JOVACET
Journal of Vocational, Adult and Continuing Education and Training

To cite: Muwaniki, C & Matara J. 2025. The role of social media and artificial intelligence tools in engaging hearing-impaired students in vocational education. *Journal of Vocational, Adult and Continuing Education and Training*, 8(1):83–98.
http://doi.org/10.14426/jovacet.v8i1.505

The role of social media and artificial intelligence tools in engaging hearing-impaired students in vocational education: A Zimbabwean case study

CHENJERAI MUWANIKI (chenjerai.muwaniki@gmail.com/cmuwaniki@unam.na) Adult Learning and Development, Department of Higher Education and Lifelong Learning, University of Namibia, Windhoek, Namibia
ORCID LINK: https://orcid.org/0000-0002-0476-0168

JOYCE MATARA (joycematara@yahoo.com) National Association of Societies for the Care of the Handicapped (NASCOH), Zimbabwe
ORCID LINK: https://orcid.org/0000-0002-5499-3381

ABSTRACT

The rapid advancement of social media and artificial intelligence (AI) has significantly influenced the participation of hearing-impaired (HI) students in vocational education in Zimbabwe. This study explored the ways in which social media platforms and AI-powered tools affect these students' access to vocational eduacation opportunities and also their social, emotional and economic well-being. The study aimed to answer the following two research questions: How do social media and AI tools facilitate vocational education for HI students in Zimbabwe? What are the opportunities and challenges associated with the use of social media and AI tools in vocational education for these students? The research focused on Hunhu Vocational School in Harare. Data were collected through a case study approach involving 12 purposively selected HI students, using semi-structured interviews, and in-depth interviews with three teachers and one key informant. Thematic analysis was employed to identify patterns and emerging themes in the data. The findings indicate that, in the Zimbabwean context, social media and AI tools hold emancipatory potential for HI vocational students by expanding educational access and opportunities to include them. However, the study also highlights the persistent structural, institutional and personal barriers that hinder the effective use of these technologies in vocational education.

KEYWORDS

Artificial intelligence (AI) tools; hearing-impaired (HI) students; social media; vocational education; Zimbabwe

Introduction

The role of social media and artificial intelligence (AI) tools in enhancing vocational education for hearing-impaired (HI) students in Zimbabwe is becoming increasingly significant (Mutswiri & Hapanyengwi, 2025). However, there remains a paucity of research specifically focused on the application of social media and AI in vocational education in the Zimbabwean context. Vocational education is broadly defined as the preparation of learners with practical skills for employment and self-employment. It is often regarded as the preferred educational pathway for individuals with hearing impairments, as it provides tangible opportunities for self-reliance and economic participation (Muwaniki & Muvirimi, 2017).

Globally, an estimated 466 million people experience hearing loss, making it one of the most prevalent forms of disability (Terry & Meara, 2024). According to the 2022 Census, people with disabilities comprise approximately 9.2% of Zimbabwe's population. While comprehensive data on students with hearing impairments in Zimbabwe are limited (Pedersen et al., 2022), earlier estimates suggest that about 2.5% of students experience hearing loss (Choruma, 2007). As in many other countries, the participation of people with disabilities in education and employment in Zimbabwe lags behind that of the general population (Hlatywayo & Ncube, 2014). The integration of social media and AI tools into the education system is therefore viewed as a promising development that could improve access to education and more successful outcomes for HI students.

The concepts of social media and AI are subject to definitional ambiguities. However, for the purposes of this article, *social media* refers to a range of user-centric digital spaces that enable social interaction and networking online (Obar & Wildman, 2015). In the Zimbabwean context, the most commonly used social media platforms include Facebook, X (formerly Twitter), WhatsApp, TikTok and YouTube. *AI*, in contrast, is defined as a scientific discipline concerned with creating computing models that simulate human cognitive processes for problem-solving (Shehu et al., 2021). A notable application of AI is *machine learning*, a subset of AI that underpins several data-based tools used in daily life which imitate the way humans learn to perform tasks autonomously (Jung, 2022). In this study, we focused on AI tools that leverage machine learning and are specifically applied in vocational education for HI students. These include visual reality sign language laboratories, interactive 3D signing environments, and sign-language avatar models (Kasapakis et al., 2023).

Social media have emerged as key communication tools that exert both positive and negative influences on learning and student engagement (Fazal et al., 2025). The technological revolution has further expanded the educational use of social media, benefiting both students with hearing impairments and their hearing peers (Musengi, et al., 2023). Similarly, AI contributes to the development of sign language by enhancing communication and promoting knowledge acquisition among HI learners (Papastratis et al., 2021).

This article reviews the literature on the intersection of social media and AI broadly, while also paying attention to the unique context of Zimbabwe, where access to technology and resources may differ significantly from that of other regions. The study sought to answer the following research questions:

1. How do social media and AI tools facilitate vocational education for HI students in Zimbabwe?
2. What are the opportunities and challenges associated with the use of social media and AI in vocational education for students with hearing impairments in Zimbabwe?

The article is structured as follows: literature review, methodology, findings and discussion, and conclusion.

Literature review

Globally, AI is permeating more areas of daily life and is increasingly being used in professional contexts such as vocational education (Laupichler et al., 2022). The emergence of the Fourth Industrial Revolution (4IR) has brought the use of AI tools, robotics, the Internet of Things (IoT) and biotechnology to the forefront of education and industry (Schwab, 2024). As these technologies evolve, they require new skills and competencies. The global technological revolution has significant implications for vocational education, leading to various advances that can enhance learning experiences, improve institutional efficiency and prepare students for the workforce. However, challenges are associated with disruptive technologies such as AI, especially when they are applied in weaker economies and also among populations with special needs (Mhlanga, 2023). Goal 4 of the United Nations Sustainable Development Goals (SDGs) emphasises the need to provide inclusive and equitable quality education and promote lifelong learning, including vocational education opportunities, by the year 2030 (Gupta & Vegelin, 2016). Despite this proclamation and the targets set, providing equitable opportunities for underprivileged communities, including students with HI, remains a daunting challenge (Fazal et al., 2025).

The use of AI tools has significant implications in approaches such as pedagogy, andragogy and heutagogy (self-initiated learning). These concepts relate to self-determined learning, which has become increasingly relevant through the use of technology; they enable adaptive education, personalised instruction and real-time transcription services that provide greater accessibility for HI students (Halder & Tayade, 2021). In the context of Zimbabwe, the growing integration of AI tools and social media in vocational education provides unprecedented positive opportunities for HI students. AI technologies have the potential to mitigate communication barriers and enhance access to auditory information, in this way improving the educational experiences of this target group (Chandramma et al., 2025). AI is making advances daily, introducing new and exciting technologies that are significantly changing society; these could be used by HI students engaged in vocational education.

AI has the potential to improve the quality of life of these students by overcoming communication challenges and expanding their access to auditory information (Alkahtani, 2024). The fusion of social media and AI tools in the context of vocational education serves to facilitate more inclusive educational frameworks for HI students. Social media platforms act as dynamic environments for resource sharing and community building that enable HI students to engage with educational materials which resonate with their unique experiences. Through online platforms such as WhatsApp and Facebook, HI students can connect, share knowledge and collaborate on educational projects because these platforms foster a more supportive and participatory learning atmosphere (Charitoo et al., 2023). In addition, AI applications, including machine learning-based tools for speech recognition and computer vision, are able to transcribe and translate sign language in real-time, which promotes active engagement among HI learners (Hari et al., 2025).

Moreover, research indicates that the personalisation of educational content through AI-driven adaptive learning platforms allows students to learn at their own pace and according to their own style. This significantly enhances their overall learning outcomes (Lee et al., 2022). Furthermore, the provision of assistive technologies such as AI-powered tools that offer real-time captioning further equips HI students to navigate educational materials effectively (Scherer et al., 2023). This targeted approach not only fosters improved comprehension but also promotes a culture of self-directed learning, which is essential for empowering HI learners in Zimbabwe's educational landscape. More specifically in vocational education, social media platforms such as YouTube, Facebook and Twitter have been used to improve the learners' thinking, technical and collaboration skills (Mafrur & Andri, 2018).

The literature on the opportunities and challenges in the use of social media and AI in vocational education in the Zimbabwean context is still scarce because the area of study is still in its nascent stage of development. However, the few studies conducted to date indicate that the integration of emerging technologies, including Internet-based social media and AI, faces substantial challenges (Mutswiri & Hapanyengwi, 2025). According to Mutswiri and Hapanyengwi (2025), the economic status of Zimbabwe as an emerging economy that has experienced over four decades of economic crisis has had an impact on growth in many sectors, including technological development. The major challenges are structural – such as the technological divide, the human-capital skills gap and financial investment barriers (Chilunjika & Chilunjika, 2024; Mutswiri & Hapanyengwi, 2025). Fundamentally, teachers lack the necessary skills with which to facilitate learning using modern technologies such as social media and AI tools. This implies that, without the proper professional development of vocational teachers in the use of social media and AI tools in learning, the integration of these technologies will remain a challenge. Yet AI-assistive devices can provide personal help and support to HI students in their completion of learning tasks and activities (Salawa et al., 2024). The transformative potential of AI-based tools for HI students is duly acknowledged, though, according to Mukabbir (2023), AI-supported devices provide innovative tools that enhance communication, accessibility and student engagement.

Methodology

The study was conducted at the Hunhu Vocational School (a pseudonym) in Harare, Zimbabwe. This school was selected because of its inclusive approach to secondary education, its strong emphasis on vocational training and its population of a significant number of students with hearing impairments. The data collection for this qualitative case study involved 12 purposively sampled primary participants – HI vocational students – and, in addition, three vocational teachers from the Hunhu Vocational School and one representative from the National Association of Societies for the Care of the Handicapped (NASCOH). Semi-structured interviews were conducted with the primary participants to gain insights into their experiences, challenges and opportunities regarding the integration of social media and AI tools in vocational education (Mears, 2012). The researchers observed the ethical considerations of obtaining informed consent from the teachers of students and from the student participants, in line with the requirements for research involving children (Jenkin et al., 2020). The student participants in the study were exclusively drawn from a secondary school that offers general academic and vocational subjects. Their ages range between 14 and 21 years and they were enrolled in Forms 2, 3 and 4. For several reasons, it is not unusual to have young adults still in secondary school, including disability (D'Angelo & Singal, 2024). Interviews with the HI students were conducted using sign language by a qualified sign language interpreter who was part of the research team; this greatly facilitated effective communication.

In-depth interviews were also conducted with the three vocational teachers and the NASCOH Programmes Officer. The qualitative approach that was used enabled a flexible interview process, allowing the participants to share their experiences freely while ensuring that key topics were systematically covered. The diversity of the participants, in alignment with the principle of triangulation, enabled us to obtain a comprehensive understanding of both the lived experiences of HI students and the institutional frameworks that influence their access to vocational education in Zimbabwe (Santos et al., 2020). Thematic analysis, as described by Clarke and Braun (2017), was used to analyse the data and identify recurring themes and patterns.

About the case: Hunhu Vocational School

Hunhu Vocational School is a church-based institution that is dedicated to empowering children with hearing impairments at both the primary and the secondary education levels. The school was initially established as a residential institution for learners with hearing impairments, which reflects the common trend among schools for students with disabilities in Zimbabwe (Musengi, 2014). In its early years, the school catered exclusively for students with hearing impairments. However, with the advent of inclusive education policies, the school began to enrol students without disabilities, embracing a more integrated educational model.

Hunhu Vocational School offers both academic and vocational programmes. Academic subjects are examined by the Zimbabwe School Examinations Council (ZIMSEC), whereas

vocational subjects are assessed by the Higher Education Examination Council (HEXCO) at the National Foundation Certificate level, which is the focus of this study. The school currently has 142 students enrolled, of whom only 11 do not have hearing impairments – demonstrating the institution's continuing commitment to inclusive education.

The vocational department offers a variety of practical subjects, including carpentry and joinery, bookkeeping, bakery studies, computers, and garment construction and textiles. These programmes are designed to equip students with the appropriate skills for employment and self-sufficiency, and they are aligned with the broader goals of vocational education for learners with a disability.

Presentation and discussion of findings

This section presents and discusses the study's findings under the following subheadings:

1. The interface of social media and AI tools in vocational education;
2. The opportunities provided by social media and AI tools for HI students in vocational education; and
3. The challenges associated with their use.

The study has possible limitations, because, as it is a case study, the findings may not be generalisable to all vocational schools with HI students across Zimbabwe. However, the results are able to provide valuable insights into the ways in which social media and AI tools can be used in vocational education settings and into the challenges that are faced in their use. Consequently, the study has relevance to other institutions and provides lessons that might inform their approaches.

Interface of social media and artificial intelligence tools in vocational education

The integration of social media and AI into vocational education for HI students in Zimbabwe is becoming increasingly critical to promoting inclusive educational practices. The convergence of these technologies provides a dynamic platform through which HI students can actively engage in learning, access educational resources and interact meaningfully with their peers and educators.

Teacher 1 highlighted this convergence, stating:

> Social media serves as a dynamic space in which information is readily shared, enabling HI individuals to access resources and communities that resonate with their experiences. For example, at Hunhu Vocational School, HI students use AI applications to enhance their learning experiences.

Student 3 echoed the transformative impact, noting:

> My learning experiences have changed since the introduction of social media and AI in teaching and learning. The use of social media has improved communication with other students, both with and without hearing impairments. This has increased my sense of belonging to the academic community.

Another student, Student 11, shared their experience:

> Social media and AI tools help me to remain in touch with current trends in various areas. Through the use of these technological tools, I stay updated on developments in the world. Information comes directly to my gadget as long as I have data.

Student 12 remarked further:

> Social media and AI tools work hand in hand. I am not sure which informs the other, but it appears AI is now available on all social media platforms.

From these insights, it is evident that there is a growing convergence between social media and AI tools. AI is increasingly being embedded in the social media platforms used by the students and teachers at Hunhu Vocational School, which enables real-time communication, improved access to information and enhanced engagement. These tools play a vital role in bridging communication gaps and facilitating learning among HI students. The findings align with previous research, which highlights the potential of AI-powered tools to enhance communication and to make information more accessible to students with hearing impairments. Technologies such as computer vision and speech recognition allow for the transcription and translation of sign language, and in these ways they support real-time interactions and the consumption of educational content (Musengi et al., 2023).

Opportunities for using social media and artificial intelligence tools among hearing-impaired students in vocational education in Zimbabwe

Social media and AI tools offer numerous opportunities for HI students in vocational education by fostering greater accessibility, engagement and independent learning. These tools support the development of inclusive educational environments by bridging communication gaps and enabling personalised, self-paced learning experiences.

One of the most promising applications is the use of virtual reality (VR) technologies, including the visual reality sign-language laboratory, interactive 3D signing environments and sign-language avatar models. These tools simulate real-world scenarios and help HI students to understand speech patterns through lip-reading and visual cues. Sign-language avatar models also translate spoken and written communication into sign language and enable inclusive engagement (Mondonico, 2021).

Communication-enhancement tools such as the *SignBridge System*, which allows for real-time captioning in multiple languages, speech-to-sign translation, gesture recognition and visual learning aids contribute further to a more accessible educational environment. Social media and AI have therefore emerged as powerful platforms that support vocational education among persons with a disability. They not only enhance communication and access to resources but also encourage collaborative and self-directed learning in virtual communities.

Student 8 stated:

> AI tools and social media have opened a lot of possibilities because I can now access tutorials. Social media platforms, through AI, can now use sign language – something that has never been used before. I can learn at my own pace and share notes in real-time with my colleagues; hence, learning is now more engaging and fun.

Student 6 added:

> Social media and AI have become an essential part of my educational journey. Platforms like YouTube and Facebook offer valuable resources, including sign-language tutorials and captioned videos. The fact that these learning platforms are not controlled by our teachers means I still have access to materials after lessons. This gives me more control over my learning.

Teacher 1 highlighted the collaborative use of social media in vocational instruction:

> Social media platforms are a very important tool in the teaching of vocational subjects. For example, in a WhatsApp group, we post assignments for learners. We can hold group discussions, mark and post written work, and evaluate each learner's performance and participation in real-time.

Teacher 2 emphasised the broader impact of these tools:

> As an instructor for HI students, I believe social media and AI tools play a pivotal role in providing accessible learning resources [and] networking, and increasing their chances of gaining employment and livelihood opportunities.

Teacher 3 noted the practicality and flexibility that these tools provide:

> These tools enhance inclusivity, especially in learning vocational skills. Since time for practicals is often limited in class, students use platforms like YouTube in their free time to complete their tasks.

In addition, Teacher 1 described the implementation of advanced AI tools at the school:

> Since 2023, we [have been using] Sign Teach Pro, a custom-developed software [program] that translates Zimbabwe Sign Language in real-time and provides instant feedback on sign-language practice. The software has an accuracy rate of 85% for local sign-language recognition. We also use an AI-powered chatbot for basic query responses, voice-to-text translation, and integration with local sign language.

These experiences align with broader research that highlights AI's transformative potential in education. AI also enables personalised learning through intelligent tutoring systems and automated assessments (Papastratis et al., 2021). Adaptive learning platforms tailor educational content to individual needs and learning styles, enhance comprehension and foster self-directed learning (Mohebbi, 2025). In addition, AI-powered applications support real-time captioning and translation, which helps HI students to engage more effectively with educational materials (Alkahtani, 2024).

Massive Open Online Courses (MOOCs) are another example of the way AI and online platforms can make high-quality education accessible to diverse learners, eliminating geographical and financial barriers.

Key Informant 1 from NASCOH observed:

> In our organisation focused on disability, we see AI and social media as opportunities to advocate for the rights of students with disabilities. Platforms like WhatsApp, Facebook, and Twitter are used to mobilise support and share information on issues like HIV and AIDS, sexual and reproductive health rights (SRHR) and, more recently, drug and substance abuse. These are critical issues for vocational learners because they do not live in a vacuum.

These insights underscore the broader educational and social value of integrating social media and AI tools into vocational education. Their use fosters collaborative learning, self-directed learning and heutagogy. Platforms such as WhatsApp and YouTube enable students to participate in virtual-learning communities, exchange knowledge and collaborate on projects. Through machine-learning algorithms, AI tools can analyse learning patterns to offer personalised content that enhances comprehension and motivation.

Moreover, AI can help educators to develop targeted strategies that support HI vocational students, not only in acquiring technical skills but also in dealing with critical life skills. This is particularly relevant in the Zimbabwean context, where challenges such as drug abuse and HIV and AIDS are prevalent (Mugari, 2024). Instructors can use data-driven insights to adapt teaching methods to meet diverse learning needs and to ensure inclusive success. This

is particularly important in resource-constrained settings where traditional methods may fail to accommodate all learners. Furthermore, the time limitations of classroom-based practical sessions in vocational education reinforce the value of online platforms that allow students to continue learning beyond the school environment.

Challenges of using social media and artificial intelligence tools in vocational education for hearing-impaired students in Zimbabwe

The study revealed that the integration of social media and AI tools in vocational education for HI students faces barriers that affect the use of these modern technologies in the Zimbabwean vocational learning context. Both students and teachers have expressed their views on, and their experience of, the barriers they have been up against in attempting to use these tools.

Student 7 noted two main challenges for them:

> The challenges that I face are mainly to do with … data, which is very expensive, and I can hardly afford to have data that lasts me for just a week. The other challenge is that they [the tools] are not easily accessible. I have also often been bullied and called names on social media. I am sometimes even scared to associate with fellow students in vocational education because of that.

Teacher 3 stated that the major shortcomings are these:

> I acknowledge the shortcomings of AI tools and social media. The major issue is … limited digital literacy among HI students. Some social media lack accessibility features, thereby limiting them from benefiting from such platforms. The challenge also extends to us, the teachers. We lack up-to-date knowledge and skills to fully utilise social media and AI tools in the classroom.

Another teacher added to these limitations:

> A large percentage of our students come from rural areas where there is no or limited access to the Internet. Some also face language barriers, for example some do not understand English; hence, they would not benefit without the assistance of a translator.

The above was also confirmed by Key Informant 1, who noted:

> The use of AI tools is much easier for people who can see and hear but poses great challenges for a person who lacks both senses – the deaf–blind. I haven't come across AI [tools] that work well with this category of learners.

Furthermore, another student (Student 7) made this point:

> In Zimbabwe, the cost of data is beyond our reach most of the time. Due to the high costs, we lose out on learning experiences. The high costs of access also extend to Internet-enabled gadgets such as smartphones, tablets and laptops.

Key Informant 1 added the following points:

> Though vocational teachers have a variety of social media and AI tools at their disposal, these have not yet been fully integrated as learning platforms. The elephant in the room is the attitude of some teachers who think that social media is just for fun and not educational. Another challenge linked to the above is the lack of capacity on the side of teachers to effectively use social media and AI tools in the learning environment.

The above data reveal that there are real challenges in the use of social media and AI in vocational education, certainly as evidenced at this institution. The main challenges identified are cost, access, a negative attitude among teachers towards the use of technology in teaching and learning, and their lack of competence in the use of technology. From the data presented, the digital divide remains a critical issue for Zimbabwe. Access to reliable Internet and technology is not uniform; this is particularly the case in rural areas, where there may be a lack of infrastructure to support the effective use of social media and AI. This disparity could exacerbate existing inequalities and leave some HI students at a greater disadvantage than before (Moyo, 2022; Vurayai, 2023). Another critical issue is that access to social media and AI tools by HI students is never equal; there is therefore a genuine fear among scholars that their use will possibly exacerbate the digital divide (Mhlanga, 2023). In addition, instructors may lack knowledge about the appropriate technological tools to use when instructing HI students, which could lead to the ineffective use of technology. Moreover, educational curricula may not fully integrate the technology that supports inclusive learning environments for HI students.

Strategies to enhance the use of social media and artificial intelligence in vocational education for hearing-impaired students in Zimbabwe

Based on the findings of the study, we recommend the following strategies to enhance the provision of social media and AI tools in vocational education settings in Zimbabwe. We argue that students need to gain increased access to technology gadgets, vocational teachers need training and capacity development, and locally adaptable social media and AI tools need to be developed to reduce the digital divide.

Increase access to technological gadgets

Educational institutions can, however, establish dedicated computer laboratories, create mobile technology-lending programmes for HI students and develop offline-capable learning

applications for areas with limited connectivity. The ethical and responsible use of social media and AI have become topical issues that also need to be considered when such media are used in vocational education settings (Mhlanga, 2023).

Training and capacity development of vocational teachers

Vocational education teachers need training in the use of AI tools and social media if teaching and learning through these media are to be implemented effectively. Such training will enable them to offer personalised guidance and support to HI learners, answer questions and provide feedback and encouragement to them, apart from rendering them confident users of the technology themselves. Teacher training and professional development have become a top priority to ensure the effectiveness of digital learning (Muwaniki & Wedekind, 2018) and therefore mandatory training for educators in AI-assisted teaching tools must be implemented.

Create locally adaptable social media and AI tools

Technology developers should be required to develop AI models that are applicable to Zimbabwe sign-language variants and create content delivery systems that are optimised for low-bandwidth environments. They also need to design user interfaces that reflect local cultural contexts.

Promoting digital equity

AI can help to identify students who need additional support early on to enable timely interventions and prevent learning gaps from widening (Aljedaani et al., 2022). However, ethical and digital equity challenges must be overcome and all HI learners must have fair and equitable access to AI technologies, regardless of their backgrounds or circumstances. In addition, efforts should be made to bridge the digital divide and to ensure that all HI students have access to the necessary technology and Internet connectivity to participate in vocational education opportunities.

Conclusion

Based on this study, the researchers conclude that social media and AI tools can, and should, play a pivotal role in transforming the vocational education of HI students in Zimbabwe. Based on the study's findings, several key conclusions emerge.

First, the integration of social media and AI has significant potential to dismantle the traditional barriers to education experienced by HI students. These technologies not only enhance communication but also foster inclusive learning environments that can be personalised to meet individual needs. Features such as real-time translation, captioning services and adaptive-learning platforms have created new opportunities for educational engagement – opportunities that have historically been limited or overlooked in Zimbabwe's vocational education system.

Secondly, while these tools offer significant benefits, several challenges persist and must be resolved. The digital divide, infrastructural constraints and limited accessibility continue to hinder equitable access to social media and AI technologies. These problems are especially pronounced in rural and remote areas, where Internet connectivity and access to digital devices remain limited.

In response to these challenges, the researchers recommend several strategies to strengthen the integration of social media and AI tools into vocational education for HI learners. These include improving access to technological devices, promoting digital equity and investing in the training and capacity-building of vocational teachers to use these tools effectively both in and beyond the classroom.

Looking ahead, the future of AI and social media in Zimbabwean vocational education will depend on the effectiveness of their implementation and the extent to which the current barriers are overcome. Nevertheless, the combined potential of AI-powered personalised learning and the community-building capabilities of social media offers a promising pathway towards improving the educational experiences and outcomes of HI vocational students.

REFERENCES

Aljedaani, W, Krasniqi, R, Aljedaani, S, Mkaouer, MW, Ludi, S & Al-Raddah, K. 2023. If online learning works for you, what about deaf students? Emerging challenges of online learning for deaf and hearing-impaired students during COVID-19: A literature review. *Universal Access in the Information Society*, 22(3):1027–1046.

Alkahtani, BN. 2024. The impact of artificial intelligence on quality of life for deaf and hard of hearing students. *American Annals of the Deaf*, 169(4):329–347.

Chandramma, R, Babu, KS, Ranjith, KS, Sinha, AK, Neerugatti, V & Reddy, DS. 2025. *Enhancing e-learning accessibility through AI (Artificial Intelligence) and inclusive design*. 6th International Conference on Mobile Computing and Sustainable Informatics (ICMCSI), 7–8 January 2025, Purbanchal University, Nepal, 1466–1471.

Charitoo, DSIM, Lotachi, A, David, IO & Gbobo, IT. 2023. Social media innovation and the management of secondary schools in Nigeria. *Journal of Education in Developing Areas*, 31(3):96–107.

Chilunjika, SR & Chilunjika, A. 2024. Artificial intelligence and human resource management in Zimbabwe's public health sector: Opportunities and challenges. *African Journal of Development Studies*, 14(4):239–251.

Choruma, T. 2007. *The forgotten tribe: People with disabilities in Zimbabwe*. London: Progressio.

Clarke, V & Braun, V. 2017. Thematic analysis. *The Journal of Positive Psychology*, 12(3): 297–298.

D'Angelo, S & Singal, N. 2024. Inclusive education in the Dominican Republic: Teachers' perceptions of and practices towards students with diverse learning needs. In: S D'Angelo & M Singal (eds), *Frontiers in education, Volume 9.* Johannesburg: Frontiers Media SA, 1387110. Available at: <https://doi.org/10.3389/feduc.2024.1387110>.

Fazal, I, Bandeali, MM, Shezad, F & Gul, H. 2025. Bridging educational gaps: The role of AI and social media in enhancing access to quality education in under-privileged communities. *The Critical Review of Social Sciences Studies*, 3(1):2413–2431.

Gupta, J & Vegelin, C. 2016. Sustainable development goals and inclusive development. *International Environmental Agreements: Politics, Law and Economics*, 16(3):433–448.

Halder, A & Tayade, A. 2021. Real-time vernacular sign language recognition using media pipe and machine learning. *International Journal of Research Publication and Review*, 2(5):9–19.

Hari, SS, Rajashree, RH, Dharani, J & Santhiya, C. 2025. AI-enabled learning ecosystems: Bridging gaps and enhancing education. In: T Murugan & AM Abirami (eds), *Driving quality education through AI and data science*. New York: IGI Global Scientific Publishing, 165–192.

Hlatywayo, L & Ncube, AC. 2014. The extent to which transitional services prepare deaf learners for community participation: The Zimbabwean case. *IOSR Journal of Humanities and Social Science*, 19(11):108–113.

Jenkin, E, Wilson, E, Campain, R & Clarke, M. 2020. The principles and ethics of including children with disability in child research. *Children & Society*, 34(1):1–16.

Jung, A. 2022. *Machine learning: The basics*. Singapore: Springer Nature.

Kasapakis, V, Dzardanova, E & Agelada, A. 2023. Virtual reality in education: The impact of high-fidelity nonverbal cues on the learning experience. *Computers & Education: X Reality*, 2(1):1–13.

Laupichler, MC, Aster, A, Schirch, J & Raupach, T. 2022. Artificial intelligence literacy in higher and adult education: A scoping literature review. *Computers and Education: Artificial Intelligence*, 3:100–101.

Lee, W, Tan, J & Kok, J. 2022. The struggle to fit in: A qualitative study on the sense of belonging and well-being of deaf people in Ipoh, Perak, Malaysia. *Psychological Studies,* 67(3):385–400. Available at: <https://doi.org/10.1007/s12646-022-00658-7>.

Mafrur, UN & Andri, SF. 2018. *The use of social media as a learning environment of vocational education*. Proceedings of the 2nd International Conference on Learning Innovation – vol 1. ICLI, 15–20. Available at: <https//doi.org/10.520/0008407100150020>.

Mears, CL. 2012. In-depth interviews. *Research Methods and Methodologies in Education*, 19:170–176.

Mhlanga, D. 2023. Open AI in education: The responsible and ethical use of ChatGPT towards vocational education. In: Sustainable Development Goals series (eds), *FinTech and artificial intelligence for sustainable development: The role of smart technologies in achieving development goals*. Cham: Springer Nature, 387–409.

Mohebbi, A. 2025. Enabling learner independence and self-regulation in language education using AI tools: A systematic review. *Cogent Education*, 12(1):2433814.

Mondonico, M. 2021. *Accessibility in social VR platforms for deaf people: Research on accessibility in physical and digital interaction, and definition of guidelines for an inclusive human-to-human communication in VR*. Master's dissertation, Milan Polytechnical.

Moyo, Z. 2022. The Fourth Industrial Revolution: A literature study of challenges associated with access to education in rural schools in Zimbabwe. *Journal of Educational and Social Research*, 12(3):125–136.

Mugari, I. 2024. The emerging trends and response to drug and substance abuse among the youth in Zimbabwe. *Social Sciences*, 13(9):469.

Mukabbir, MN. 2023. AI-based solutions for students with hearing impairments. *Multidisciplinary Science Journal*, 1(1):27–33.

Musengi, M. 2014. *The experience of teaching in residential schools for the deaf*. Doctoral thesis, Wits School of Education, University of the Witwatersrand.

Musengi, M, Muwaniki, C & Musengi, E. 2023. Mobile media and the sign language of Zimbabwe's deaf community. In: T Rugoho (ed), *Disability and media: An African perspective.* London*:* Palgrave MacMillan, 9–30.

Mutswiri, P & Hapanyengwi, T. 2025. Challenges to the implementation of artificial intelligence and machine learning in emerging economies: A systematic review of the case of Zimbabwe. *International Journal of Science Academic Research*, 6(3):9475–9481.

Muwaniki, C & Muvirimi, P. 2017. Realigning vocational skills for employment and self employment of hearing-impaired youths: The case of Masvingo-Peri Urban. *Journal of Education and Vocational Research*, 8(3):29–36.

Muwaniki, C & Wedekind, V. 2018. *Professional development of vocational teachers in Zimbabwe: The past, present, and future.* Cham: Springer Nature.

Obar, JA & Wildman, S. 2015. Social media definition and the governance challenge: An introduction to the special issue. *Telecommunications Policy*, 39(9):745–750.

Papastratis, I, Chatzikonstantinou, C, Konstantinidis, D, Dimitropoulos, K & Daras, P. 2021. Artificial intelligence technologies for sign language. *Sensors*, 21(17):5843.

Pedersen, CK, Zimani, P, Frendø, M, Spindler, NJ, Chidziva, C, Von Buchwald, C & Jensen, RG. 2022. Prevalence and causes of paediatric hearing loss in a rural province of Zimbabwe: A cross-sectional study. *International Journal of Pediatric Otorhinolaryngology*, 154:111044.

Salawa, JS, Sebastian, P, Nyatega, CO, Ally, JS, Karawa, CJ, Koola, EO & Mwanjalila, R. 2024. Development of artificial intelligence-driven aid to enhance visual and hearing-impaired students. *African Journal of Education, Science and Technology*, 8(1):129.

Santos, KDS, Ribeiro, MC, Queiroga, DEUD, Silva, IAPD & Ferreira, SMS. 2020. The use of multiple triangulations as a validation strategy in a qualitative study. *Ciencia & Saude Coletiva*, 25:655–664.

Scherer N, Smythe, T, Hussein, R, Wapling, L, Hameed, S, Eaton, J, Kabaja, N, Kakuma, R & Polack, S. 2023. Communication, inclusion, and psychological well-being among deaf and hard of hearing children: A qualitative study in the Gaza Strip. *PLOS Global Public Health,* 3(6):e0001635. Available at: <https://doi.org/10.1371/journal.pgph.0001635>.

Schwab, K. 2024. The Fourth Industrial Revolution: What it means, how to respond. In: Z Simsek, C Harvey & BC Fox (eds), *Handbook of research on strategic leadership in the Fourth Industrial Revolution*. Cheltenham: Edward Elgar Publishing, 29–34.

Shehu, HA, Rabie, A & Sharif, MH. 2021. Artificial intelligence tools and their capabilities. *PLOMS Journal of AI*, 1(1):13–19.

Terry, J & Meara, R. 2024. A scoping review of deaf awareness programs in health professional education. *PLOS Global Public Health*, 4(8):e0002818. Available at: <https://doi.org/10.1371/journal.pgph.0002818>.

Vurayai, S. 2023. Digital divide and threats to heutagogy: A necropsy of teaching and learning in early childhood development in the COVID-19 pandemic in Zimbabwe. *Journal of African Films and Diaspora Studies*, 6(3):27.