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Voices from Academia

Providing Education to Students with Visual Impairments During the Pandemic

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ABSTRACT

As part of a larger study, the authors examined how the COVID-19 pandemic was impacting access to technology for students with visual impairments. In November 2020, 369 educators of students with visual impairments completed an online survey where they shared their experiences with the accessibility of digital learning tools, their students' improvement of skills, and providing instruction through the use of technology. Key lessons learned from the findings include: educators must ensure that students have full access to all learning materials, students need early instruction in technology use, and professional development in technology needs to be readily available to educators.

Keywords: blind, low vision, education, digital access, assistive technology

PROVIDING EDUCATION TO STUDENTS WITH VISUAL IMPAIRMENTS DURING THE PANDEMIC

The COVID-19 pandemic caused most school systems to shift from educating students in brick-and-mortar buildings to providing, or not providing, education virtually. The unprecedented disruption to the education of U.S. and Canadian students brought to the forefront systemic issues that impacted the delivery of high-quality special education services to students with visual impairments, including those with additional disabilities and deafblindness (the term visual impairment is used in this article). The pandemic also created its own unique set of issues that affect education for students with visual impairments, including how to teach students skills that involve hand-under-hand guidance, how to provide learning opportunities in the community when community travel was prohibited, and how to support students to access inaccessible teacher created videos.

At the same time, the COVID-19 pandemic has resulted in positive outcomes in special education services. Some educational teams have forged deeper understandings of each individual's role, online professional opportunities have increased, and in some cases, administrators have come to recognize the unique impact that a visual impairment has on a learner (Rosenblum et al., 2020; 2021).

During the pandemic, access to curriculum, availability of AT for students, training in the use of mainstream and AT for families and educators, and the opportunities technology afforded students with visual impairments often took center stage. The short-term and long-term impacts of the COVID-19 pandemic on students' technology needs and use are yet to be realized. However, there is much to consider as we examine the future of education for students with visual impairments.

LITERATURE REVIEW

The American Printing House for the Blind (APH) had a total of 56,137 students with visual impairments registered in their programs as of January 2, 2019 (APH, 2019). Students with visual impairments are served by educators who work as teachers of students with visual impairments (TVIs) and orientation and mobility (O&M) specialists. Key responsibilities of TVIs include conducting specialized assessments to understand the unique impact of a visual impairment on the learner, adapting instructional materials so that they are accessible to learners, supporting other educators in using appropriate instructional strategies for learners, and providing instruction in the nine areas of the expanded core curriculum (ECC; Allman & Lewis, 2014; Zatta, 2016). One of the nine areas of the ECC focuses on AT instruction. O&M instruction supports students in developing a conceptual understanding of their environment and the travel skills they need to be safe and independent/interdependent travelers within the community (Fazzi, 2014; Herrera et al, 2016).

According to the Individuals with Disabilities Education Act (IDEA), AT is defined as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities" (IDEA,

2004). The use of AT can empower someone with a visual impairment to gain a sense of independence and self-determination (McNear & Farrenkopf, 2014); thus, the stakes for teaching students to use AT are indeed high. Students with visual impairments use their AT to access curriculum and complete educational tasks such as accessing print media; accessing digital text; authoring, editing, and preparing materials for themselves in alternate formats such as Braille; accessing multimedia; and working with data (Siu & Presley, 2020).

For students with visual impairments, AT can include high-tech tools such as hardware (physical devices) or software (program applications; Siu & Presley, 2020). These tools can be specialized for people with disabilities, such as with screen magnification or screen reader software, or include mainstream technologies that were designed for universal use, but allow customization to meet a range of needs or preferences of the user. AT also includes low-tech or even no-tech tools such as Braille writers, bold ink pens, optical devices (magnifiers and telescopes), and talking calculators.

Technology is acknowledged as an increasingly important component of O&M instruction with tools such as Global Positioning Satellite (GPS) being specifically incorporated by O&M specialists into lessons. GPS-based tools, when used with skills taught by O&M specialists, provide students real-time environmental information and routing directions to a destination. The use of new technologies such as GPS, transit scheduling apps, and rideshare apps allows individuals with visual impairments to be more successful in community travel. Thus, it is critical that O&M specialists teach both fundamental O&M skills and technology skills to ensure that students are able to maximize their travel abilities in all environments (Corn & Rosenblum, 2020).

Even before the COVID-19 pandemic, both blended (i.e. hybrid) and fully virtual instruction had become increasingly common (Greer et al., 2014; Smith & Basham, 2014). Blended and online learning options can offer benefits to students with disabilities and particularly to students who are visually impaired, such as opportunities to individualize content, format, and pacing of instruction (Smith & Basham, 2014), and greater student independence in the classroom (Cranmer, 2020). However, in order to benefit students with disabilities, educational technology must be both accessible and usable (Smith & Basham, 2014). IDEA (2004) additionally includes a provision that all students who are blind must have access to print instructional materials, including textbooks in accessible format, free of charge, which makes it even more critical that materials and technology be accessible and usable. TVIs play a vital role in facilitating access for their students, often acting as liaison between the student, general education teachers, and educational technology vendors or developers (Siu & Emerson, 2017).

The research questions guiding this study were:

1. During online instruction, what digital learning tools, learning management systems (LMS), and videoconferencing software were reported by TVIs and O&M specialists to be accessible and usable by their students with visual impairments?
2. In the opinion of TVIs and O&M specialists, what mainstream and AT knowledge, skills, and tools must students have to be successful in online education?

3. How did TVIs and O&M specialists report supporting students with visual impairments during online learning?

TARGET AUDIENCE AND RELEVANCE

The audience for this article includes educators, administrators, and technology companies and publishers that produce educational materials for children. Through reading this article, educators and administrators will increase their awareness of what AT students need when participating in online learning and the impact on learning when digital learning tools, LMS, and web conferencing tools are not accessible. Having a deeper understanding of what makes a product both accessible and usable will enable technology companies to consider Universal Design from the beginning of product development. All readers will recognize that coordinated efforts, clear communication, and resources are necessary for the success of students with visual impairments in our highly technology-oriented education system.

METHODS

The *Access and Engagement II* study was conducted in November 2020. The study was approved by the American Foundation for the Blind's (AFB) Institutional Review Board. Participation in the study was voluntary. The study was open to U.S. and Canadian family members of children with visual impairments, TVIs, and O&M specialists. The 662 study participants represented 206 children with visual impairments via family member report, and 475 individuals who worked as TVIs and O&M specialists. In this article we report findings from 369 participants who worked as TVIs, O&M specialists, in both roles, or as student teachers/interns and serving students in the general-education setting.

Participants

There were 369 U.S. and Canadian participants. The sample included 224 TVIs, 64 O&M specialists, 77 dually-certified professionals serving as both TVIs and O&M specialists, and 4 student teachers/interns. All participants were working as itinerant teachers, meaning that they traveled from school to school, often within more than one school district. The participants were primarily female (88%) and White (84%). About two-thirds of the participants were over 46 years of age. Participants were from 47 U.S. states, and four Canadian provinces.

Analytic Procedures

Descriptive statistics were calculated for quantitative data. Qualitative data was coded using the constant comparison method (Stern, 2008). With the constant comparison method, the researchers compare all responses to an open-ended question to identify themes. Coding continues until no new themes are identified. Researchers using the constant comparison method are focused on finding relationships among the themes that emerge as they review the responses (Chun Tie et al., 2019; Stern, 2008).

RESULTS

Accessibility of Mainstream Digital Learning Tools

Participants were given a list of 35 mainstream tools, including digital learning apps and websites, videoconferencing tools (e.g., Zoom, Microsoft Teams), and LMS (e.g. Canvas, Google Classroom). They were asked two questions regarding each tool: (a) Were their students expected to use the tool by their general or special education teachers? and (b) Was the tool inaccessible to their students because of their students' visual impairments and/or additional disabilities? Table 1 lists learning tools that at least 15 participants reported their students were expected to use. For each tool, Table 1 shows the number of participants who stated that their students were expected to use the tool and the number and percentage of participants who also reported that the tool was inaccessible. The five tools that were rated most inaccessible by participants were iReady, IXL, Kahoot, EdPuzzle, and NearPod.

Table 1: Use and Reported Inaccessibility of Technology Tools, Organized by Percentage Inaccessible

Tool	Number of participants whose students use	Number of Participants who rated the tool as inaccessible	Percentage of participants who rated the tool as inaccessible
iReady	62	31	50
IXL	72	30	42
Kahoot	126	47	37
EdPuzzle	45	16	36
NearPod	68	22	32
Seesaw	127	41	32
Quizlet	89	28	31
ThinkCentral	17	5	29
Schoology	92	24	26
Edmentum	16	4	25
Canvas	102	24	25
Edgenuity	32	7	22
Class Dojo	82	16	20
Clever	99	17	17
Google Hangout	42	6	14
Google Classroom	258	35	14
Zoom	261	35	13
Kami	55	7	13
Google Drive	226	24	11
Google Meet	202	19	9
FaceTime	41	3	7
Microsoft Teams	75	5	7
WebEx	20	1	4
Remind	65	3	4

Fewer participants rated videoconferencing platforms such as Microsoft Teams and Google Meet as inaccessible compared to digital learning tools. Thirteen percent of participants stated that their students could not fully access Zoom, the most commonly utilized videoconferencing platform.

When asked to describe students' experiences with digital learning tools, the participants emphasized the amount of time that students required to learn new technology tools and the many skills they needed to develop to be independent and proficient using digital learning tools. In open response questions, some participants shared that digital learning tools were not fully compatible with screen reader and screen magnification software. For example, while discussing Edgenuity, one TVI explained that "Videos are not described, pictures/diagrams are not described, navigation tools are inconsistent, [and educators] cannot access materials ahead of time for quizzes." TVIs often access student tests and quizzes ahead of time to ensure that they are accessible and to prepare any needed adaptations, such as actual objects rather than objects shown in pictures, tactile diagrams, or Braille (Spungin et al., 2017).

Participants also reported via open-ended questions that some of the challenges experienced by students were multiplied when students needed to access multiple digital learning tools and video conferencing platforms. Students with less technology proficiency, and those with cognitive or fine motor disabilities, were described by participants as having a particularly difficult time accessing digital learning tools, LMS, and video conferencing platforms. These students often depended on at-home family support in order to engage with the digital learning tools.

Some hardware was described by participants in the open-ended items as presenting accessibility challenges for students with visual impairments. For example, participants explained that Chromebooks were commonly provided to students by the school district. Though Chromebooks do have the screen reader ChromeVox, participants noted that this screen reader was not as robust as JAWS, which their students more often used. For some students, participants explained that the level of magnification available on the small Chromebook screen was not sufficient for their students with low vision. Some students required a large monitor to use in conjunction with their Chromebook, or another type of laptop. TVIs spent considerable time advocating with administrators to obtain the hardware, software, and other accommodations their students needed in order to access and fully participate in online learning.

TVIs also described in open-ended responses several workarounds that they coordinated to enable students to access digital content. Workarounds included providing students with tablets instead of Chromebooks or laptops; accessing the content on the LMS and converting the content to an accessible formatted document for the student's use; or accessing the student's device remotely to help troubleshoot issues. One TVI explained, "I have used remote access to the students' computers while meeting on Zoom. I am able to help them navigate or troubleshoot computer issues in real time." The participants additionally reported that they needed to work closely with students' families, paraprofessionals, and general/special education teachers to ensure that students were able to participate and access learning opportunities during online instruction. Yet, even by November 2020, there were students who did not have access. An O&M specialist explained, "I had a student go on quarantine. I was the first (as her O&M) to contact the family and meet virtually. My student and her parent had not yet been taught how to

access the platform needed for virtual education visits, so in November, I was the first to address this with that particular family. She had the device but had not been trained how to use it."

Improvement of Skills as a Result of Increased Technology Use

As a result of the shift to online education due to the COVID-19 pandemic, many TVIs and O&M specialists explained that their students' technology skills have improved. Improvement occurred more frequently for students in the higher grades who were academic learners. Specific skills the students gained included use of multiple LMS, AT skills (e.g., screen reader or Braille device familiarity), keyboarding skills, self-advocacy skills, and problem-solving skills. For example, some students were reported to have improved their skills using Chromebooks, Zoom, and YouTube. During O&M instruction, students increased their skills with mapping tools and internet searches. However, it should be noted that participants reported that students with additional disabilities, with severe disabilities, and those who were medically fragile, did not typically make the same gains as academic learners. One O&M specialist explained, "For some things, like ECC [skills], looking at schedules, working on O&M planning and independence skills, I am all about [online instruction]. It is a great way to interact and I don't feel rushed like I have to jet off to the next school when I can do things virtually in my schedule. However, virtual instruction just does not cut it for working on all of the O&M skills that need to be repetitive and hands-on in person to ensure a student's safety."

Many participants also reported improvement in their own skills, particularly with accessing web conferencing programs and online teaching platforms. One TVI shared, "I have always been techy but this [time of online learning due to the COVID-19 pandemic] has really made me expand my skills. With how to access remotely and guide my students without me just doing the 'fix' myself. There is more problem solving on both of our parts." Some participants shared, however, that they or their students did not have adequate time or supports to master new technology skills as quickly as was required to keep up with teaching and learning. One dually-certified professional noted that the time during the pandemic has been a "crash course in learning. It has become a sink or swim type of learning [for my students] and focus has been on whatever one skill is needed to access and complete an assignment."

Providing Instruction Through the Use of Technology

Part of the challenge for TVIs and O&M specialists were the different methods, including technology, they could use to support their students' learning. Participants were provided with lists of methods they could use to support their students and families; Table 2 for TVIs and Table 3 for O&M specialists. Dually-certified professionals were provided with both lists. The lists included items that did not incorporate technology, such as dropping off or mailing materials to students' homes.

TVIs in Table 2 reported that their top three methods of providing instruction were meeting with students/families online to consult or give suggestions, virtually observing students do a task and providing feedback, and sharing websites, blog posts, etc. with students/families. O&M specialists in Table 3 reported that their top three methods of providing instruction were meeting with students/families online to consult or give suggestions, having students complete online assignments created by O&M specialists, and sharing websites, blog posts, etc. with students/families.

Table 2: Technological Methods Used by TVIs

Method for Providing Instruction	Number of TVIs Using Method
Meeting with students/families online to consult or give suggestions	237
Virtually observing students do a task and providing feedback	230
Sharing websites, blog posts, etc. with students/families	186
Attending class with students virtually	180
Meeting with students to describe material not accessible to them in class	169
Accessing teachers LMS to access content to adapt	168
Collaborating with paraprofessionals	168
Learning about technology tools students can use	149
Meeting and reviewing assignments with students	144
Sending families videos to watch with their children	127

Challenges of Remote Instruction During the Pandemic

In their responses to open-ended questions, participants reported that it was challenging to teach specific concepts online, particularly specialized O&M concepts such as correct cane techniques, street-crossing skills, and specialized Braille concepts such as correct hand/finger positioning. Such skills are much more effectively taught in person in the same physical space. Many participants reported that students were not currently receiving instruction in these skills. Participants reported that it was especially challenging to deliver online instruction to students who were very young and those who had additional disabilities. These students frequently required intensive in-person support to manage the technology and to help them stay engaged. Due to a variety of family factors, such support was not consistently provided to students. For example, one TVI shared, “One of my pre-Braille students is only 4 years old. Parents don't speak English. But I am expected to meet with her on Zoom for 30 minutes 5 days a week. Her attention span is short, materials at home are limited, home is chaotic, and I'm taking mom away from her other kids the whole time… I feel like after 15 minutes we are done.”

Successes of Using Technology for Instruction

In addition to the students’ technology skill gains, participants observed a variety of successes that emerged from online instruction. Students had the opportunity to socialize with other students who were visually impaired from other schools and states. Additionally, through teachable moments, students were able to enhance and increase their independent living skills, and families were able to observe what their children were truly capable of accomplishing. TVIs and O&M specialists were able to spend more time with their students, since they did not have to drive between schools. Participants felt that their coaching skills had improved through this experience. Another major benefit of online learning was increased communication between participants and their students’ family members. One TVI stated, “One of the positives that I have found in meeting online with students and families is that it has strengthened the relationships between parents and myself. Since I need parent assistance, at times, to be able to teach my lesson, the parents have a better understanding of how I am helping their child and how they can support this at home.”

DISCUSSION

In their roles as itinerant teachers, the 369 participants had to adapt instruction and ensure that their students had the ability to use technology to engage in online learning. Often, they had to support their students to gain access to instructional content that was not accessible to them due to their visual impairment and/or their additional disabilities. With little time to prepare for the switch to online instruction, many participants had to increase their own technology skills to meet their students' needs. They reported that they used technology in multiple ways to deliver and support instruction.

Lessons Learned

As Rice and Ortiz (2021) noted, the use of digital learning tools and digitized instructional materials have grown tremendously in K–12 education. Participants reported that students had greater success when they had access to technology tools with AT, accessible web conferencing and digital learning tools, as well as adequate skills to use them independently. When the web conferencing, LMS, or digital learning tools were not accessible, participants had to provide support to students. Rice and Ortiz (2021) explained that even when students are engaged with educators in person, the use of digital learning tools and digitized instructional materials are an integral part of the curriculum. When these materials are not accessible, students are disadvantaged. Educators of students with visual impairments and other disabilities must work to ensure that whether education is delivered in person, through a hybrid model, or fully online, students have full access to all learning materials. It is also important to recognize that materials may technically be accessible, but their usability by a student is problematic for the student (Cranmer, 2020; Smith & Basham, 2014). Educators must continually evaluate both the accessibility and usability of digital learning tools and materials.

Though it is part of the role of the TVI to prepare accessible materials (Siu & Emerson, 2017; Spungin et al., 2017), TVIs have many additional responsibilities. Thus, it is imperative that educators, administrators, and policymakers work together to maximize accessibility of digital learning materials, online platforms, and LMS (Rosenblum et al., 2020, 2021) so that TVIs do not find themselves having to neglect their other responsibilities because they are spending a disproportionate amount of time on accessibility-related issues. Meyer (2017) speaks to the importance that those in charge of procurement only purchase accessible materials. Resources such as the National Instructional Materials Access Center (NIMAC, n.d.) provide those producing Braille materials access to some publishers' files for conversion into Braille. However, unless language is written into procurement contracts to require publishers to provide the necessary files, often school districts and state departments of education do not purchase print materials that can easily be made accessible for Braille readers. The NIMAC does not provide for the provision of accessible digital materials that are teacher created, openly licensed educational resources, or digital instructional materials that are interactive.

It is imperative that efforts are made to provide classroom teachers training on developing accessible materials. Educational product developers must design products that are born accessible. Students with visual impairments should be part of beta testing of products during field testing. TVIs and/or O&M specialists should serve on procurement committees, and they should share specific feedback with

developers on challenges encountered by students with visual impairments when using their products. As Rosenblum et al. (2020, 2021) suggested, school districts should only purchase web conferencing programs, digital learning tools, and LMS that have been shown to be both accessible and usable.

Of 299 participants who responded to the question, 286 (96%) reported that they provided direct instruction to students with additional disabilities. Children with additional disabilities require individualized instruction that is often hands-on (Erin, 2016; Zatta, 2016) and delivered in short increments of time due to limited attention spans. The same is true for children in early intervention. Most participants reported that they had to find ways to engage learners with additional disabilities and/or who were young during online instruction. Providing intervention and instruction to children receiving special education services has been found to be effective (McCarthy et al., 2019) including children in early intervention receiving O&M instruction (Dewald et al., 2015; Dewald & Smyth, 2013). As a field, we must develop resources to support TVIs, O&M specialists, and other educators in providing meaningful, individualized online learning for students who are young and/or have additional disabilities. We must work with family members to acquire the tools and resources they need to support their children during online learning (Dewald & Smyth, 2013). Participants did report that when family support was present, some students made educational gains, there were opportunities to provide coaching to family members, and the ability to teach within the child's home promoted greater student independence. We must capitalize on these successes and build in opportunities to increase students' skills through the use of online learning methods when appropriate, even when in brick-and-mortar buildings. For example, having a student use a GoPro camera (a camera worn on the head to give a first-person experience), allows a family member to be invited to join their child and O&M specialist during community travel, in order to learn strategies they can use to support their child when the family travels in the community.

There has been a recognized shortage of special education teachers, especially those serving rural areas and children with low-incidence disabilities, long before the COVID-19 pandemic (Jameson et al., 2019; Mason et al., 2000). The pandemic has brought to the forefront the need to be creative in the way we recruit future educators and the methods educators use to meet their students' needs. Rosenblum et al. (2021) recommended that educational teams be provided more time to problem-solve together, and, when appropriate, TVIs and O&M specialists be permitted to join their students online, even when their students are in brick-and-mortar buildings.

Students need strong technology skills, problem-solving skills, and self-advocacy skills to foster ongoing academic and lifelong success (D'Andrea, 2012; Kelly & Kapperman, 2018). Therefore, it is imperative that TVIs and other educators promote students' early skill development in a wide range of technology options and support them in deciding which tools to use for various tasks (McNear & Farrenkopf, 2014; Siu & Presley, 2020). Some participants commented on the technology and other ECC skill growth they had seen in their students, such as self-determination.

For students with visual impairments to successfully learn to use both AT and mainstream technology, they must have educators who themselves are well-versed in these tools (Siu & Emerson, 2017). Some participants reported that at the beginning of the pandemic they had much to learn about technology in

order to support their students. Many participants indicated that they had grown in their own technology usage during the pandemic. In an analysis of surveys completed by TVIs, Ajuwon and colleagues (2016) found that TVIs acknowledged that they needed to build their own AT and technology skillsets. The pandemic has brought to the forefront the importance of providing ongoing professional development in both AT and mainstream technology to educators, as they will be expected to support their students' educational participation and learning in the 2020s and beyond.

Limitations

The study was advertised online through postings on the AFB website, Paths to Literacy website, and Paths to Technology website. The study was also announced on national listservs such as AERNet and Braille and Teach and was shared by some states through their listservs (e.g., Arizona, Colorado, South Carolina). It was also announced on social media, such as Facebook groups for TVIs and O&M specialists. Individuals who did not see the study announcement online may have missed the opportunity to participate, as did those who do not choose to participate in surveys. Participants volunteered to complete the online survey. All data was self-reported and was not verified by the researchers.

Collecting information through self-report also has limitations. Participants are often biased when they report on their own experiences. There are many reasons that participants might express biased estimates of self-assessed behavior, ranging from misunderstandings of what a proper measurement is, a desire to please the researchers, or even a desire to present a certain persona despite the survey itself being anonymous (Rosenman et al., 2011).

CONCLUSION

This study, part of a larger study by Rosenblum et al. (2021), brings to the forefront the relationship between accessibility and education of students with visual impairments. When students do not have full access to curriculum, the skills and supports to use both AT and mainstream technology, and educators with adequate technology and AT skills themselves, there is a high probability their learning will suffer. Technology also has the potential to allow educators and families to work more effectively together to support children's learning. As we step back and evaluate both the short-term and long-term impact of the pandemic on the education of students with visual impairments, we must consider carefully the lessons learned from this study. A TVI shared, "I have always been very 'techy,' but I feel like I know so much more about technology and its lack of [or] ability to be accessible to students this year. I am pleasantly surprised when things work like they are supposed to."

DECLARATIONS

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