

Assistive Technologies for Inclusive Education: A Computer Science Perspective

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Abstract

Inclusive education aims to provide equitable learning opportunities to all students, including learners with disabilities and diverse educational needs. In this context, assistive technologies have emerged as important tools for reducing barriers to learning and improving students' participation, independence, and academic engagement. This paper examines the role of assistive technologies in inclusive education from a computer science perspective. It discusses how emerging technologies such as artificial intelligence, machine learning, speech recognition, text-to-speech systems, optical character recognition, screen readers, adaptive learning platforms, and mobile applications can support learners with visual, hearing, physical, cognitive, and learning disabilities. These technologies can facilitate personalized learning experiences by adapting educational content according to individual abilities and learning requirements. The paper also highlights the potential of intelligent assistive systems to provide real-time feedback, communication support, accessible digital content, and alternative methods of interaction. From a computer science perspective, the development of user-centered, accessible, secure, and affordable technological solutions is essential for effective implementation. However, challenges related to digital accessibility, cost, technical infrastructure, data privacy, teacher training, and usability remain significant. The study emphasizes the need for collaboration among computer scientists, educators, institutions, students, and policymakers to develop sustainable assistive solutions. Overall, the integration of assistive technologies with inclusive educational practices can contribute to a more accessible, flexible, and learner-centered education system.

Keywords: Assistive Technology, Inclusive Education, Artificial Intelligence, Accessibility, Machine Learning, Adaptive Learning, Educational Technology, Learners with Disabilities