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ARTIFICIAL INTELLIGENCE IN SPECIAL EDUCATION: PERSPECTIVES FROM SOUTH AFRICAN SPECIAL NEEDS EDUCATORS

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Abstract

Artificial intelligence (AI) has the potential to revolutionise the education of students with special needs, but its implementation in South African special schools remains largely unexplored. This study addresses this gap by investigating the perceptions of special-needs educators regarding AI and its potential impact on their teaching practices and student outcomes. This paper is situated in the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. A qualitative research methodology, consisting of individual interviews, was employed to explore educators' perceptions of AI in relation to their teaching and learning in special education. A purposive sample of five educators from a special school in South Africa was used to collect data. This research suggests that educators acknowledge AI's potential to enhance customised learning, alleviate administrative responsibilities, and increase instructional clarity. Nevertheless, barriers such as accessibility issues, inadequate training, infrastructure limitations, and ethical concerns hinder its widespread adoption. Moreover, socio-economic disparities across South African special schools exacerbate the digital divide, influencing educators' readiness to use AI. This paper further emphasizes the need for professional development that integrates AI within the context of governmental support and regulation, ensuring the inclusive and ethical use of AI in special education for individuals with special needs. The article concludes with strategies for leveraging AI in special needs education in South Africa.

Keywords: *Artificial Intelligence, special education, special needs educators, assistive technology, South Africa.*

1. Introduction

Inclusive education aims to provide equitable learning opportunities for all students, including those with disabilities, within traditional educational environments. In South Africa, this initiative is governed by the policies outlined in White Paper 6 (2001). However, its implementation faces several challenges, including limited resources, inadequate teacher training, and insufficient infrastructure. The integration of Artificial Intelligence (AI) with Assistive Technology (AT) holds the potential to offer innovative solutions to these obstacles. AI can facilitate contextualized educational experiences, develop adaptive assessment tools, and deliver immediate feedback, all of which can significantly enhance teaching practices. Assistive technologies, including screen readers, speech-to-text systems, and Braille devices, improve accessibility for students with disabilities. AI can transform special needs education by providing customized learning experiences, reducing administrative burdens, and clarifying instructional content. Nevertheless, funding constraints and a lack of adequate training for educators continue to hinder widespread implementation. Despite these challenges, ongoing initiatives and advancements in technology present promising opportunities to cultivate a more inclusive educational environment in South Africa.

The perspectives of special needs educators in South Africa are critically significant due to their deep understanding of the unique challenges and opportunities present within the nation's special education landscape. Considering the resource constraints and diverse learning needs that characterize many South African schools, the insights provided by these educators are essential for informing the effective implementation of artificial intelligence (AI) to address specific educational challenges and to foster inclusive learning environments. Additionally, an examination of these educators' perspectives can reveal potential ethical considerations and cultural nuances that may influence the acceptance and integration of AI within the context of special education in South Africa. By grasping the lived experiences and professional insights of educators, policymakers, and technology developers, they can make informed decisions that resonate with the needs and values of the South African educational community.

This understanding will enable all stakeholders to recognise the possibilities inherent in AI-driven personalized learning within educational institutions.

The increasing significance of AI literacy in contemporary society further underscores the need for comprehensive research on its integration into educational frameworks, as AI becomes increasingly intertwined with various facets of daily life, from credit assessments to medical advice (Rizvi, Waite, & Sentence, 2023). Therefore, fostering AI literacy among students is imperative to ensure their success in an increasingly AI-dominated society (Park et al., 2023). This involves equipping students with the capacity to critically evaluate AI technologies, communicate effectively with AI systems, and utilize AI as a functional tool across diverse contexts (Lalor, Lorenzi, & Rami, 2015). Furthermore, empowering students with a robust understanding of AI enables them to confront ethical dilemmas, make informed choices regarding its applications, and actively participate in shaping its future trajectory.

AI literacy encompasses a foundational understanding of AI concepts and methodologies, enabling individuals to distinguish between technologies that utilise AI and those that do not (Otero et al., 2023). Additionally, it empowers individuals to critically assess the quality of data utilized in training AI systems and to evaluate the outcomes and recommendations produced by such systems. By fostering AI literacy, students gain the ability to comprehend the broader societal implications of AI technology while also addressing associated ethical and social challenges (Otero et al., 2023).

2. Theoretical framework: Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is the foundational theoretical framework guiding this research. The UTAUT model offers a structured methodology for understanding how technology is adopted within educational settings, particularly in light of recent advancements (Venkatesh, 2022; Venkatesh et al., 2003). This framework highlights four essential constructs: performance expectancy, which relates to the perceived benefits of using technology; effort expectancy, indicating the ease of use; social influence, reflecting the impact of peers and the broader community on adoption decisions; and facilitating conditions, which encompass the necessary resources and support for effective implementation. Together, these factors are crucial in determining educators' willingness to incorporate artificial intelligence (AI) into their teaching practices (Venkatesh, 2022). This study aims specifically to explore both the practical and perceived barriers to the integration of AI within the realm of special needs education in South Africa.

3. Methodology

To investigate these issues, a qualitative research methodology was employed, with individual interviews serving as the primary data collection method. Educators from a special school in South Africa were selected as the subjects of this study, enabling a comprehensive examination of their unique experiences and perspectives. This qualitative approach enables a comprehensive understanding of educators' beliefs, attitudes, and concerns regarding the integration of AI in their classrooms. A purposive sampling technique was employed to select a group of five educators who possess rich insights relevant to the study's objectives.

During the data collection process, individual interviews were conducted with each participant, providing a platform for them to express their thoughts on how AI could influence their teaching practices and enhance learning outcomes for students with special needs. These interviews were meticulously recorded to ensure accurate representation of the educators' voices. The resulting data were systematically organized into a table format to aid in analysis, and thematic analysis was employed to identify common patterns and insights from the interviews. To uphold ethical standards and protect participant privacy, each educator was assigned a pseudonym, thereby ensuring their confidentiality throughout the research process.

4. Results

The educators responded to six key questions, addressing their experiences with special needs learners, the role of AI in education, its benefits, challenges, and the support needed from the education system. These responses were analysed using the UTAUT theoretical framework.

The responses from educators were analysed to evaluate the impact of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) on their acceptance and utilisation of AI in assisting learners with special needs (Vantekash *et al.,* 2003).

Performance Expectancy (PE)

Educators recognise that AI can improve teaching efficiency by saving time and simplifying tasks. Multiple educators observed that AI tools facilitate the rapid generation of tasks and the organisation of content, thereby enhancing lesson planning and delivery. Educator 3 noted that AI enhances their class preparation and allows for the customisation of lessons to accommodate varying learning levels. Concerns were expressed about excessive dependence on AI, with Teacher 1 and Teacher 3 highlighting the importance of learners not relying solely on AI.

Effort Expectancy (EE)

Some educators perceive AI as beneficial, while others exhibit unfamiliarity with the technology, leading to resistance to its adoption. Educator 2 indicated that AI was not part of their formal training, necessitating adaptations. Educator 4 acknowledged a deficiency in knowledge regarding AI, citing generational differences as the reason. Several educators recognized the need for training to enhance their understanding and application of AI tools. Research indicates that AI can be advantageous when educators are provided with sufficient training on its effective utilisation.

Social Influence (SI)

Social pressure influences the adoption of AI, especially among learners. Educator 3 observed that learners currently possess access to AI, suggesting that educators must advance accordingly. Some educators view AI as a beneficial instructional tool, yet they express concerns about potential dependence and its impact on creativity. Educator 5 articulated concerns regarding the potential for AI to induce complacency among educators, thereby hindering their critical engagement in lesson planning. Educator 4 expressed scepticism, characterising AI as a concept introduced by younger generations.

Facilitating Conditions

Educators have identified a notable challenge: the limited resources available for implementing AI. Educators emphasised the importance of laptops, Wi-Fi connectivity, and training to facilitate the effective integration of AI in special needs education. Educators 1 and 2 emphasised that the lack of adequate infrastructure hinders the adoption of AI. Educator 5 proposed the formulation of guiding policies to govern AI utilisation and ensure alignment with educational goals. Furthermore, certain educators suggested the implementation of institutional support mechanisms, including frameworks that facilitate the use of AI by learners within a regulated setting.

5. Discussion

The results indicate that educators acknowledge AI's capacity to enhance special needs education by conserving time, automating administrative tasks, and facilitating lesson planning (Chen, Chen, & Lin, 2021). This study supports the literature reviewed, which indicates that there is a strong positive and effective PE and EE from educators across Africa, despite challenges surrounding financial constraints FC in most African countries (Bandoh, Akweittey, Lotey, Gordon, & Appiagyei, 2024). Several educators emphasised AI's capacity to facilitate personalised learning by adjusting to the unique learning levels of each learner. Nonetheless, a considerable challenge is the absence of familiarity and formal training, as senior educators convey unease stemming from their restricted exposure to technology. Concerns regarding excessive reliance on AI were widespread, with some educators apprehensive that an overdependence on AI-generated tasks might inhibit creativity in lesson planning. Bandoh *et al.* (2024) found that facilitating conditions are often a detriment to the integration of ICT in mathematics. Moreover, access to infrastructure poses a significant obstacle, as many schools lack sufficient computers, Wi-Fi, and adequate AI training programs to support educators effectively.

To enhance AI integration in special needs education, educators advocate for extensive training programs, revised policies, and equitable access to technological resources. Some advocate for the utilisation of AI as an assistive tool rather than a substitute for critical thinking, thereby ensuring that educators retain authority over their pedagogical methods (Chen *et al.,* 2021). Furthermore, protocols for the responsible utilisation of AI in educational institutions could mitigate misuse while enhancing its advantages. The results underscore the need for institutional support, encompassing investment in technology and the implementation of explicit policies to aid educators in transitioning to AI-driven teaching methodologies, thereby ensuring that learners with special needs receive high-quality, individualized education (Chen *et al.,* 2021).

6. Conclusion

In conclusion, the integration of AI in special needs education presents both advantages and challenges. To achieve effective implementation, it is crucial to prioritise educator training, technological accessibility, and appropriate deployment. While AI can enhance lesson planning, streamline processes, and facilitate personalised learning, it is essential to address concerns regarding over-reliance, a potential loss of creativity, and digital inequality. Future research should focus on examining the long-term impacts of AI on learning outcomes, exploring strategies to bridge generational and technological knowledge gaps among educators, and evaluating the effectiveness of AI-driven tools in differentiated instruction for students with special needs. Additionally, research on AI governance in education could help inform policy frameworks and establish ethical and practical guidelines for its implementation. By addressing these areas, AI has the potential to make a significant contribution to a more inclusive educational environment.

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