Abstract

In India, visually impaired children encounter major challenges in accessing quality education. Textbooks are rarely available in Braille, and audio resources, when available, are often unstructured, outdated, or limited to English, leaving regional language learners underserved. These barriers force students to rely heavily on teachers or family members, which restricts independent learning and hinders confidence building. Although digital tools exist, most are expensive, require advanced hardware, or are not localized for Indian curricula such as NCERT. This creates a persistent accessibility gap, especially in rural and underprivileged areas, where resources and trained educators are already limited.

To overcome these challenges, we propose VoiceEd – Smart Audio Learning Assistant, an inclusive and affordable solution designed to function as a "talking textbook" for visually impaired students. VoiceEd converts NCERT and other curriculum-based content into structured audio lessons, accessible through simple voice navigation commands such as "Next," "Repeat," or "Explain in Hindi." It supports multiple Indian regional languages, ensuring inclusivity across diverse linguistic backgrounds. Beyond passive listening, VoiceEd integrates interactive Q&A features, enabling students to ask subject-related questions and receive simplified explanations. Additionally, it employs gamified audio quizzes to make learning engaging and effective.

The system leverages a combination of text-to-speech (TTS), speech-to-text (STT), and natural language processing (NLP) technologies. It can run on affordable Android smartphones or low-cost hardware like Raspberry Pi with speakers, ensuring accessibility in both urban and rural environments. Teachers and parents can also track student progress, which reduces teaching burdens while supporting continuous monitoring.

VoiceEd is not just a tool but a step toward inclusive education. By empowering visually impaired children with independent, engaging, and curriculum-aligned learning, it promotes educational equality, boosts confidence, enhances digital literacy, and supports long-term empowerment. Scalable, low-cost, and socially impactful, VoiceEd has the potential to transform inclusive learning across India.