Assessment of Students' Experiences and Viewpoints in Using Chatbots for Education Practice: A University Case of a Developing Country

Sichelesile Moyo, National University of Science and Technology, Zimbabwe
Phillip Nyoni, National University of Science and Technology, Zimbabwe
Belinda Ndlovu, National University of Science and Technology, Zimbabwe
Sibusisiwe Dube, National University of Science and Technology, Zimbabwe
Catherine Sibanda, National University of Science and Technology, Zimbabwe
Mary Dzinomwa, National University of Science and Technology, Zimbabwe

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Abstract
Artificial Intelligence (AI) based chatbots have transformed education globally with several different chatbots becoming popular. However, adoption has been met with differing perceptions, particularly in developing countries' education. AI can assist these countries as higher education institutions in these areas suffer from a high rate of lecturer turn-over and brain drain. Few studies have recorded developing countries' students' perceptions of chatbots, which is a gap this study fills. Using the Technology Acceptance Model (TAM) as a theoretical lens, quantitative data were collected using an online survey from 212 participants. The analysed results showed students had positive perceptions towards using chatbots, particularly ChatGPT. There is a general willingness to adopt AI chatbots despite some not knowing about chatbots. They also emphasised that using AI chatbots will reduce their workload and help them to understand their work. Additionally, few students are afraid to use chatbots due to plagiarism concerns and falsely generated information. These findings are useful for policymakers who must make informed decisions when formulating policies and guidelines for AI adoption in universities. The research findings guide university management on how to regularise and standardise the adoption and usage of innovative AI technologies, chatbots in particular, which students are currently using informally.

Keywords: Artificial Intelligence, Chatbots, Learning Assistants, Artificial Intelligence, Technology Acceptance Model

1. Introduction

The COVID-19 pandemic caused an unprecedented shift in higher education, requiring a quick switch to distance learning. Previous studies have examined the difficulties and advantages encountered by educators in their teaching endeavors during this time (Dube et al., 2023) and put up a model for successfully transitioning to online classrooms (Mutunhu et al., 2022). These research emphasised the urgent requirement for creative pedagogical methods and strong technology assistance to improve student involvement and academic achievements in distant settings. Although these studies provide insight into the opinions of instructors, it is essential to also comprehend the experiences and perspectives of students in utilising technological innovations to meet their educational requirements. This study explores the prospect of chatbots as a tool to tackle the difficulties described in prior research, based on the lessons acquired from the COVID-19 incident.

As artificial intelligence (AI) technology continues to advance, chatbots are likely to play an increasingly important role in our lives (Velankar et al. 2024). Chatbots can be used to provide us with information, assistance, and companionship (Casheekar et al., 2024). They can also be used in the education sector as they are helpful to students (Al Husaeni et al., 2024; Traymbak et al., 2024; Hwang & Chang, 2023). The term chatbots, which is short for chat robots, refers to computer programs created to mimic human dialogue and communicate with people through text- or speech-based interfaces (Hussain et al., 2019). To comprehend and react to user requests or orders, chatbots make use of artificial intelligence (AI) technologies including natural language processing (NLP) and machine learning (Ayanouz, Abdelhakim & Benhmed, 2020).

Chatbots have become popular in both business and healthcare settings in developed countries (Traymbak et al., 2024). They are also being used to help students learn new material and to provide entertainment for people of all ages (Hwang & Chang, 2023). However, the use of chatbots within educational settings is still limited in both developing and developed countries (Gikunda, 2023). Universities can benefit from chatbots as they offer enhanced engagement, personalized learning and enhanced student experiences for learners (Kumar et al., 2024; Wan Ismail et al., 2023; Dube et al., 2024). In some developed countries, chatbots have been successfully used not only to develop students' interaction skills but also to assist teaching faculty by bringing automation (Gökçearslan, Tosun & Erdemir, 2024; Okonkwo and Ade-Ibijola, 2021; Dsouza et al., 2019). It has also been noted by (Ondas et al., 2019) that the use of chatbots in education also increases connectivity, and efficiency, and reduces uncertainty in interactions (Gökçearslan, Tosun & Erdemir, 2024; Lombardi et al., 2021).

Despite all these benefits associated with the adoption of chatbots, there has been little action taken by African universities to adopt this technology (Gikunda, 2023). It is important to adopt the use of these chatbots at NUST to keep up with the fast pace of artificial intelligence (Wan Ismail et al. 2023). This study aims to get insights into students' experiences and perspectives on the use of chatbots in education. It specifically focuses on understanding the impact of this technology in a developing nation context. The goal is to maximize the learning experience, particularly in the post-pandemic era. The findings can inform the strategic adoption of chatbots within NUST and potentially serve as a roadmap for wider adoption across Africa. This, in turn, can contribute to a more engaging, efficient, and personalized learning experience for students and a more supportive environment for educators.

2. Related Work

2.1 Adoption of Chatbots in Higher Education

Chatbots are being rapidly adopted in higher education worldwide as institutions acknowledge their ability to improve student assistance, customize instructional experiences, and expedite administrative procedures (Labadze, Grigolia, & Machaidze, 2023). While still in its early stages. Universities worldwide are incorporating chatbots for diverse purposes, ranging from administrative tasks like course registration and financial aid queries to offering academic support, personalised learning recommendations, and mental health guidance (Gökçearslan, Tosun & Erdemir, 2024).

The early adopters of AI chatbots are institutions like MIT, Stanford, and Cambridge have been at the forefront, showcasing successful chatbot implementations. However, the spread is uneven, with many universities yet to explore this technology (Chen et al., 2024). Chatbots provide 24/7 access to information and support, catering to students across time zones and learning styles which leads them to accessibility and convenience (Casheekar et al., 2024; Kumar et al., 2024). In personal learning, chatbots can tailor responses and recommendations based on individual needs and preferences, fostering a more engaging learning experience (Al Husaeni et al., 2024). By automating routine inquiries and tasks, chatbots can free up staff time for more complex interactions and strategic initiatives. As stated by Chen et al. (2024), low teacher-student ratios can make it challenging for students to get prompt and engaging assistance.

Unfortunately, information specifically about the adoption of chatbots in higher education in Southern Africa is limited. While the global trend suggests rising interest and implementation, data pinpointing specific regions like Southern Africa is scarce (Gikunda, 2023). Based on available information, it appears that the widespread implementation of chatbots in Zimbabwean universities is still in its early stages. There are also indications of growing interest in AI-powered solutions in South African universities, including chatbots. Examples include the University of Pretoria's Libby Robot and the University of Johannesburg’s SPOT robot, showcasing a willingness to explore technological advancements (University of Pretoria, 2019; University of Johannesburg, 2021).

2.2 Factors Influencing Adoption or Resistance

Several studies have examined factors influencing the adoption or resistance to using chatbots for education (Al Husaeni et al., 2024; Traymbak et al., 2024; Hwang & Chang, 2023; Dube et al., 2024). The technology acceptance models of TAM and UTAUT/UTAUT2 are commonly applied theoretical frameworks when discussing the adoption of new technologies (Zhang & Wareewanich, 2024; Al-Maatouk et al., 2020). The key characteristics that have been discovered include performance expectancy (the perceived usefulness of a product or service), effort expectancy (the ease of use), social impact, and enabling conditions relating to technological compatibility and support (Goli et al, 2023). Additional attributes like hedonic motivation (perceived enjoyment), price value, habit and experience also play a role. Institutional-level support and expertise, technological maturity, interface design quality and privacy/security features further impact adoption decisions (Parsakia, 2023).

Another research gap is in the development of chatbots that can handle complex and nuanced conversations. While current chatbots can handle single-turn tasks effectively, they often struggle with multi-turn conversations that involve back-and-forth exchanges (Wu et al., 2023). Improving the dialogue management capabilities of chatbots to handle more dynamic and interactive conversations is an important area of research (Hwang & Chang, 2023).

3. Methodology

Data was collected using a structured questionnaire that was developed based on a systematic review of existing literature on AI chatbot adoption in higher education. It was distributed physically to participants over a 2-month period, on campus by the researchers. The questionnaire was also pre-tested with a small group of students to ensure it was easy to understand.

The population for this study was university students currently enrolled at the National University of Science & Technology (NUST) in Bulawayo. NUST was selected as the research site because it is a recognised institution in science and technology education in the country. Students were selected as their experiences will provide insights into the reasons for chatbot by them.

A convenience sampling strategy was used to select participants from the target population. This meant that participants who were readily accessible and willing participated in the study (Sukmawati, Salmia and Sudarmin, 2023). A sample size of participants was calculated from a total population of 5000 which led to a sample size of approximately 212 participants. The collected data was then analysed using descriptive statistics such as distribution, frequencies, means, and standard deviations. The researchers used the statistical software IBM SPSS (Statistical Package for the Social Sciences), as it easily generated descriptive statistics for this study.

The study was conducted in accordance with the ethical guidelines of NUST. Ethical considerations were observed during the research process to ensuring the protection of participants' rights and welfare (Creswell & Creswell, 2022). Informed consent was obtained from all participants, and the researchers assured them of their confidentiality and anonymity.

4. Results and Discussion

The following are results on the data collected on students’ perceptions on the adoption of AI chatbots in education. The results have been summarised using tables and frequencies and illustrated in a chart where necessary.

4.1 Participant Demographics

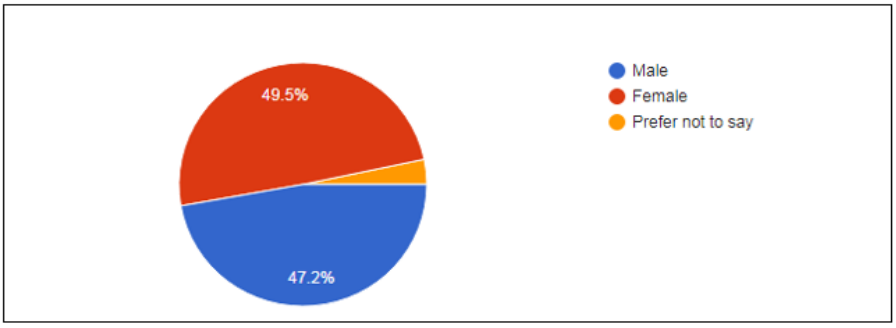

Figure 1: Participants Gender

Figure 1 represents the number of students and gender who responded to a survey questionnaire on the adoption of AI chatbots. Out of 212 responses, the biggest number were females at 49.5% followed by males which has 47.2 % and lastly, those who prefer not to say 3.3 %.

4.2 AI Chatbots Used

Participants indicated how they were alerted to the AI chatbot, 55 female students were through friends, 36 through the internet, 19 through social media, and then zero from advertisement whilst 39 male students knew it through friends and the internet 19 from social media, and one from advertisement. ChatGPT has the highest number of students using it and also has the lowest number of people who don't use it, Bard has the second highest number, followed by iAsk, Gemini and Perplexity has the least number. Perplexity seems not to be known but has the biggest number to those who said they do know it followed by Bard, Gemini, iAsk and lastly ChatGPT.

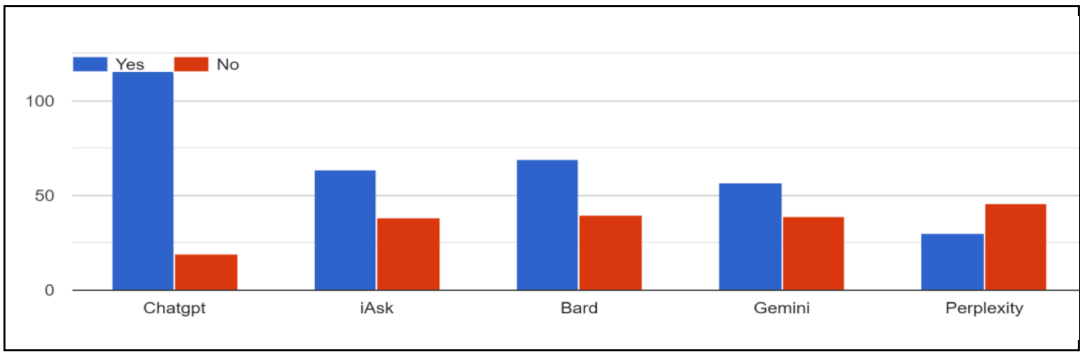

Figure 2: Chatbots Used

These findings suggest that AI chatbots have become increasingly prevalent and integrated into the educational landscape (Chen et al., 2024). However, the study also revealed that a small percentage (9.5%) of students are still unaware of AI chatbots, highlighting the need for continued awareness-raising and educational initiatives to ensure all students can benefit from these technological advancements (Malik et al., 2021).

The high rate of AI chatbot usage (93.37%) among the surveyed students further reinforces the growing adoption of these tools in higher education by the students themselves. This widespread usage can be attributed to the various perceived benefits that students associate

with AI chatbots, such as enhanced learning experiences, increased engagement, and improved learning outcomes (Labadze, Grigolia & Machaidze, 2023).

4.3 Students' Perceptions of AI Chatbots

The study reveals that students hold generally positive views towards AI chatbots, with 66.67% expressing positive sentiment, 25% negative, and 8.33% neutral. This indicates a strong potential for AI chatbots to be embraced as valuable tools in the educational landscape. While the overall sentiment towards AI chatbots is positive, the presence of negative perceptions (25%) and privacy concerns (13.33%) cannot be ignored. Addressing these concerns through transparent communication, robust data security measures, and ethical development practices is crucial for building trust and fostering wider acceptance (Cerny, 2023).

Perception of students on AI chatbots	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
AI Chatbots provides personalised learning experiences for students.	12(6.4)	11(5.85)	47(25.0)	94 (50.0)	24(12.8)
AI Chatbots can enhance student engagement and motivation.	95(50.8)	15(8.0)	33(17.7)	95(50.8)	33(17.6))
AI Chatbots can improve student's learning outcomes	11(5.9)	5(2.7)	41(22.0)	29(15.6)	100(53.8)
AI Chatbots can bring efficiency and productivity gains to a student's learning	10(5.3)	9(4.8)	43(22.9)	102(54.3)	24(12.8)
AI Chatbots can improve the quality of students 'assignments and research	12(6.4)	5(2.7)	37(19.8)	103(55.1)	30(16.0)

Table 1: Perception of Students on AI Chatbots

Table 1 shows students perceive numerous benefits associated with AI chatbots. Enhanced learning experience (50%), increased engagement (25%), and quick access to information (33.33%) emerge as the top three advantages. These findings highlight the potential of AI chatbots to improve student learning outcomes and engagement.

The high level of perceived benefits highlights the transformative potential of AI chatbots in education, as they can positively impact various aspects of learning (Kumar et al., 2024). Educational institutions and policymakers should leverage these positive perceptions to promote the adoption and integration of AI chatbots, ensuring that students can fully benefit from their advantages (Gökçearslan, Tosun & Erdemir, 2024).

4.4 Identifying Influencing Factors

Ease of use (41.67%) and perceived usefulness (50%) are identified as the most crucial factors influencing student adoption of AI chatbots. Availability (25%), technical support (8.33%), and integration with existing systems (16.67%) also play significant roles. Addressing these factors is essential for maximising the adoption and impact of AI chatbots in educational settings.

Educational institutions should focus on enhancing the user-friendliness of AI chatbots, ensuring their perceived usefulness, and seamlessly integrating them with existing educational platforms and systems (Al-Maatouk et al., 2020). Additionally, providing adequate technical support and clear communication around the availability and functionalities of AI chatbots can further facilitate their adoption.

4.5 Determining Successful Integration Strategies

Training and awareness programs (33.33%), clear communication and guidelines (41.67%), and collaboration with faculty (25%) are identified as the most effective strategies for successful AI chatbot integration. Customisation and personalisation (16.67%), continuous improvement, and feedback (8.33%) also contribute to successful implementation.

Collaboration with faculty emerged as a critical factor for successful AI chatbot integration. This underscores the importance of involving educators in the development and implementation process (Zhang & Wareewanich, 2024). By working together, educators and chatbot developers can ensure that AI chatbots align with pedagogical goals and seamlessly integrate into existing learning environments.

The data emphasises the importance of continuous improvement and feedback mechanisms. By actively soliciting feedback from students and educators, developers can refine and enhance the capabilities of AI chatbots, ensuring they remain relevant and effective in the ever-evolving educational landscape (Malik et al., 2021).

5. Limitations and Future Research

This study offers a valuable snapshot of students' perspectives and attitudes regarding AI chatbots in higher education. Nevertheless, it is crucial to recognize the constraints of the study. The study was done at a singular university, and the conclusions may not apply to different educational situations. Moreover, the data collection was constrained to a certain period, and the swift progress in AI technology could have led to alterations in student perspectives and usage trends since the data was gathered.

Future studies should investigate the longitudinal experiences of students with AI chatbots, specifically analyzing the long-term effects on learning results, engagement, and overall educational experiences. Engaging in cross-institutional research can enhance our awareness of how AI chatbots are adopted and integrated into various educational environments, leading to a more thorough comprehension. Integrating these chatbots with University Recommender Systems Ndlovu et al. (2023) can offer important insights into student personalities and provide improved advice in proposing appropriate degree programs. Furthermore, the research might further investigate the precise methods and techniques used to design, implement, and evaluate AI chatbots in higher education, which are crucial for their effective integration.

There is a further need for future research to address the ethical implications of adopting Chatbots in higher education. University policies and existing privacy and security awareness frameworks (Mutunhu et al., 2022; Maguraushe et al., 2024) need to address how these emerging technologies can be fostered in a university setup whilst upholding responsible use.

6. Conclusion

The findings this paper has discussed on students' perceptions towards AI chatbots can help universities as they develop policies towards artificial intelligence. The findings suggest a growing awareness and usage of these technologies among the student population, with generally positive perceptions and a strong recognition of their potential benefits. However, the study also highlights the need to address key influencing factors and implement effective integration strategies to ensure the successful and widespread adoption of AI chatbots in the educational landscape.

Beyond their current applications, AI chatbots hold immense potential for various other educational purposes. They can be used to provide personalised tutoring, facilitate peer-to-peer learning, offer career guidance, and even support mental health and well-being. Exploring these possibilities can unlock the full potential of AI chatbots in transforming the educational experience.

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