbabwe pose hurdles despite their significant potential for aiding the learning process. In their seminal work, Woolf et al. (2013) identify significant issues regarding AI in education. These challenges encompass several aspects, such as the provision of mentors, the acquisition of 21st-century skills, and the establishment of universal access to global classrooms. AI chatbots in education are a nascent development, and the extent to which they enhance the overall quality of instruction and learning outcomes has yet to be definitively established. While there is an increasing body of research in industrialized nations investigating the efficacy of AI chatbots in enhancing educational achievements, there exists a need for more studies examining the impact of AI chatbots on the development of cognitive skills in graduate students.

The research question of this study is formulated as follows: What is the impact of AI chatbots on the development of cognitive skills in graduate students in Zimbabwean universities? This research aims to investigate graduate students' perceptions and attitudes towards using AI chatbots in their learning process. The study also aims to assess the effectiveness of AI chatbots in enhancing the development of cognitive skills among graduate students. Lastly, the potential challenges and limitations associated with using AI chatbots in the educational context will be identified, and recommendations for their integration and effective use will be provided. The rest of this paper is organized as follows. The following section presents an overview of the use of AI chatbots in the education sector. The methodology section outlines the research design, data collection, and data analysis procedures. Section Four highlights the findings and discussions. The last section concludes this study.

Literature review

Artificial intelligence (AI) technology has rapidly emerged in education, driven by the demand for personalized and adaptive learning experiences. One particular application of AI in education is through the use of chatbots, which have the potential to deliver customized education and support services. This literature review examines the emergence of AI chatbots in education and their impact on student learning processes. It highlights the advantages of using chatbots, such as providing prompt feedback, addressing inquiries, and making tailored suggestions. Moreover, chatbots can assist educators in evaluating assignments, monitoring student progress, and offering administrative assistance. The review also discusses contrasting perspectives regarding the impact of chatbots in education, including concerns about privacy, academic integrity, and the loss of in-person interactions with teachers. While the existing literature showcases the potential benefits of incorporating AI chatbots in education, further research is needed to fully understand their impact on cognitive skills development in graduate students.

The emergence of AI technology in education

The emergence of AI technology in education can be attributed to the demand for scalable, personalized, and adaptive learning experiences. The integration of chatbots into education has commenced (Winkler & Söllner, 2018). Cunningham-Nelson et al. (2019) assert that chatbots can deliver and customize various aspects of education. According to Okonkwo and Ade-Ibijola (2021), using chatbot technology holds promise in delivering efficient and tailored services to individuals within the educational domain. Furthermore, Verleger and Pembridge (2018) suggested that AI software tools have the potential to revolutionize the student experience. There are several justifications for their acceptance in the educational sector. Sandu and Gide (2019) conducted a study that centers on using AI chatbots inside the higher education system in India. The authors highlight the advantages of utilizing chatbots to improve students' learning experiences. AI chatbots offer students prompt feedback, address inquiries, and make tailored suggestions.

Moreover, chatbots can provide information without requiring extensive, time-consuming searches while concealing the underlying complexity (Ondáš et al., 2019). According to the findings of Pérez et al. (2020), chatbots have the potential to facilitate learning in a manner comparable to that of a human teacher. In addition, Sung (2020) evaluates AI English-language chatbots and posits that they are anticipated to significantly contribute to achieving speaking and listening proficiency benchmarks.

Furthermore, AI chatbots support educators and administrators in their day-to-day responsibilities, particularly evaluating assignments, monitoring student advancement, and offering administrative assistance. According to Yang and Evans (2019), AI chatbots have been found to assist in many educational endeavors. As a result, this technology provides educators with additional time to dedicate to tasks that necessitate human involvement, such as offering mentorship and assistance to students.

Furthermore, the study conducted by Yang (2022) delves into preservice teachers' perspectives regarding AI chatbots in English education. The author's findings shed light on the positive attitudes shown by these individuals towards the efficacy of AI chatbots as valuable tools for teaching and learning purposes. In addition, Thomas (2020) posits that chatbots serve as virtual instructional tools, alleviating instructors from mundane responsibilities. According to the study by Huang et al. (2019), using chatbots in the learning process has been found to mitigate the sense of isolation experienced by e-learners.

Nevertheless, there is a need for improvement in the awareness of AI technology among certain educational institutions. In their study, Adarkwah et al. (2023) examine the level of awareness and degree of acceptance of ChatGPT and AI chatbots among Ghanaian academics. The authors propose that many of the academic community might benefit from acquiring additional knowledge of ChatGPT and chatbots driven by artificial intelligence.

Discussing the impact of AI chatbots on education and student learning process

The existing scholarly literature offers divergent perspectives on the impact of AI technology on education and students' learning processes. While several scholarly publications showcase the potential advantages of incorporating this technology within education, contrasting research findings indicate a contrary perspective (Gamage et al., 2023; Sullivan et al., 2023).

According to the study conducted by Kim et al. (2021), it is posited that the utilization of AI chatbots has the potential to enhance students' proficiency in English communication within the context of learning English as a Foreign Language. According to Wu and Yu (2023), using AI chatbots has benefited students' learning outcomes, particularly those engaged in higher education. Numerous scholarly publications offer valuable perspectives on the impact of AI chatbots on the educational journey of postgraduate students within higher education institutions. Koivisto (2023) states that implementing chatbots in student counselling can enhance scalability and service hours. However, it is essential to note that students continue to be provided with human counselling services. In their recent publication, Liu et al. (2022) offer a novel chatbot system that utilizes AI to tailor the learning process, augment cognitive capabilities, and boost students' acquisition of learning skills.

In a study conducted by Neo (2022), the MERLIN Project was examined. This project aimed to create a virtual learning assistant utilizing AI chatbot technology. The study results indicated that students evaluated the chatbot as beneficial to their learning experience and effectively enhancing their comprehension of course content. In their study, Pantelić et al. (2023) analyzed student perspectives about AI chatbots and observed a general inclination among students to utilize them for academic-related objectives. According to Chen et al. (2023), using AI chatbots in educational settings facilitates responsive and interactive learning experiences for students, enabling them to acquire crucial material knowledge.

Moreover, these instruments possess significant value in terms of providing educational resources. Hannan and Liu (2023) emphasize AI technology's notable contributions to higher education. As per the authors' assertions, they hold significant importance in facilitating students' learning experiences and providing support to students. According to Michel-Villarreal et al. (2023), incorporating ChatGPT within higher education presents a range of potential benefits for students and educators. These advantages encompass round-the-clock accessibility and assistance, individualized instruction and mentoring, and supplementary educational materials. Additional chances encompass language acquisition and communication proficiency, pedagogical assistance and support for educators and teaching assistants, novel and transformative educational encounters, research endeavors, and data examination.

Furthermore, ChatGPT provides enhanced precision and accuracy in responding to inquiries, generating abstracts, summarizing textual content, and executing various academic-related tasks (Gamage et al., 2023). The usage of chatbots in education is seen favorably by both teachers and students, with the former noting that the chatbot's ability to respond to common inquiries could alleviate their workload (Limna et al., 2023). As per Rasul et al. (2023), ChatGPT can enhance students' learning experiences by helping them develop ideas for their assignments, research, analysis, and assessments. One of ChatGPT's main advantages is that it lets students learn by doing and experiencing things. With ChatGPT, students can assess various methods and techniques for resolving issues and accomplishing objectives through self-directed learning in lieu of a teacher (Rudolph et al., 2023). According to Sullivan et al. (2023), ChatGPT offers distinct possibilities for improving students' academic achievements belonging to diverse equity groups. The study by Yin et al. (2021) investigates the effects of a micro-learning system that utilizes chatbot technology on students' motivation and academic achievement levels. According to the authors, students who incorporate AI chatbots into their educational setting demonstrate high competence and independence. Consequently, these pupils exhibit a reduced need for traditional in-person instruction. Furthermore, these students demonstrate a rapid acquisition of heightened intrinsic desire.

Moreover, Wang et al. (2023) assert that the integration of AI in the realm of higher education affords overseas students the advantage of engaging in individualized and adaptable learning experiences. In addition, artificial intelligence enhances the overall quality of teaching. = Yu (2023) also posits that AI technology presents a significant prospect for education and pedagogy. Specifically, this entails the creation of virtual educational settings and the advancement of virtual instructors. According to Akiba and Fraboni (2023), integrating AI technology is valuable to academic counsellors, fostering educational fairness by empowering individuals individually. Imran and Almusharraf (2023) added that AI chatbots can enhance the efficiency of the academic process.

Nevertheless, chatbots pose potential hazards, including the infringement of privacy and challenges in understanding intricate tasks (Kaushal & Yadav, 2022). Furthermore, implementing AI technology presents many ethical dilemmas and legal liabilities, most notably academic plagiarism, intellectual property infringement, and the erosion of academic integrity (Yu, 2023). Additional issues of using chatbots in education include the necessity for data security and privacy, the accuracy of the chatbot's information, and the possible loss of in-person interactions with teachers (Limna et al., 2023). According to Rasul et al. (2023), academic dishonesty, prejudice, fabricated data, and poor assessment design will hinder the acquisition of critical graduate skills and encourage cursory learning. According to Perkins (2023), there is a contention about the possible hazards AI Large Language Models pose concerning preserving academic integrity. In a similar vein, Talaue (2023) cautions that the utilization of chatbots by student authors poses a potential threat to the maintenance of academic integrity. Furthermore, the research conducted by Wollny et al. (2021) posits that the evaluation of chatbots with implementation objectives presents significant research issues within the field of education. Michel-Villarreal et al. (2023) employ an ethnographic methodology to shed light on the diverse obstacles associated with using ChatGPT in higher education, particularly emphasizing academic integrity and quality control issues.

Besides, additional concerns warrant attention: personalized learning, expertise, authority, communication, and collaboration. Additionally, integrating AI technology into education has raised significant concerns regarding students' academic performance authenticity. A specific example is the utilization of ChatGPT. It has been identified as a potential avenue for engaging in academic misconduct (Gamage et al., 2023). Similarly, ChatGPT poses a potential risk to academic integrity, particularly concerning plagiarism and academic dishonesty (Sullivan et al., 2023).

The extant body of scholarly work about the impact of AI chatbots on the educational journey of postgraduate students elucidates various advantages and drawbacks associated with their utilization. Nevertheless, further investigation is warranted in the existing scholarly corpus about the equilibrium between educational novelty and the cultivation of advanced cognitive abilities in postgraduate students. Hence, it is imperative to undertake additional research on the impact of AI chatbots on the development of cognitive skills in graduate students.

Theory exploring the adoption and use of AI chatbots in education

The Cognitive Load Theory (CLT) is a theoretical framework explaining how the human mind processes and retains information (Sweller, 1988). It postulates that there are limits to the amount of information the working memory can handle at a given time, and excessive cognitive load can hinder learning and problem-solving. CLT is grounded in the idea that humans have limited cognitive capacities, and the learning process can be optimized by managing and balancing the cognitive load. CLT suggests three types of cognitive load: intrinsic, extraneous, and germane (Sweller, 1988). Intrinsic cognitive load refers to the inherent difficulty of the learning materials or tasks. Extraneous cognitive load

refers to the unnecessary cognitive burden imposed by instructional design elements that do not facilitate learning. Lastly, germane cognitive load refers to the cognitive effort required to construct new schema or knowledge structures.

Previous works relied on CLT to investigate the influence and adoption of AI technology in the educational sector. Abbasi et al. (2019) used the CLT to explore the effects of chatbot systems on students' learning outcomes. In addition, Fidan and Gencel (2022) investigated the impact of chatbots on online learning using the CLT. Similarly, Riapina (2023) analyzed the integration of AI in higher education using the same theory.

This study aims to investigate the impact of germane cognitive load on the potential of AI chatbots to enhance the acquisition of higher-order cognitive skills. AI chatbots can facilitate substantial conversations with pupils, foster the development of critical thinking skills, and assist in tackling intricate problem-solving tasks. AI chatbots can boost germane cognitive load and facilitate the development of higher-order cognitive skills by guiding students during strenuous activities and offering scaffolding support. Hence, this theoretical framework is deemed appropriate for investigating the impact of AI chatbots on the development of cognitive skills in graduate students enrolled in universities in Zimbabwe.

Methodology and data

The research philosophy of this study is interpretivism because students' perceptions of artificial intelligence and its impact on innovation and higher-order cognitive skills are highly subjective. Therefore, a qualitative methodology was used because the study aimed to explore the influence of artificial intelligence from learners' perspectives. This study's primary data analysis method is thematic analysis (Braun & Clarke, 2006). Thematic analysis identifies and interprets patterns, themes, and meanings within the data. It involves systematically organizing and categorizing data into themes, which helps understand the underlying patterns and relationships. In this research, thematic analysis enables a deep exploration of the participants' perceptions and attitudes toward using AI chatbots. It allows researchers to identify and interpret participants' rich and nuanced responses.

The population is Zimbabwean graduate students in 15 official Zimbabwean universities. A mixture of purposive and snowball sampling was employed. Purposive sampling was adopted because the study targeted only graduate students' views in Zimbabwean universities. On the other hand, the interviews were the ones that referred the researcher to other potential participants who were also university students (snowball sampling) (Reeves et al. 2013). Each interview lasted for about 30 minutes. Because the study is qualitative, saturation point sampling was used, and saturation was achieved at the 15th interview. Therefore, interviews were immediately stopped to save time and resources associated with the research. Critical incident techniques were used during participant interviews to draw on participants' experiences and observations on artificial

intelligence (Tuffour, 2017). Table 1 below displays the profile of the participants.

Table 1. Profile of the participants.

Attribute	Frequency	Percentage (%)
Gender		
Male	7	46.67
Female	8	53.33
Age		
25-35 years	10	66.67
Above 35 years	5	33.33
Employment Status		
Employed	6	54
Unemployed	9	46

Eight participants were women, and seven were men. 10 were aged between 25 and 35 years, and only five were above 35 years old. This is because graduate studies such as Master's and Ph.D. studies are done by older students as compared to undergraduate studies. Only six graduate students were employed at the time of the study. What is essential is that the study was inclusive, and the beliefs and perceptions of diverse groups were considered.

The Guba model was used for data trustworthiness as propounded by Guba and Lincoln in 1994. The model states that qualitative research is subjective and susceptible to participant biases. In addition, to avoid these biases, repeat interviews were done to measure data consistency after two weeks. The first interview was held on the 10th of November 2023, and the second on the 24th of November 2023. The consistent responses made this study credible, dependable, and transferable. NVivo software v14.23.0 was used to organize and analyze qualitative data obtained from field interviews. Data analysis was two-phased, and it started with open coding identifying repeated words as themes and ended with selective coding where themes were solidified and combined depending on relatedness. Ethics were not an issue as participants were kept anonymous and treated as autonomous agents who could withdraw from the study whenever they wished.

Results and discussions

Perceptions and attitudes of graduate students towards the use of AI chatbots in their learning process

The study aimed to understand graduate students' perceptions and attitudes toward using AI chatbots in their learning process. The study found that graduate students are aware of AI chatbots and use them in their learning process. One of the participants said this:

My first encounter with chatbots was with FoondaMate, which I used to assist my child in Form Four. However, FoondaMate is for secondary and primary school only. In the class WhatsApp group, a friend shared a WhatsApp chatbot contact (+27600703213), PI [Personal Intelligence chatbot], covering all primary,

secondary, and tertiary education. I have been using it for my assignment tasks and research. (R4)

However, graduate students are more averse to chatbots on social media (WhatsApp and Telegram). They needed to ponder their awareness of ChatGPT, a more advanced AI. Few of them have been using ChatGPT, and they gave two reasons: ChatGPT was not available in Zimbabwe and is more expensive given the economic hardships in Zimbabwe. Below is an extract from one of the students who summarized why graduate students in Zimbabwe tend to use something other than ChatGPT.

> ChatGPT is unpopular in Zimbabwe because, since its inception last month, one could not open a ChatGPT account. Only those who use VPNs and have foreign phone numbers can use ChatGPT. However, this is a hustle; many students do not open the accounts. However, now one can open ChatGPT, but you are limited to GPT-3, which is [the free version]. To access GPT-4, which is advanced, one has to pay a subscription of US$20 per month, and this is beyond the reach of many graduate students, given our economy. (R7)

In a nutshell, Zimbabwean graduate students are using AI in their learning processes (assignments and research). However, they are using chatbots that are free and available on WhatsApp and Telegram. ChatGPT is not used in Zimbabwe because up until last month, Zimbabweans could not open accounts, and now that it is there, the subscription fee for GPT-4 is expensive to them. This finding deviates from Yu (2023) and Wang et al. (2023), who found that ChatGPT is the preferred AI platform for learning. This deviation may be because Yu (2023) and Wang et al. (2023) conducted their studies in developed countries.

In terms of perceptions and attitudes, the study found that most graduate students have a positive perception and attitude towards AI. The positive attitude is because of AI's positive impact on their learning process. For example, R2 is happy about AI because it is "a source of research".

> I am studying data analytics, and in Zimbabwe, this is a new emerging field, and there are limited textbooks both physical and in online libraries... Before using chatbots, I struggled to find information about my study. If I want to know a certain concept, I type on a WhatsApp chatbot, which can tell me the concept using simple terms. (R2)

On the other hand, R5 is enthusiastic about AI because it has brought about efficiency in completing tasks such as assignment writing.

> AI chatbots help me in writing my assignments. Usually, my assignments are in essay format. The chatbot writes the whole essay; my role is to put Zimbabwean examples only, which these chatbots are limited in. An assignment that took me one month to write now takes me five minutes. (R5)

R5 was not worried about hallucinations of chatbots and ethics involved in using AI to write the whole assignment. R5 maintained that using AI is more ethical than copying and pasting from the internet. R5 said that copying and pasting from another human is undermining the hard work of others while copying and pasting from AI is not the same because no humans are involved. Some graduate students are happy because AI helps in paraphrasing. R7 is of the view that AI solves all plagiarism dilemmas.

> I used to struggle with reducing the similarity index in my assignments and research projects. I now use Quillbot to paraphrase... so that my similarity index complies with the 10% accepted rate. (R7)

Some graduate students positively perceive AI because it helps them resolve grammatical challenges. Learning is done in English in Zimbabwe, and English is the second language of many students, and there are bound to be grammatical errors. R9 clarified this.

> What frustrates our professors is marking assignments with grammatical issues. The grammar used to result in me getting low marks. These days, before I submit my assignment, I upload it into the chatbot for editing, and recently, my assignment marks have improved. (R9)

The study concludes that many graduate students have a positive perception and attitude towards AI because it has brought about efficiency, helps them address grammatical errors, is a source of research, and helps in paraphrasing. This finding converges with findings by Michel-Villarreal et al. (2023) in Spain and Hannan & Liu (2023) in China that students are bound to have positive attitudes and perceptions of AI because it makes learning easier particularly for graduate students who have other commitments, such as family and work.

Effectiveness of AI chatbots in fostering the development of higher-order cognitive skills among graduate students

The final objective of the study is to understand the effectiveness of AI chatbots in fostering higher-order cognitive skills among graduates. In terms of this objective, three themes emerged: the augmentation of traditional lectures, test preparation, and personalization.

Augmentation of traditional lectures

The investigation found that AI chatbots are effective as they augment traditional lectures. Graduate students stated that they use AI chatbots to understand concepts they missed out during traditional lectures.

> Before a lecture, I prepare myself for the topics we will learn using chatbots... This has made me participative during lectures, and my lecturers have commented that I have improved in my classroom participation. (R2)

However, R15, unlike R2, uses chatbots after lectures to seek further clarity and understanding.

> I am an introvert, and I miss out on much information during lectures because I am too shy to ask the lecturer for further clarity... After the lesson, I then asked the chatbots those questions to get further clarity. (R15)

This finding is different from Chen et al. (2023), who found that AI will replace traditional learning. This study observed that AI chatbots and traditional learning can complement learners' cognitive development.

Test preparation

Some graduate students highlighted that chatbots are pivotal to cognitive development because they aid in examination preparation. It was highlighted by R2, who was enthusiastic about this.

> The most preferred revision method was group discussions, but I could not attend group discussions because of family commitments and the costs associated with travelling to the discussion venue. I now use chatbots, and I can write a mock test, and the chatbot can mark it for me. I do this until I feel ready for the examination and the chatbot gives me the corrections. (R2)

This finding corresponds to Wu and Yu (2023), who argue that AI is critical in learners' cognitive development because it helps them prepare for examinations, which is an essential part of the cognitive development of graduate students.

Personalization

One other area that was unearthed by the research is that AI chatbots are vital in cognitive development. Graduate students in the research explained that in AI chatbots, you can ask them what you want in your own time, which is vital in cognitive development. R11, concerned about the content, highlighted this:

> The thing with AI chatbots is you can ask them anything that you want, unlike in a lecture where someone asks the lecturer about concepts that you already know, and we end up not having time to ask the lecturer what we do not know. Chatbots allow us to ask about concepts we do not know and get enhanced understanding. (R11)

However, R13 is happy about personalization in terms of time. With lectures, there is a time limit. For example, lecturers prefer students to book appointments to attend to them; this is not the case with AI chatbots.

> Chatbots are very flexible whenever I am studying; it can be in the middle of the night, I can ask the chatbot about a concept I do not understand, and I always get feedback. (R13)

In summary, AI chatbots give graduate students the ability to personalize their cognitive development, a concept not identified, for instance, by studies conducted by Liu et al. (2022) and Wang et al. (2023), making this finding an under-researched area in AI chatbot studies and pedagogical innovation.

However, some graduate students noted some challenges associated with AI chatbots, making them less effective in their academic cognitive development. For example, R10 spoke about how AI has resulted in plagiarism.

> Some students are no longer doing their assignments; they task the chatbot and copy and paste. It is making graduate students lazy, and they now lack essential cognitive skills such as problem-solving, which are essential. (R10)

It is in line with studies by Hannan and Liu (2023) that show that with AI, there is always a temptation for students to plagiarize. Students are becoming lazy with the introduction of AI chatbots in education (Michel-Villarreal et al., 2023).

However, R6 believes that AI chatbots are ineffective in cognitive development because they are too general. ChatGPT-3.5 does not have up-to-date information on Zimbabwean issues, and it is also prone to hallucinations.

> The chatbot I use has limited information. If you want to learn about a recent phenomenon, it tells you that it only has information up to 2021, and this is a challenge; we have to go back to our lecturers for information.

However, this deviates from Wu and Yu (2023), who found that AI chatbots have up-to-date information essential for students. The reason is most likely because they use GPT-4, which has access to the Internet, especially when plugins are used. This deviation may be because of the free AI chatbots (like ChatGPT-3.5) that tend to be used by graduate students in Zimbabwe.

Many graduate students who participated in the study asserted that GPT-4 is expensive, as graduate students cannot afford to pay US$20 per month, given the harsh economic environment in Zimbabwe. However, this deviates from Yu (2023), who found that the current US$20 more affordable than the initial US$40. This divergence is due to the differences in economic contexts.

Conclusions and recommendations

This research paper aimed to explore the influence of AI chatbots on the learning process of graduate students in Zimbabwean universities and their impact on balancing pedagogical innovation with the development of higher-order cognitive skills. Through qualitative methodologies, including field interviews, the study aimed to better understand graduate students' perceptions and attitudes towards AI chatbots and their effectiveness in fostering cognitive skills.

The study found that graduate students know and use AI chatbots in their learning process. However, they are mostly limited to free chatbots available on social media platforms such as WhatsApp and Telegram. The study also uncovered a positive perception and attitude towards AI chatbots, as students appreciate their role in making research more accessible, enhancing assignment efficiency, improving grammar, and enabling personalization in their learning. The findings suggest that AI chatbots foster higher-order cognitive skills by augmenting traditional lectures, test preparation, and personalization.

However, the study identified challenges associated with integrating AI chatbots in education, including plagiarism, outdated information, and financial constraints. It is recommended that AI companies provide discounts to graduate students to enable them to access advanced AI chatbot tools, and universities develop academic policies that allow students to acknowledge using AI chatbots as sources. There is a need to democratize access to AI chatbots by making them affordable and available to students in Zimbabwean universities. It can be achieved through partnerships between AI companies, universities, and the government to ensure that AI chatbots are accessible to all students, regardless of their socio-economic backgrounds. In addition, universities should provide training opportunities for lecturers to enable them to integrate AI chatbots effectively into their teaching methods and facilitate the development of higher-order cognitive skills in graduate students.

Furthermore, universities in Zimbabwe should integrate AI chatbots into formal courses to enhance the learning experience and foster the development of higher-order cognitive skills. This integration should not replace traditional teaching methods but should be used to augment classroom teachings. Lastly, there is a need to develop ethical guidelines for using AI chatbots in education, specifically regarding academic integrity and plagiarism.

Despite this research's valuable insights, several limitations should be acknowledged, notably the focus on graduate students, the limited geographical scope, and the lack of comparative analysis. The study could be expanded further to include undergraduate students and their experiences with AI chatbots to gain a more comprehensive understanding of the impact of these tools on overall education. Moreover, future research should consider conducting cross-cultural studies to explore the impact of AI chatbots on educational practices in different contexts. Lastly, further research could explore the effectiveness of AI chatbots compared to traditional teaching methods or other technological tools.

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