Vol.8 No.1 (2025)

Journal of Applied Learning & Teaching

ISSN : **2591-801X**

Content Available at : **http://journals.sfu.ca/jalt/index.php/jalt/index**

Assessing the role of AI technology in mitigating the equity gap in educational access in Zimbabwe: Barriers and implications

Arthur William Fodouop Kouam[A] — A — *Assistant Professor, Sanya University*

Regis Misheal Muchowe[B] — B — *Zimbabwe Open University, Department of Business Management*

Keywords

Accessibility;
AI;
artificial intelligence;
chatbots;
educational access;
equity gap;
generative artificial intelligence;
higher education.

Correspondence

willyfodouop@163.com [A]

Article Info

Received 29 February 2024
Received in revised form 30 December 2024
Accepted 2 January 2025
Available online 28 January 2025

DOI: https://doi.org/10.37074/jalt.2025.8.1.15

Abstract

This study investigates the role of artificial intelligence (AI) technology in mitigating the equity gap in educational access in Zimbabwe. By exploring the potential benefits, limitations, and best practices of using AI technology, this research contributes to a deeper understanding of how AI can address the complex issue of equity in higher education. Data was collected from lecturers and students through interviews, revealing that AI technology offers affordable, independent, personalized learning experiences and student support, enabling vulnerable learners to access educational resources. However, challenges such as the high cost of premium AI platforms, internet accessibility issues, and potential social skills deficits were identified as limitations to widespread implementation. The study recommends developing AI policies, university subscriptions to premium AI technologies, and the rollout of AI chatbots to ensure equitable and accessible learning opportunities for all students. This research sheds light on the importance of leveraging AI technology to promote inclusive education systems and close the equity gap in educational access, offering valuable insights for educational institutions in Zimbabwe and beyond.

Introduction

An equity gap refers to the disparity in academic achievement, access to resources, and opportunities for learning between students from low-income families and their more affluent peers. It is a persistent issue in higher education access, with the under-representation of disadvantaged groups remaining challenging (Parjanadze & Kapanadze, 2016). It is particularly evident in the lack of progress in improving access for low socio-economic backgrounds, with family income and cultural factors playing a significant role (Ajjawi et al., 2023). Despite efforts to expand access, there is a growing stratification in the quality and prestige of institutions, further exacerbating the equity gap (McCowan, 2016). The complex nature of this issue, which includes the failure of mass higher education systems and equity programs to address social stratification, underscores the need for a reconceptualization of equity in a globalized higher education environment (Baldwin & James, 2010).

Equity in higher education is multifaceted, encompassing both access and outcomes (Wang & Shulruf, 2013). Ling and Nasri (2019) identify key issues in achieving equity, including health equity, building relationships, and promoting a safe environment. Peercy and Svenson (2016) emphasize the role of tertiary education in promoting equitable human development, while Portus et al. (2024) raise critical questions about the definition and impact of equity gaps in education.

A range of factors contribute to the equity gap in higher education access. Government policies and financial support play a significant role, with social backing also crucial (Wanti et al., 2022). Family income and cultural factors, particularly for boys from blue-collar backgrounds, are critical determinants of this gap (Ajjawi et al., 2023). Affirmative action and financial aid programs have effectively promoted equity, but cultural and societal attitudes remain challenging (Kefalaki et al., 2022; Adoui, 2023). Furthermore, lack of information, responsibility, societal involvement, and inadequate state protection are additional barriers to equitable access (Parjanadze & Kapanadze, 2016).

Research offers various strategies to address the equity gap in higher education. Adoui (2023) highlights the effectiveness of affirmative action and financial aid programs but also emphasizes the need to address cultural and societal attitudes. McCowan (2007, 2016) discusses the expansion of access to higher education in Brazil and the UK, respectively, and the need for equitable expansion, including providing quality education. Ward (2006) underscores the importance of federal initiatives, such as GEAR UP, in improving equity and access for low-income and minority students.

Despite the efforts to address the equity gap in educational access, more than traditional approaches are needed to address this issue's complexity. One major limitation of previous studies (Chaudhry et al., 2023; Leenknecht et al., 2023) is their focus on individual-level factors, such as student motivation or teacher effectiveness, rather than systemic issues related to resource allocation or institutional policies.

Another limitation of previous studies is their reliance on static measures of academic achievement or resource allocation rather than dynamic measures that consider changes over time. Moreover, many studies (Chaudhry et al., 2023; Leenknecht et al., 2023) have focused on short-term outcomes rather than long-term impacts on student success or social mobility. In sum, the limitations of traditional approaches have become increasingly apparent. In recent years, there has been growing interest in the potential of artificial intelligence (AI) technology to mitigate the equity gap in educational access. Using AI in higher education, such as predictive modeling, can help identify and support underprivileged students (Cheddadi & Bouache, 2021).

In light of these limitations, this study aims to address the following research question: How can AI technology be used to mitigate the equity gap in educational access?

This study will explore the following research objectives to answer the research question:

- To identify the potential benefits of AI technology for mitigating the equity gap in educational access by addressing systemic issues related to resource allocation and institutional policies;
- To examine the limitations and challenges of using AI technology for this purpose; and
- To identify best practices for implementing AI technology in a way that is equitable and accessible for all students.

This study is significant because it addresses a critical education issue with substantial social and economic consequences. By exploring the potential benefits, limitations, and challenges of using AI technology to mitigate the equity gap in educational access, this study will contribute to understanding how AI can effectively address this issue. Moreover, by providing recommendations on how AI technology can be used equitably and accessibly for all students, this study will help ensure that AI-based interventions are socially responsible and beneficial for all members of society.

This paper is structured as follows: In the next section, we present a comprehensive literature review and the theoretical framework. The subsequent section outlines the research methodology, detailing the data collection and analysis methods employed to address the research objectives. We then present and discuss the findings, followed by a robust analysis and interpretation in the subsequent section. Finally, we conclude the paper with a summary of the key findings, insights, limitations, and directions for future research.

Literature review and theoretical framework

Artificial intelligence technology in education has become increasingly prevalent due to the growing need for scalable, adaptive, and personalized learning experiences. Incorporating AI chatbots and software tools in higher education can enhance student learning experiences,

support educators and administrators in their tasks, and potentially mitigate the equity gap in educational access. However, while AI technology shows promise, addressing its potential limitations and unintended negative consequences is crucial to ensure that it is accessible and beneficial for all learners (Ahmad et al., 2024; Sevnarayan & Potter, 2024).

The advent of AI technology in the realm of education

The rise of AI technology in education can be ascribed to the increasing need for scalable, personalized, and adaptive learning experiences. The implementation of chatbots in education has begun (Winkler & Söllner, 2018). According to Cunningham-Nelson et al. (2019), it has been argued that chatbots can provide and personalize many elements of education. Okonkwo and Ade-Ibijola (2021) assert that the utilization of chatbot technology exhibits the potential to provide effective and personalized services to individuals inside the educational sphere. Moreover, Groothuijsen et al. (2024) have posited that AI software tools could fundamentally transform the student experience. Multiple rationales exist for its incorporation within the educational domain. AI chatbots promote expanding higher-order cognitive skills by boosting test preparation, traditional lectures, and personalization (Kouam & Muchowe, 2024).

Moreover, the escalating prevalence of online learning and the desire for personalized and flexible learning experiences have stimulated the incorporation of AI technology in education. Sandu and Gide (2019) conducted a study focused on implementing AI chatbots into the higher education system in India. The authors emphasize the benefits of employing chatbots to enhance students' comprehensive learning experiences. Artificial intelligence chatbots provide students with timely feedback, answer their inquiries, and offer personalized recommendations. In addition, it has been argued that chatbots can provide information that circumvents the need for arduous and time-consuming searches while masking the intricate processes that underlie their functioning (Ondáš et al., 2019). The potential of chatbots to aid learning like human teachers has been highlighted in the research conducted by Pérez et al. (2020). Furthermore, Sung (2020) evaluates AI English-language chatbots and argues that they are expected to contribute substantially towards attaining competency standards in speaking and listening skills.

Furthermore, AI chatbots support educators and administrators in their daily tasks: assignment evaluation, student progress monitoring, and administrative support. Yang and Evans (2019) have shown that AI chatbots have demonstrated their efficacy in supporting various educational initiatives. Consequently, this technological advancement affords educators supplementary time to allocate toward activities requiring human engagement, such as student mentorship and support. Moreover, the research undertaken by Yang (2022) explores the viewpoints of preservice educators regarding integrating AI chatbots in the context of English language instruction. The author's research reveals the optimistic sentiments exhibited by these individuals on the effectiveness of AI chatbots as beneficial instruments for educational purposes. Furthermore, Labadze et al. (2023) state that chatbots can be virtual instructional tools, relieving instructors of tedious tasks. Huang et al. (2019) conducted a study which revealed that using chatbots during the learning process has demonstrated the benefit of alleviating the feelings of loneliness commonly encountered by individuals engaged in e-learning.

However, it is imperative to enhance the level of understanding regarding AI technology within certain educational institutions. Adarkwah et al. (2023) conducted a study to investigate the extent of awareness and level of acceptance among academics in Ghana concerning ChatGPT and AI chatbots. The authors conclude that a considerable portion of the scholarly community could benefit from obtaining supplementary knowledge about ChatGPT and AI-driven chatbots. Furthermore, integrating AI into education presents both opportunities and challenges. Rudolph et al. (2024) highlight that while generative AI can enhance pedagogy, research, and student support, it also raises concerns regarding academic integrity, labor displacement, and embedded biases. Similarly, Popenici (2023) emphasizes the need to go beyond the hype surrounding AI, advocating for a critical examination of its risks and ethical implications.

Solving the equity gap in educational access: Benefits and limitations of AI

Meyer et al. (2023) and Jurado de los Santos et al. (2020) emphasize the importance of addressing excellence gaps and the evolving understanding of equity in education. Meyer et al.'s review of interventions for reducing excellence gaps highlights the need for preparation, placement, evaluation, and adjustment. At the same time, Jurado de los Santos et al.'s bibliometric analysis underscores the shift from focusing on student diversity to specific aspects of equity, such as gender and race. Hoang (2019) contributes a model for classifying inequity and inequality, emphasizing the need to consider the individual and group/subgroup levels. Haxhiu (2022) underscores the potential of equity-based educational interventions, mainly when implemented with fidelity and supported by good leadership and a positive school culture. Bandyopadhyay and Subrahmanian (2008) highlight the need for enabling policies to improve the quality of schools and ensure better opportunities for girls at higher levels of education. Ross and Berger (2009) identify 16 research-based strategies for school leaders to promote equity, including curriculum interpretation, instruction, assessment, and community involvement. These studies underscore the complexity of the equity gap in education and the need for multifaceted interventions.

AI technology can reduce the equity gap in educational access by providing personalized learning experiences and addressing disparities in achievement (Holstein & Doroudi, 2021; Ahmad et al., 2021). However, there are concerns that AIEd systems may inadvertently exacerbate existing inequities (Holstein & Doroudi, 2021). To mitigate this risk, designing AIEd systems with equity in mind is crucial, ensuring that they are accessible and beneficial to all learners (Holstein & Doroudi, 2021; Ahmad et al., 2021). AI technology in education can potentially reduce the equity gap (Garcia & Lee, 2020), particularly in K-12 settings

(Zafari et al., 2022). However, this potential is contingent on addressing technology accessibility issues, particularly for disabled learners (Shaheen et al., 2019). In AI applications, strategies to improve equity include enhancing data quality and transparency, involving the community in development, and improving governance (Berdahl et al., 2023). While AI has shown promise in various educational applications, including tutoring and learning support (Sidana, 2019), its potential to reduce the equity gap will depend on successfully implementing these strategies.

The use of AI technology to reduce the equity gap in educational access highlights several limitations. Lin et al. (2020) and Holstein and Doroudi (2021) both point out that AI interventions, while well-intentioned, can have unintended negative consequences and may amplify existing inequities. Murphy (2019) further underscores the lack of evidence supporting the usefulness of AI applications in K-12 education, suggesting a need for more rigorous evaluation.

In sum, previous studies addressing the equity gap in educational access have focused on individual-level factors and static measures of academic achievement rather than systemic issues related to resource allocation and institutional policies. Moreover, many studies have focused on short-term outcomes and have not considered the long-term impact on student success or social mobility (Chaudhry et al., 2023; Leenknecht et al., 2023). Therefore, there is a need for a reconceptualization of equity in a globalized higher education environment that feels like using AI technology to mitigate the equity gap. This study explores the potential benefits, limitations, and challenges of using AI technology to minimize the equity gap in educational access.

AI's technology potential in addressing educational equity: The Capability Approach (CA)

The Capability Approach (CA) provides a comprehensive perspective on equity and social justice, applicable in various fields, including education. This approach argues that an individual's well-being or "capability" level is determined by multiple factors, including their access to resources and opportunities (Sen, 1979; Nussbaum, 2011). In education, the CA emphasizes providing all students with the necessary resources and opportunities to develop their capabilities to lead fulfilling lives.

The Capability Approach has been applied in various educational contexts, including social work (Slabbert, 2018), higher education (Ribeiro, 2015), and the use of ICT in schools (Chigona & Chigona, 2010). It effectively assesses clients' well-being in social work education (Slabbert, 2018) and identifies factors that hinder educators from using ICT in their pedagogy (Chigona & Chigona, 2010). However, the approach has also been critiqued for its operationalization difficulties (Ribeiro, 2015). Despite these challenges, the Capability Approach continues to gain momentum in educational contexts (Hart, 2012).

The Capability Approach, as discussed by Hart (2012), Broderick (2018), Campbell and McKendrick (2017), and Herguner (2012), offers a valuable lens for understanding and addressing the equity gap in educational access. It emphasizes the importance of not only providing access to education but also ensuring that individuals have the capabilities to make use of that education. This approach is particularly relevant in the context of the right to education for persons with disabilities (Broderick, 2018) and the under-representation of young people from deprived communities in higher education (Campbell & McKendrick, 2017). Herguner (2012) further highlights the potential of the Capability Approach in education projects, particularly in promoting social development and equity.

The CA also emphasizes the importance of individual agency, which asserts that individuals should be allowed to exercise their autonomy in defining their capabilities and pursuing their goals. Therefore, it emphasizes the importance of empowerment and social justice as essential components of equity. This approach could translate into providing all students with access to high-quality education tailored to their needs, enabling them to develop the necessary skills and knowledge to achieve their goals. Campano et al. (2020) and Hart (2018) emphasize the importance of collective agency in educational change and the development of children's agency, well-being, and participatory rights. Broderick (2018) applies the Capability Approach to the right to education for persons with disabilities, highlighting its potential to ensure equality and human potential development. Walker (2007) extends this discussion to the specific context of gender equality in education, emphasizing the role of education capabilities in shaping agency and the importance of learning in developing agency.

Using the CA as a theoretical framework for this study enables examining the various forms of disparity and inequality contributing to the equity gap in educational access. It also allows an exploration of the role of AI technology in addressing these disparities. Additionally, the CA could highlight how AI technology impacts students' agency, whether it leads to their empowerment or reinforces existing inequities. The framework could also aid in developing strategies to ensure that the use of AI technology in education is equitable and accessible for all students.

Methodology and data

This study seeks to assess the role of AI technology in mitigating the equity gap in educational access in Zimbabwe. Hence, the study adopted qualitative methodologies to understand this phenomenon. The target population of this study is 3,000 lecturers and 25,000 university students in Zimbabwe. The sample size for this study was six lecturers and six students. Snowball and convenience sampling were used to determine the sample size. At the 12th interview, data was saturated. A mixture of telephone interviews and face-to-face interviews were used. Telephone interviews were critical in soliciting information from seven participants outside Harare.

Five participants were interviewed face to face because they were in Harare, where there were no transport costs. Before the publication of the results, study participants were given the results to peruse and confirm if the research was a product of their beliefs and perceptions. The participants were satisfied that the results reflected their views on the phenomenon. It was significant in the solicitation of non-verbal information. Ethics were not an issue as study participants were treated as autonomous agents who could withdraw from the study at any time. Anonymity and confidentiality were achieved through anonymizing the names of participants and also ensuring that the data was stored in a password protected hard drive accessible only to the principal researchers. Thematic analysis was conducted using NVivo 14. Interview responses were grouped, classified, and presented using themes and codes.

The research paradigm of the study is interpretivism (William, 2024), as it seeks to understand the role of AI technology in educational access in Zimbabwe through qualitative methodologies, focusing on the perceptions and beliefs of the participants. The study values the subjective experiences and perspectives of the participants to gain a deeper understanding of the phenomenon. Table 1 below summarize the sample details.

Table 1. Sample details.

Category	details
Lecturers	Total: 6
Gender	Female: 3, Male: 3
Age Range	31-40: 4, 41-50: 2
University Type	Private: 3, State: 3
Faculty	Commerce: 1, ICT: 1, Engineering: 1, Social Science: 1, Arts: 1, Natural Science: 1
Position	Lecturer: 2, Senior Lecturer: 2, Associate Professor: 1, Full Professor: 1
University Students	Total: 6
Gender	Female: 3, Male: 3
Age Range	18-27: 4, 28-37: 1, >37: 1
University Type	Private: 3, State: 3
Faculty	Commerce: 1, ICT: 1, Engineering: 1, Social Science: 1, Arts: 1, Natural Science: 1
Student Level	Undergraduate: 3, Graduate: 3

Findings and discussions

The study identifies several benefits and challenges associated with using AI technology to reduce educational inequities in Zimbabwean universities.

Regarding the benefits, four key themes emerged: affordability, independent learning, personalized learning, and personalized support. AI technologies, such as chatbots, provide cost-effective resources for vulnerable learners, enabling them to access educational support without the financial burden of traditional tutoring. Participants noted that AI encourages independent learning by allowing students to study remotely, particularly in challenging economic conditions where transportation and resources may be lacking. Additionally, AI offers personalized learning experiences, helping students grasp complex concepts quickly and saving time and effort. Participants also emphasized that AI could resolve administrative queries, providing essential support to students who may not have other means to access information.

Despite these benefits, the study highlighted significant challenges, including the high costs associated with some AI technologies, limited internet access, and the potential negative impact on social skills. Premium AI services can be unaffordable for many students, and the cost of internet data remains a barrier, particularly for those in remote areas. Participants expressed concern that reliance on AI might lead to reduced opportunities for interpersonal interaction, which is vital for developing social skills in a collectivistic culture like Zimbabwe.

Finally, to promote equitable access to AI technologies, the study recommends that universities establish clear AI policies that support rather than penalize AI use, subscribe to premium AI services to ensure accessibility for all students, and implement a broader range of chatbots to facilitate administrative and educational support.

Benefits of AI technology in mitigating the equity gap in educational access

Regarding this finding, four themes emerged: cheap, independent learning, personalized learning, and personalized support. The study found that AI technology mitigates the equity gap in education access by providing affordable learning in Zimbabwean universities. Participants I, IV, and XII alluded that using chatbots is cheap for university learners, making it possible for every student to access learning. Participant 1, a lecturer, stated this:

> If you look at WhatsApp chatbots such as FoondaMate, they are cheap to use for our learners and understand complex concepts. [FoondaMate is an AI-powered chatbot that leverages natural language processing (NLP) to assist students, particularly in mathematics. It offers a range of features designed to help users solve math problems and complete homework assignments by providing step-by-step explanations and solutions. The chatbot is mainly geared towards students who struggle with understanding complex math concepts, enabling them to learn at their own pace and gain confidence in their mathematical abilities. FoondaMate aims to make math learning more accessible and engaging, helping bridge learning gaps in various educational contexts (https://foondamate.com/).]

AI technologies can be a cheap resource for vulnerable learners (Campano et al., 2020; Adarkwah et al., 2023). In addition, the study found that AI technology is mitigating the equity gap in educational access by offering independent learning. According to Participants II, III, VIII, X, and XI, AI technologies present an opportunity for vulnerable learners. As Participant X suggests, at times, some students do not have money for transport and food to be able to go to campus to learn. However, they use AI technologies such as ChatGPT, FoondaMate, and PI to catch up with other learners' learning. On the other hand, XI, a student, stated that:

> Some students from wealthy backgrounds are privileged to hire tutors for extra lessons to grasp complex concepts. AI has bridged this gap as it also functions as a tutor for extra lessons without spending a fortune.

AI encourages independent learning among students, as Haxhiu (2022) and Garcia and Lee (2020) noted. Furthermore, the study found that AI helps bridge the equity gap in educational access by providing university learners with personal learning. Participants I, III, V, IX, and XII subscribed to this view. According to these participants, with AI technologies, vulnerable students save time and money as they use AI to simplify specific concepts which they struggle to understand. For example, Participant IX, a university student, stated:

> Use of AI technologies such as chatbots……I do not waste time. The chatbot provides simple and understandable information about my problem and catches up with other learners.

It resonates with Berdahl et al. (2023) and Cheddadi & Bouache (2021) that the epitome of AI is offering personalized learning. Moreover, the study found that personalized support is another way AI technology bridges the educational access gap. Participants II, IV, XI, and XII explained that administration students' queries can be resolved if the students travel to the campus or by telephone. Campano et al. (2020) found that European universities have chatbots that resolve routine administration queries. However, students from poor backgrounds face challenges as they do not have these resources. AI has presented cheaper options to support students. A university lecturer, Participant II, stated that students can now use university chatbots to resolve administrative problems.

Challenges of AI in bridging educational equity gap

Regarding the limitations and challenges of using AI technology to bridge the education access gap, four themes emerged: expensive, internet access, problem-solving, and social skills. Participants I, II, IV, V, X, XI, and XII explained that using artificial intelligence technology is, at times, expensive, thereby widening the educational access gap. For example, Participant II, a university lecturer, stated that:

> Accessing premium ChatGPT4 is expensive for these vulnerable students, and those who can afford it are students from wealthy backgrounds.

On the other hand, Participant X, a student, asserted that:

> To access AI technologies, you need data bundles, and data bundles are too expensive in Zimbabwe due to the hyper-inflation environment, and only a few sections of the students have access to artificial intelligence technologies.

Groothuijsen et al. (2024) and Labadze et al. (2023) argued that some AI technologies are beyond the reach of many. The study also found that internet access is another challenge and limitation to using AI technology to bridge the gap in educational access. Participants II, III, V, VIII, X, and XI subscribed to this view by explaining that AI technology in Zimbabwe can only be accessed through the Internet. For example, Participant III, a university lecturer, stated that:

> Most of the students who are vulnerable are those that stay in remote areas where internet access is a challenge.

Wanti et al. (2022) and Zafari et al. (2022) buttress this finding by stating that AI technologies require internet access, and those who do not have it cannot enjoy the benefits of AI technologies. In addition, the study found that social skills are another important theme that emerged from Participants, particularly Participants I, II, IV, VI, VII, and XII. All these participants stressed that university students relying on AI technology must catch up in social skills. For example, Participant II, a university lecturer, stated this:

> In trying to bridge the education gap, these disadvantaged students who use AI end up not having important social skills due to not physically interacting with their peers and lecturers.

This finding resonates with Yang (2022), and Kouam and Muchowe (2024) further explain that students who constantly use AI lack social skills. Social skills are essential, especially in Zimbabwe, which has a collectivistic cultural approach.

Equitable and accessible AI implementation in education

The final objective was to establish best practices for Zimbabwean universities for implementing AI technology in a way that is equitable and accessible for all students. Three themes emerged from the study: AI policies, subscribing to premium AI, and rolling out AI chatbots. Participants V, VII, IX, X, and XII explained the need for AI policies. Participant IX stated that these policies should encourage learners to use AI technologies rather than discourage them. For example, Participant X, a university student, said that:

> The university should develop policies such as how we cite and reference work derived from AI chatbots rather than making it criminal to use information from chatbots.

Labadze et al. (2023) and Portus et al. (2024) explain that policies should govern the use of AI chatbots in every sector. The other finding pertained to universities subscribing to premium AI technologies. According to Participants VII, X, XI, and XII, disadvantaged students cannot afford to use premium AI such as ChatGPT-4. Participant XI, a university student, highlighted this:

> Universities should subscribe to premium AI technologies so that all students can use these technologies in bridging the education gap.

Only the better-off can afford AI technologies such as ChatGPT-4 in Zimbabwe (Kouam & Muchowe, 2024). The study found that universities should roll out chatbots.

Participants I, III, V, VI, VIII, X, XI, and XI highlighted the need for universities to roll out chatbots to enable learning. For example, instead of only having chatbots that help with administration, they should invest in chatbots that help students in learning. It resonates with Labadze et al. (2023), who says that AI chatbots can be helpful in the entire university process, and universities need to explore their utility.

Conclusion

This study has identified the potential benefits, limitations, and best practices of using AI technology to mitigate the equity gap in educational access in Zimbabwe. The key findings suggest that AI technology can offer affordable, independent, personalized learning experiences and student support, bridging the equity gap in educational access. By utilizing AI technology effectively, academic institutions can work towards closing the equity gap and promoting inclusive education systems that benefit all students, regardless of their socio-economic background.

However, challenges such as the expensive nature of some AI technologies, internet accessibility issues, lack of problem-solving skills, and potential social skills deficits among students have been identified as limitations to the widespread implementation of AI technology in education.

The implications and contributions of this study are significant for educational institutions in Zimbabwe and beyond. By understanding the potential of AI technology to address the equity gap in educational access, universities can formulate policies, subscribe to premium AI platforms, and roll out AI chatbots to ensure equitable and accessible learning opportunities for all students. This study underscores the importance of leveraging AI technology to enhance educational access and promote inclusive learning environments.

While the findings of this study provide valuable insights into the role of AI technology in educational access, some limitations should be acknowledged. The small sample size and focus on a specific context (Zimbabwe) may limit the generalizability of the findings. Future research could explore the role of AI technology in mitigating the equity gap in educational access in other regions and institutions to provide a more comprehensive understanding of this phenomenon. Additionally, further research could delve into the ethical considerations of using AI technology in education and its implications for student well-being and academic success.

Acknowledgment

The authors are grateful to Zimbabwean universities' lecturers and students who helped carry out this investigation. They are also indebted to the reviewers.

References

Adarkwah, M. A., Amponsah, S., van Wyk, M. M., Huang, R., Tlili, A., Shehata, B., Metwally, A. H. S., & Wang, H. (2023). Awareness and acceptance of ChatGPT as a generative conversational AI for transforming education by Ghanaian academics: A two-phase study. *Journal of Applied Learning and Teaching, 6*(2), 78-93. https://doi.org/10.37074/jalt.2023.6.2.26

Adoui, A. (2023). Exploring inequity factors in higher education: Promoting equitable access and success in the US. *Simulacra, 6*(1), 63-78. http://dx.doi.org/10.21107/sml.v6i1.19256

Ahmad, M., Subih, M., Fawaz, M., Alnuqaidan, H., Abuejheisheh, A., Naqshbandi, V., & Alhalaiqa, F. (2024). Awareness, benefits, threats, attitudes, and satisfaction with AI tools among Asian and African higher education staff and students. *Journal of Applied Learning and Teaching, 7*(1), 57-64. https://doi.org/10.37074/jalt.2024.7.1.10

Ahmad, S. F., Rahmat, M. K., Mubarik, M. S., Alam, M. M., & Hyder, S. I. (2021). Artificial intelligence and its role in education. *Sustainability, 13*(22), 12902. http://dx.doi.org/10.3390/su132212902

Ajjawi, R., Tai, J., Boud, D., & Jorre de St Jorre, T. (2023). *Assessment for inclusion in higher education: Promoting equity and social justice in assessment* (p. 260). Taylor & Francis.

Baldwin, G., & James, R. (2010). Access and equity in higher education. *International Encyclopedia of Education, 4*, 334-340.

Bandyopadhyay, M., & Subrahmanian, R. (2008). *Gender equity in education: A review of trends and factors*. CREATE Pathways to Access. Research Monograph No. 18.

Berdahl, C. T., Baker, L., Mann, S., Osoba, O., & Girosi, F. (2023). Strategies to improve the impact of artificial intelligence on health equity: Scoping review. *JMIR AI, 2*, e42936. https://doi.org/10.2196/42936

Broderick, A. (2018). Equality of what? The capability approach and the right to education for persons with disabilities. *Social Inclusion, 6*, 29-39. https://doi.org/10.17645/si.v6i1.1193

Campano, G., Ghiso, M. P., Badaki, O., & Kannan, C. (2020). Agency as collectivity: Community-based research for educational equity. *Theory Into Practice, 59*, 223-233. https://doi.org/10.1080/00405841.2019.1705107

Campbell, L. A., & McKendrick, J. (2017). Beyond aspirations: Deploying the capability approach to tackle the under-representation in higher education of young people from deprived communities. *Studies in Continuing Education, 39,* 120 - 137. https://doi.org/10.1080/0158037X.2017.1293630

Chaudhry, I. S., Sarwary, S. A. M., El Refae, G. A., & Chabchoub, H. (2023). Time to revisit existing student's performance evaluation approach in higher education sector in a new era

of ChatGPT—a case study. *Cogent Education, 10*(1), 2210461. https://doi.org/10.1080/2331186X.2023.2210461

Cheddadi, S., & Bouache, M. (2021). Improving equity and access to higher education using artificial intelligence. *2021 16th International Conference on Computer Science & Education (ICCSE)* (pp. 241-246). https://doi.org/10.1109/ICCSE51940.2021.9569548

Chigona, A., & Chigona, W. (2010). Capability approach on pedagogical use of ICT in schools. *The Journal for Transdisciplinary Research in Southern Africa, 6,* 16. Microsoft Word - 00 a Contents.docx

Cunningham-Nelson, S., Boles, W., Trouton, L., & Margerison, E. (2019). A review of chatbots in education: Practical steps forward. In *30th Annual conference for the Australasian Association for Engineering Education (AAEE 2019): Educators becoming agents of change: Innovate, integrate, motivate* (pp. 299-306). Engineers Australia. AAEE2019_Annual_Conference_paper_184.pdf

Garcia, A., & Lee, C. H. (2020). *Equity-centered approaches to educational technology*. https://doi.org/10.1007/978-3-030-36119-8_10

Groothuijsen, S., van den Beemt, A., Remmers, J. C., & van Meeuwen, L. W. (2024). AI chatbots in programming education: Students' use in a scientific computing course and consequences for learning. *Computers and Education: Artificial Intelligence, 7*, 100290. https://doi.org/10.1016/j.caeai.2024.100290

Hart, C. S. (2012). The capability approach and education. *Cambridge Journal of Education, 42*, 275-282. https://doi.org/10.1080/0305764X.2012.706393

Haxhiu, Z. (2022). Closing the achievement gap: An analysis of equity-based educational interventions. *Journal of Education Review Provision, 2*(2), 32-35. http://dx.doi.org/10.55885/jerp.v2i2.154

Herguner, B. (2012). In pursuit of equity: The capability approach and education. *Public Policy and Administration Research, 2,* 22-28. https://www.researchgate.net/publication/350459377_In_Pursuit_of_Equity_The_Capability_Approach_and_Education

Hoang, A. (2019). Fantastic educational gaps and where to find them: A review of research in educational equity and equality. *Journal of International Education and Practice*. http://dx.doi.org/10.30564/jiep.v2i4.1309

Holstein, K., & Doroudi, S. (2021). *Equity and artificial intelligence in education: Will "AIEd" amplify or alleviate inequities in education?* https://doi.org/10.48550/arXiv.2104.12920

Huang, W., Hew, K. F., & Gonda, D. E. (2019). Designing and evaluating three chatbot-enhanced activities for a flipped graduate course. *International Journal of Mechanical Engineering and Robotics Research*. http://dx.doi.org/10.18178/ijmerr.8.5.813-818

Jurado de los Santos, P., Moreno-Guerrero, A., Marín-Marín, J., & Soler Costa, R. (2020). The term equity in education: A literature review with scientific mapping in web of science. *International Journal of Environmental Research and Public Health, 17*. https://doi.org/10.3390/ijerph17103526

Kefalaki, M., Diamantidaki, F., & Rudolph, J. (2022). Editorial 5 (SI1): Technology and education: Innovation or hindrance. *Journal of Applied Learning & Teaching, 6*(1), 6-11. https://doi.org/10.37074/jalt.2022.5.s1.1

Kouam, A. W. F., & Muchowe, R. M. (2024). Exploring graduate students' perception and adoption of AI chatbots in Zimbabwe: Balancing pedagogical innovation and development of higher-order cognitive skills. *Journal of Applied Learning and Teaching, 7*(1), 1-11. https://dx.doi.org/10.2139/ssrn.4748274

Labadze, L., Grigolia, M., & Machaidze, L. (2023). Role of AI chatbots in education: Systematic literature review. *International Journal of Educational Technology in Higher Education, 20*(1), 56. https://doi.org/10.1186/s41239-023-00426-1

Leenknecht, M. J., Snijders, I., Wijnia, L., Rikers, R. M., & Loyens, S. M. (2023). Building relationships in higher education to support students' motivation. *Teaching in Higher Education, 28*(3), 632-653. https://doi.org/10.1080/13562517.2020.1839748

Lin, Y., Hung, T., & Huang, L. T. (2020). Engineering equity: How AI can help reduce the harm of implicit bias. *Philosophy & Technology*, 1-26. https://doi.org/10.1007/s13347-020-00406-7

Ling, T., & Nasri, N. M. (2019). A systematic review: Issues on equity in education. *Creative Education, 10*(12), 3163-3174. http://dx.doi.org/10.4236/ce.2019.1012240

McCowan, T. (2007). Expansion without equity: An analysis of current policy on access to higher education in Brazil. *Higher education, 53,* 579-598. https://doi.org/10.1007/s10734-005-0097-4

McCowan, T. (2016). Three dimensions of equity of access to higher education. *Compare: A Journal of Comparative and International Education, 46*, 645-665. https://discovery.ucl.ac.uk/id/eprint/1501901/1/McCowan_Three%20dimensions%20of%20equity%20of%20access%20to%20higher%20education.pdf

Meyer, M. S., Shen, Y., & Plucker, J. A. (2023). Reducing excellence gaps: A systematic review of research on equity in advanced education. *Review of Educational Research, 94,* 33-72. https://doi.org/10.3102/00346543221148461

Murphy, R. F. (2019). *Artificial intelligence applications to support K-12 teachers and teaching: A review of promising applications, opportunities, and challenges*. Perspective. The RAND Corporation. https://www.jstor.org/stable/resrep19907

Nussbaum, M. C. (2011). *Creating capabilities: The human*

development approach. Harvard University Press.

Okonkwo, C. W., & Ade-Ibijola, A. (2021). Chatbots applications in education: A systematic review. *Computers and Education: Artificial Intelligence, 2,* 100033. http://dx.doi.org/10.1016/j.caeai.2021.100033

Ondáš, S., Pleva, M., & Hládek, D. (2019, November). How chatbots can be involved in the education process. In *2019 17th International Conference on Emerging Elearning Technologies and Applications (ICETA)* (pp. 575-580). IEEE. https://doi.org/10.1186/s41239-023-00426-1

Parjanadze, N., & Kapanadze, I. (2016). Equity in access to higher education for special needs and socially deprived students in Georgia. *Journal of Education in Black Sea Region, 2*(1). http://dx.doi.org/10.31578/jebs.v2i1.31

Peercy, C. L., & Svenson, N. (2016). The role of higher education in equitable human development. *International Review of Education, 62*, 139-160. http://dx.doi.org/10.1007/s11159-016-9549-6

Pérez, J. Q., Daradoumis, T., & Puig, J. M. M. (2020). Rediscovering the use of chatbots in education: A systematic literature review. *Computer Applications in Engineering Education, 28*(6), 1549-1565. https://doi.org/10.1002/cae.22326

Popenici, S. (2023). The critique of AI as a foundation for judicious use in higher education. *Journal of Applied Learning and Teaching, 6*(2), 379-384. https://doi.org/10.37074/jalt.2023.6.2.4

Portus, R., Aarnio-Linnanvuori, E., Dillon, B., Fahy, F., Gopinath, D., Mansikka-Aho, A., ... & McEwen, L. (2024). Exploring environmental value action gap and education research: A semi-systematic literature review. *Environmental Education Research,* 1-31. https://doi.org/10.1080/13504622.2024.2314060

Ribeiro, A. S. (2015). A normative framework or an emerging theory? The capability approach in higher education research. In *Theory and method in higher education research* (Vol. 1, pp. 277-294). Emerald Group Publishing Limited. http://dx.doi.org/10.1108/S2056-375220150000001013

Ross, J. A., & Berger, M. J. (2009). Equity and leadership: Research-based strategies for school leaders. *School Leadership & Management, 29,* 463-476. http://dx.doi.org/10.1080/13632430903152310

Rudolph, J., Ismail, F., & Popenici, S. (2024). Higher education's generative artificial intelligence paradox: The meaning of chatbot mania. *Journal of University Teaching and Learning Practice, 21*(6), 1-35. https://doi.org/10.53761/54fs5e77

Sandu, N., & Gide, E. (2019, September). Adoption of AI-Chatbots to enhance student learning experience in higher education in India. In *2019 18th International Conference on Information Technology Based Higher Education and Training (ITHET)* (pp. 1-5). IEEE. https://www.researchgate.net/publication/338868551_Adoption_of_AI-Chatbots_to_Enhance_Student_Learning_Experience_in_Higher_Education_in_India

Sen, A. (1979). *Equality of what?* (Vol. 1). Sen_IequalityRexanmined_Chaps-1_AND_5.pdf

Sevnarayan, K., & Potter, M. A. (2024). Generative artificial intelligence in distance education: Transformations, challenges, and impact on academic integrity and student voice. *Journal of Applied Learning and Teaching, 7*(1), 104-114. http://dx.doi.org/10.37074/jalt.2024.7.1.41

Shaheen, N. L., & Lohnes Watulak, S. (2019). Bringing disability into the discussion: Examining technology accessibility as an equity concern in the field of instructional technology. *Journal of Research on Technology in Education, 51*, 187-201. https://doi.org/10.1080/15391523.2019.1566037

Sidana, M. (2019). A review of the use of artificial intelligence in the field of education. *International Journal of Artificial Intelligence and Machine Learning, 1*(3). https://www.ijaiml.com/wp-content/uploads/2019/05/Volume1-Issue3-Paper1.pdf

Slabbert, I. (2018). Applying the capability approach in social work education. *Social Work Education, 37*, 867- 880. https://doi.org/10.1080/02615479.2018.1458830

Sung, M. C. (2020). Preservice primary English teachers' AI chatbots. *Language Research, 56*(1), 97-115. http://dx.doi.org/10.30961/lr.2020.56.1.97

Walker, M. (2007). Selecting capabilities for gender equality in education. In *Amartya Sen's capability approach and social justice in education* (pp. 177-195). New York: Palgrave Macmillan US. https://doi.org/10.1057/9780230604810_9

Wang, G. Y., & Shulruf, B. (2013). Admission model and equity in higher education. *The Asia-Pacific Education Researcher, 22*, 111-117. https://doi.org/10.1007/s40299-012-0002-8

Wanti, M., Wesselink, R., Biemans, H. J., & Brok, P. (2022). Determining factors of access and equity in higher education: A systematic review. *Equity in Education & Society, 1*, 279 - 296. https://doi.org/10.1177/27526461221092429

Ward, N. L. (2006). Improving equity and access for low-income and minority youth into institutions of higher education. *Urban Education, 41,* 50 - 70. https://doi.org/10.1177/0042085905282253

William, F. K. A. (2024). Interpretivism or constructivism: Navigating research paradigms in social science research. *International Journal of Research Publications, 143*(1). https://ssrn.com/abstract=4801235

Winkler, R., & Söllner, M. (2018, July). Unleashing the potential of chatbots in education: A state-of-the-art analysis. In *Academy of management proceedings* (Vol. 2018, No. 1, p. 15903). Briarcliff Manor, NY 10510: Academy of Management. http://dx.doi.org/10.5465/AMBPP.2018.15903abstract

Yang, J. (2022). Perceptions of preservice teachers on AI

chatbots in English education. *International Journal of Internet, Broadcasting and Communication, 14*(1), 44-52. https://doi.org/10.7236/IJIBC.2022.14.1.44

Yang, S., & Evans, C. (2019, November). Opportunities and challenges in using AI chatbots in higher education. In *Proceedings of the 2019 3rd International Conference on Education and E-Learning* (pp. 79-83). https://doi.org/10.1145/3371647.3371659

Zafari, M., Bazargani, J. S., Sadeghi-Niaraki, A., & Choi, S. (2022). Artificial intelligence applications in K-12 education: A Systematic literature review. *IEEE Access,* 1-1. https://doi.org/10.1109/ACCESS.2022.3179356