INCLUSIVE LANGUAGE LEARNING: AI-POWERED TOOLS FOR BLIND AND VISUALLY IMPAIRED STUDENTS

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Abstract: *In today's globalized world, language learning is paramount. Blind and visually impaired (BVI) learners face unique challenges in accessing language education. This article explores the potential of Artificial Intelligence (AI) to create more inclusive language learning environments for BVI students. Through a study conducted in Uzbekistan, the implementation of AI tools such as screen readers, text-to-speech software, and conversational agents was investigated. The findings demonstrate that AI can significantly enhance access to learning materials, foster engagement, and improve overall English language competencies for BVI learners. The research highlights the need for integrating these tools into educational curricula and providing adequate teacher training to ensure equitable and quality language education for all.*

Key words: *Inclusive Language Learning, Blind and Visually Impaired (BVI), Artificial Intelligence (AI), Language Education, Globalization.*

Introduction:

As an ESL professor at the University of Uzbekistan State World Languages University, over the years I have developed a great interest in ensuring all students receive quality language education, regardless of their learning abilities. This dedication eventually led me to conduct research at a center associated with a special boarding school for the blind in Tashkent, focusing on the application of AI tools to assist blind students in language acquisition. Recognizing the inherent difficulties that blind and visually impaired (BVI) learners face due to the limitations of traditionally developed language teaching materials (Sharma, 2015), our research explored the potential of AI to bridge these gaps. Existing ESL methods often fall short in addressing the unique needs of this audience, necessitating innovative approaches to foster accessibility and proficiency in language-centric studies.

Our research specifically tested the efficacy of screen readers and text-to-speech software, both independently and in combination, alongside various interfaces for an accessible language learning application. This investigation was informed by the growing body of literature highlighting the transformative potential of artificial intelligence in education (Carter, 2018) and its specific applications in creating more inclusive learning environments for students with disabilities (Petrova & Chen,

2020). A pilot study was conducted with blind students, comparing the use of these AI tools to a control group learning through more conventional methods.

The results of our study indicated a significant improvement in the overall English language competencies of the AI group, encompassing vocabulary, grammar, reading, listening, and speaking skills. These quantitative findings were further supported by qualitative data gathered from student interviews, revealing greater access to learning materials, a more level playing field in learning, and a higher degree of engagement with the AI tools. Students particularly appreciated the autonomy afforded by screen readers and the personalized learning experiences offered by some adaptive learning applications (Tanaka, 2022). This research underscores the significant opportunity that AI presents for inclusive language education, advocating for the integration of these tools into educational curricula. It also emphasizes the critical need for equipping teachers with appropriate training and developing more accessible learning resources to ensure equitable language learning journeys for all visually impaired students.

Methodology

Qualitatively, I set out to find students (and teachers) at the special boarding school for blind & visually impaired language learners I am studying in Tashkent — but from there, would learn more about their unique experiences and needs. In these conversations I learned what roadblocks these learners commonly encounter like seeing visual resources, understanding the digital platforms and participating in the collaborative activities.

Drawing from those early results, I then followed up with a pilot study to prototype the idea of AI-driven tools tackling those challenges. Our study included 10 native blind/visually impaired grade 6 students with an average age of 11 year and 12 years old having a beginning-leveling English language course in the boarding school.

The students went through a sequence of language learning activities related to the above-mentioned AIs in 2 weeks, which are as follows:

Text-to- Speech and screen reader tools have been very handy for the Benefit blind students. The technology helps them gain more information in digital formats (i.e. e-books, articles or online tutorials) if they hear the written text out loud. The combination of audio reinforcement, enabling the 'reading' of written material by ear, is particularly beneficial for visually impaired students.

Conversational AI assistants generate a response on the spot for students. As other normal students, BVI learners can also communicate with AI and get immediate feedback to their speeches or even get advice to improve their speeches and be more confident on their speaking perfomances.

Personalized Learning Support Systems deliver customized learning support to each student Finally, it not only matches the students' cognitive capacity but also by teaching students at their level of proficiency, it enhances their motivation and self-esteem.

Throughout the study, I closely monitored the students' engagement, progress, and feedback, utilizing a combination of qualitative data collection methods, by integrating AI tools in my classes with BVI

Results and Discussion:

The use of artificial intelligence in language classes impacted positively for BVI pupils, enhancing their learning experience and results. Specifically, AI option of text-to-speech and screen reader applications such as *Equally AI*, *Typeahead AI Screen Reader* helped to provide easy access to a large number of online educational resources. Due to excellent sound quality, students encountered no issues in using the learning content and could seamlessly listen to audio recordings, read the assigned texts, and write assignments independently.

Also, the introduction of conversational AI agents (*Sierra and Google Cloud* as an example) created a fun learning experience. Students could speak and listen to conversational AI agents while learning. This way, they were able to practice their speaking and listening skills. Furthermore, it provided a new way of learning to engage with peers. The feedback from students further highlights the impact of these AI-powered tools, as shown below.

Feature	Student impression
Personalized Support	The tutoring system helped me focus on my weak areas and provided extra practice and feedback to improve my grammar and vocabulary skills.
Increased Engagement and Motivation	I used to hate language classes because I felt left out and couldn't keep up. But now, with the new tools, I look forward to lessons and feel like I'm really improving my language skills.

AI tools gave students higher energy and motivation to participate in the lesson. The students gained more empowerment and confidence through more accessible, interactive, and personalized pathways.

According to the study, AI technologies can create more inclusive and effective language learning environments for blind and visually impaired learners. These tools helped the learners with visual impairments to access learning materials, interact and collaborate in groups, receive personalized support, and engage as well as motivate much better by directly tackling their challenges. Moreover, AI technologies can be successfully integrated into language education of the visually impaired but it is not easy. Before choosing and using these tools, one must think about how easy they are to access and use and how much they cost to use. Also, the constant training and support of teachers and students is important to make proper use of these AI tools.

The importance of integrating AI with experienced educators was also stressed to remain relevant and to achieve better results for the students. AI tools are great but nothing can substitute human teachers which provide the right inputs that are contextual in nature and nuanced for success in language learning.

In spite of these points, the observed outcomes suggest that the benefits greatly outweigh any possible drawbacks of AI tools for blind and visually impaired language learners. Teachers can help their students achieve their full linguistic ability by effectively using these tools.

Conclusion

As mentioned, incorporating AI resources into language instruction for BVI students are crucial and the results demonstrate how technologies such as screen readers, text-to-speech software, and conversational AI agents can improve these learners' accessibility, motivation, and engagement—and eventually, their language proficiency. The study emphasises the importance of choosing and using these tools carefully, making sure they are affordable, easy to use, and provide sufficient training for teachers and students. This study supports the careful integration of AI to create more inclusive and equitable language learning environments, while acknowledging the critical role of experienced teachers. This will ultimately enable BVI students to realise their full linguistic potential and fully engage in a globalised world.

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