Opening the Door Wider: Support for Students with Disabilities in the Classroom

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Affecting nearly 14% of school age Americans, disability rights in the United States have undergone a rapid metamorphosis since the 20th century (Schaeffer, 2020). In a single lifetime, people with disabilities have gone from confinement in prison-like conditions to becoming a protected group under the Americans with Disabilities Act (ADA). While this expansion of liberty is the be commended, there is still work to be done in expanding rights further for those with disabilities. One area that has been particularly slow to accommodate persons with disabilities is the education sector; whether it be older college campuses that lack access ramps or elementary schools with lacking special education programs, schools and colleges have been rather slow to adopt technologies to provide equity to those with disabilities. A specific area that schools have been particularly lacking in incorporating technology include technologies to assist those with physical disabilities. The main research question is understanding the interplay between new technologies and the disabled communities and determining the obstacles that prevent their full integration into classroom settings. Before exploring the current shortcomings in United States education uptake of disability technologies, it is first important to understand the ethical history and context in which the disability community and technology have interacted in the past.

Ethical Considerations

Historical Background

While the medical and technological communities often have altruistic goals in making their discoveries, there exists a long history of the medical model of disability being abused to harm people with disabilities. The medical model is a view in which disabilities are a problem that must be fixed, negating the human component of the patient (Anderson et al., 2013). A sub

view also states that those with disabilities must have the money and resources necessary to keep themselves alive, as society should not be burdened with the extra costs of keeping them alive.

Views aligning with the medical model are extremely dangerous to those with disabilities and have led to many past injustices. For example, the eugenics movement was fueled by the medical model's belief that those with subjectively inferior genes should be exterminated as to not lower the overall quality of the human race (Anderson et al., 2013). Persons with disabilities were sterilized or killed multiple times throughout history, some more removed from the United States such as the ancient Spartans sacrificing malformed babies at birth or the Nazis exterminating those with physical and mental disabilities in the concentration camps. Other examples took place in the United States, with 60,000 people with disabilities being forcibly sterilized between 1907 and 1967 (Carey, 1998). Other atrocities that were justified through the view of the medical model include the forced confinement of those with mental disabilities in asylums and group homes, most infamously including Willowbrook, where those with mental disabilities were forcibly kept in animalistic conditions (Behnke & Ethics, 2016; Meldon, 2019).

While some might state that those examples were done more out of spite than genuine desire to help those with disabilities, there exist a plethora of examples of those seemingly trying to help those with disabilities but doing irreversible damage. The most infamous example is that of the frontal lobotomy, popularized by Walter Freeman in the United States (Gross & Schäfer, 2011). Lasting from 1935 to mid-1950's, the procedure is performed by inserting a blunt rod through the upper eyelid of a patient, usually awake, and striking with a hammer until the patient was visibly calmer. Performed on approximately 50,000 in the United States, the procedure was thought to reduce anxious tendencies and neurotic to return a patient to assumedly normal functioning. Instead, the procedure destroyed higher cognitive functioning and many parts of the

person's personality, instead reducing them to a shell of their former selves. The procedure was deemed at the time to be wildly successful, only ending in the 1950's with the development of antipsychotic medications. While the medical community was commended for its apparent success, many thousands of persons lost their humanity and were minimized as people.

The lobotomy and other wrongdoings committed against the disability community illustrate the dangers of assuming that a medical model of disability has the patient's best interest in mind. Instead of viewing the patient as a problem that must be fixed, the social model of disability uses the advancements of technology and medicine to assist with the most painful or inconvenient of the disability at the patient's discretion, retaining the individuality of the patient as they consent to undergo or participate in various surgeries or technologies. This mentality was the driving force behind the passing of the Americans with Disability Act in 1990, requiring the United States government to radically legislate many facets of everyday life, from including disability access in buildings to providing welfare social nets for those that need financial assistance (Kopelman, 1996; Mayerson, 1992). The ADA prevents discriminatory hiring and housing practices and requires the medical community to careful moderate budding technologies to ensure no harm comes upon potential patients.

Current Theory

The current landscape for those with disabilities is far better than that in the mid-20th century, but still has room for improvement. Perhaps the most perilous obstacle for those with disabilities is to protect their current rights and to expand them into new territory (Behnke & Ethics, 2016). Attacks on the ADA are launched every few years, both within local government and nationally in Congress (Abrams, 2020; Schultz et al., 2017; Wilkinson & Dresden, 2019). For example, small cities are not required to abide by some requirements of the ADA due to their

small size (United States Department of Justice, 2008), city governments often fail to implement all portions of the ADA due to lack of oversight, lack of online access for those with hearing and visual disabilities (Palmer & Palmer, 2018), and ambiguous hiring practices (Kopelman, 1996). Similarly, crimes against those with disabilities are largely underreported and domestic violence occurs at an above average rate (Jones et al., 2018; Smith et al., 2017; Taylor, 2018), while homelessness is also common among the disabled.

Of particular note, special education programs in the United States education program are overworked and at a high teacher to student ratio, spreading current resources thin and preventing students from receiving individual assistance (Garnet, 2010). While students with disabilities used to be a relatively small portion of the population, increased acceptance and diagnosis practices have led to an increase in proportion of students with disabilities and is expected to continue increasing across the United States over the next few decades (Schaeffer, 2020). Approximately 13% of students enrolled in US public schools have disabilities, with 33% of these individuals having a learning disability, 11% having a form of autism, and 1% having hearing impairments (*Fast Facts: Students with Disabilities (60)*, n.d.). This proportion increases in higher education and college, with around 19% of students in college having a disability of some type (Statista, 2019). As these numbers are expected to rise, teachers will continue to be strained and having limited resources until this problem is addressed.

Students with disabilities are often discounted for consideration by educators, whether failing to make accommodations for those with physical disabilities or lacking the programs and resources necessary for special education programs. Students with disabilities are less likely to graduate high school vs their peers, with 66% of students with disabilities graduating compared to 84% of nondisabled students (Cox & Jimenez, 2020). Similar proportions of disabled and

nondisabled students go on to college and other postsecondary education, indicating a fundamental lack of support in the classroom for students with disabilities. Current education fails to assimilate students into post-education society, with only 35% of students with disabilities receiving a job following high school, compared to 78% among those without disabilities (Taylor, 2018). While this imbalance is discouraging, advocates are pushing for increased representation and consideration within the classroom. New technologies have alleviated part of the strain on teachers, enabling students with disabilities to excel along with their nondisabled peers. Specialized teaching methods have also been popularized among special education programs to further smooth the transition for traditional education to the workforce.

Technologies to Assist with Physical Disabilities

Conceptually easier to grasp than cognitive disabilities, physical disabilities have been common throughout human history. These disabilities are also far easier to identify and diagnose as there exist many objective tests to determine the functioning of the eyes, ears, limbs, and other body parts. Sophisticated prosthetics and neural implants to regain lost sense and movement are becoming more common but are still years away from both having the functionality of the human body and being inexpensive enough for the public to afford. In the meantime, there are several budding technologies that have been commonly adapted in classrooms to assist those with physical disabilities.

Augmented Reality

One such technology is the use of augmented reality for those who are visually impaired. Affecting around 36 million people worldwide, blindness dramatically increases the difficulty of navigating new spaces, such as classrooms, gyms, and new campuses (Design, n.d.). The goal of augmented reality is to use computational algorithms to assess an individual's local environment,

with auditory cues regarding directions, obstacles, and other people to help them navigate. The location and identity of these objects is processed and converted into auditory cues, with the cue using spatialized sound to notify the individual of where the object is located (Liu et al., 2018). The technology can be used to scan entire rooms or identify and track objects of interest, enabling blind individuals to comfortably negative a new space without needing the assistance of other people. Preliminary trails have already been conducted, with several legally blind participants successfully navigating classrooms and a maze-like environment independently. While this technology is still in development, engineers and advocates for the blind hope that devices such as these will be able to give the blind a new degree of independence that can be easily affordable. Ethics have also been considered; as the technology is voluntary, noninvasive, and robustly tested, there is little chance the technology could be used to abuse patients, while providing innumerable benefits.

While augmented reality is potentially beneficial to those with visual disabilities, there are several obstacles in the way of implementation. First, the technology is still in development and has not been brought to market. Production will have to be sufficient in reliability and number to providing meaningful implementation and will likely take several more years. While production logistics are a major barrier to current use, augmented reality faces criticism in the classroom. Similar to google glass or other augmented headsets, these devices are larger than glasses and can be visually distracting for other students. Additionally, the device uses auditory cues to alert users of proximal objects; while the sound has been reported to not be particularly loud, some professors, teachers, or administrators are likely to reject the technology due to the potential for distraction via “unnecessary” ambient background noise, such as during a test or other quiet times for students. While these complaints are valid, these downsides pale in

comparison to the massive upside of providing the visually disabled with the option of increased independence, especially at young ages when increased independence is likely to lead to more successful outcomes for students. As such, similar to the increasing allowance of service dogs and other assisting devices in schools, it is likely that augmented reality will become a crucial and accepted technology that will gain protection in the school system.

Computational Speech Recognition

Another recent advancement to assist those with physical disabilities is the extraordinary gains in voice-to-speech technology. Seen as a niche technology in the early 2000's, text-to-speech increased in popularity with the development of technologies such as Siri and Alexa by Apple and Amazon, respectively. With these programs requiring accurate identification of vocal sound and translating it into processable sentences, advocates for disability communities began adapting the technology for those with both cognitive and physical disabilities preventing writing either via writing utensil or keyboard (Coleman et al., 2015; Koch, 2017). Additionally, text-to-speech can be used the opposite way, converting electronic text into auditory sentences, useful for the visually impaired and for those with cognitive disabilities affecting visual word processing. These technologies have already been adapted for widespread classroom use. One such device is the Steno SR, a device in which students speak directly into the device to convert spoken word it text on a laptop or other device (Webb, 2019). The company proclaims that the device is able to increase the test scores of students by decreasing their anxiety and increasing belongingness and increasing independence by negating the need for a peer or a teacher to provide their own notes following lectures or discussion. Reversed, the technology has been extensively shown to improve reading comprehension and social validity among students that benefit from hearing instead of reading (Oberembt, 2018; Young et al., 2019). The technology is

noninvasive and requires little training due to its simplicity in use, enabling students to quickly acclimate themselves to using the device and requiring less time for teachers and other adults to guide the student through the training process when adopting new technology. The technology can be paired with special mouthpieces or earbuds to minimize potential distractions to their peers during a lecture, further cementing text-to-speech as a viable classroom technology. The device also has few ethical concerns, as the device can be used on a closed system to ensure privacy.

Similar to augmented reality, the largest complaints for text-to-speech technologies are the potential distractions for students in the classroom. Whether students speaking into a specialized microphone or a computer voicing the written words for a lecture or reading, this technology requires auditory cues to be made to improve student understanding.

Classroom technologies for those with physical disabilities have rapidly advanced over the past two decades with the rise of computers and similar technologies. While there are still improvements to be made with function and personalization of use, many of these technologies are already being implemented to increase student's performance in school and to increase their sense of belongingness both in academia and among their peers, important factors for improving successful integration into society while preserving their independence. These complaints are minor, and have not stopped the integration of voice technologies, specifically in special education classrooms. Text-to-speed will likely see larger integration in classrooms in the coming years as it is already readily accessible, and will likely continue to improve in quality over time as algorithms for speech detection improve.

Conclusions

Technologies to assist those with disabilities in the classroom have gained prominence over the past few decades. While many of these technologies are in still early in development, researchers are confident that these useful tools will one day see widespread, affordable use. Ethical consideration towards these technologies is also key, ensuring that atrocities of the past are not repeated. The current technologies discussed in this paper have fulfilled all the aforestated criteria in determining ethical and useful technologies in the classroom that lead to net positives for all participants. Future directions of this research will be to determine the use of technologies in cognitive disorders, expanding the search in including other novel technologies, and gathering more data on individual student and teacher interactions as case studies. Regrading the future of the field, it is likely that these technologies will become integrated into the classroom similar to how smart boards, computers, and phones have become integral to education in the past two decades. These technologies will be able to assist students in ways currently incomprehensible and will enable those with disabilities to choose to alleviate whichever difficulties they find most inconvenient. The future with disabilities technology is bright, and will likely lead to better educational and long-term successful outcomes.

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