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# Empowering Visually Impaired Students: Opportunities in Inclusive Education Technologies

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## **Abstract**

The rise in electronically available course material, coupled with increased attention to accessibility should improve education opportunities for blind and visually impaired students in higher education. However, only focusing on functional access falls short of empowering visually impaired students to pursue academic success. Efforts to address inclusive education technologies should follow the lead of visually impaired students themselves, should involve a critical view of accessibility and inclusivity in higher education, and should focus on non-functional factors that impact accessibility. To improve inclusive education technologies, we must empower visually impaired students to define how such technologies ought to align with their accessibility needs.

## **Author Keywords**

Education, Visual Impairments, Accessibility, Inclusion

## **ACM Classification Keywords**

• Human-centered computing~Accessibility technologies • Applied computing~Collaborative learning

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## **Introduction**

Much of my work focuses on assistive technology design and its implications beyond functional utility [9,10], on inclusive design practices and techniques that center on needs of users with disabilities [5,11], and on teaching accessibility [7,8]. These threads intersect at examining how we can improve inclusive education technologies in higher education. Indeed, addressing accessibility in education often centers on making technologies accessible, an important focus. My research experience leads me to center these questions on students with visual impairments. In approaching the workshop, “Inclusive Education Technologies: Emerging Opportunities for People with Visual Impairments,” I consider: How are we empowering students with visual impairments when creating accessible learning environments and improving inclusive education technologies?

## **Background and Motivation**

My research has focused on the design of accessible technologies and on how accessibility is taught in computing and information science. In this section, I outline how my prior work positions my contributions as a workshop participant.

### *Disability Studies Center Disability*

My work is influenced by scholars in Disability Studies who emphasize how we center “disability” to empower those for whom we aim to create accessible technologies and learning environments [2]. A cornerstone of inclusive design practice is to consult people with disabilities (such as those with visual impairments) to guide design. However, truly centering disability also requires conscientiously following the lead of those with visual impairments, in the case of

this workshop, to improve inclusive education technologies [1]. For example, my work to date focused on how to encourage designers to incorporate accessibility and include people with disabilities. Taking a critical view, centering disability means that elevating these practices to truly benefit visually impaired technology users requires bringing them into the fold as technology designers. Engaging this critical view, shapes my inquiry: How might this perspective inform how we design inclusive education technologies?

### *Teaching Accessibility in Computing*

To center inclusive education technologies on the experiences of students with visual impairments requires us—as educators—to make the process of learning accessible to those with disabilities [1]. Yet, including accessibility in computing and information sciences is covered by a small number of faculty in these areas [4,8]. We surveyed computing and information science instructors in higher education about how they incorporate accessibility into their courses and found that few instructors regularly teach accessibility [8]. Many instructors indicated they would be interested in teaching, but felt they did not know enough about accessibility to incorporate it into computing and information science topics. Furthermore, instructors indicated confusion about whether accessibility meant topics about accessibility, or accessible pedagogy, *i.e.*, making courses and materials accessible to students with disabilities. In either case, improving inclusive education technologies, requires attention to how we approach accessibility on specific topics (not just general accessibility), how we structure course materials to be accessible to those with visual impairments, and how we train the next generation of technologists to create accessible

solutions. Beyond sweeping guidelines, specific curricula need to be fine-tuned to adequately bring accessibility into classrooms [4,8].

#### *Multiple Perspectives Benefit Inclusive Design*

Including accessibility in individual course development requires attention to accessibility concepts *and* to students' reception to how such ideas improve technology overall. Prior work including accessibility in computing courses focused on learning from users with disabilities in outlining system requirements, drawing attention to making technology usable by diverse users [3,12]. In my work examining how college students incorporate accessibility in the design process, I required students in a design course to work with "expert users" with visual and hearing impairments but to also create technologies that would be usable for nondisabled users as well [5,6]. Thus research in this space shows that the experience and knowledge from expert users was invaluable to the student learning experience, not least because students had rarely interacted with people with disabilities before. Students benefited from multiple diverse perspectives of people with disabilities; incorporating accessibility throughout the course helped students to shift their perspectives on design overall [5].

Integrating accessibility and people with disabilities into the design process also benefits students with disabilities. In the design course, the process had to be made accessible for expert users that students worked with. This highlighted the role of disabled participants as key in uncovering how to improve the accessibility of the process (*e.g.*, students learned how to describe sketches to blind users to elicit feedback). Work improving inclusive education technologies should

critically examine how visually impaired students are involved in the process. For example, building on these design courses, future investigations should involve students with visual impairments as designers. Critically opening the design process to all aspects of inaccessibility (*i.e.*, in the development of inclusive education technologies) creates opportunities to improve it.

#### *Beyond Technologies that Mitigate Functional Limitation*

In my work investigating how people with disabilities feel about using assistive technologies in public and professional spaces, I found that social dynamics and social expectations play a key role in how technologies are used [10]. Unfortunately, social decorum often dictates behavior, and can affect the usefulness of a technology, rendering situations inaccessible. Clearly, technical function is not the only barrier to access. Although my work investigated social and professional aspects of use, education settings also have social expectations; we must examine the social expectations in educational settings, particularly around inclusive education technologies. How do such technologies impact classroom interactions, enable peer group projects, or interfere with different teaching styles? The accessibility of educational material is not limited to access to text or visual content, it includes a supportive learning environment for all involved that ultimately empowers visually impaired students to address challenges and solve problems alongside their peers.

#### **Contributions**

My prior work in accessible design, and experiences working with people with visual impairments shapes my role and vision as a teacher-scholar: Improving inclusive education technologies increases access but it

must also empower visually impaired students to lead these research directions. I will bring this experience and motivation to the workshop, grounded in a perspective emphasizing empowerment: to critically examine how we center disability, how we teach accessibility, and how we create inclusive and enabling classroom activities and environments with and beyond inclusive educational technologies.

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