WORKPLACE TECHNOLOGY

RESEARCH REPORT | JANUARY 2022

Technology and Accommodations: Employment Experiences of U.S. Adults Who Are Blind, Have Low Vision, or Are Deafblind

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AFB American Foundation® for the Blind

Expanding possibilities for people with vision loss

WORKPLACE TECH

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NOLOGY

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TERMINOLOGY

The following terms are used in the report:

(Note: These definitions are not comprehensive but cover the ways the terms are used in this report.)

- **Accommodations:** An accommodation is a modification or provision of assistance to remove an accessibility barrier and allow equal access. Examples include:
  - –The purchase of a screen reader software license by an employer
  - –Assistance offered by a coworker with completing a weekly timesheet
  - –Tools at a physical workstation, such as a larger monitor, high-contrast keyboard, lighting, or adjustable window coverings, which increase productivity
- **Access/Assistive Technology:** Access or assistive technology is a subset of accommodations. It includes software such as screen readers (e.g., JAWS, NVDA, VoiceOver), screen magnification software (e.g., ZoomText, MAGic), or tools, such as a KNFB Reader or Open Book, designed specifically for those with visual impairments. This category also includes hardware such as a monocular, CCTV/video magnifier, handheld magnifier, or refreshable braille display.
- **Blind:** Individuals who are blind have little or no functional vision and typically require screen reader software and/or braille to access written content.
- **Built-in Accessibility Features:** Built-in accessibility features come already loaded onto hardware and do not need to be downloaded or added as a third-party application. Examples are the features of devices that allow you to adjust font size or select font/background combinations.
- **CCTV/Video Magnifier:** A CCTV (closed-circuit television) or video magnifier uses a camera to magnify an image onto a screen. There are desktop and handheld versions of CCTVs/video magnifiers.
- **Deafblind:** Deafblind individuals have varying levels of usable vision, from total blindness to near typical vision, and varying levels of hearing, from total deafness to near typical hearing.
- **Low Vision:** Individuals who have low vision have some level of usable vision, but do not have typical 20/20 vision. Some individuals read regular print without assistance, but many use assistance such as screen magnification software to read print.

- **Mainstream Software:** Mainstream software is “out of the box” software used by large groups of people. Examples include Microsoft, Google, and Apple products.
- **Proprietary Software:** Proprietary software has limits to its use based on copyrights, patents, or other legal restrictions imposed by its publisher, vendor, or developer.
- **Screen Magnification Software:** Screen magnification software allows low vision users to adjust the size of the screen content and select alternative background/font combinations to make viewing content easier.
- **Screen Reader Software:** Screen reader software converts text to speech and allows the individual to use keyboard commands when using a mouse is not possible or efficient.
- **Vocational Rehabilitation (VR):** VR services contribute to the learning of skills to help accommodate an individual with a disability in order for that person to gain or continue successful employment.

ABBREVIATIONS

The following abbreviations are used throughout this report:

- AFB: American Foundation for the Blind
- AT: Access/Assistive Technology
- HR: Human Resources
- IT: Information Technology
- OCR: Optical Character Recognition
- VR: Vocational Rehabilitation

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EXECUTIVE SUMMARY | JANUARY 2022

Technology and Accommodations: Employment Experiences of U.S. Adults Who Are Blind, Have Low Vision, or Are Deafblind

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The purpose of this study was to examine how technology in the workplace influences the experiences of workers who are blind, have low vision, or are deafblind. This report summarizes survey data from 323 participants who were employed in February 2021, and interviews with 25 of these participants. In this study, employed participants shared their experiences with technology used for hiring and onboarding, required work-related training, and productivity; receipt of workplace accommodations; interactions with Information Technology (IT) staff; and experiences with telework. Self-employed participants also reported on the methods they use to access technology they needed for their work. The *Workplace Technology Study* report details findings revealing that key employee support staff, especially Human Resources (HR) and IT, as well as technology developers, must improve their practice to achieve full inclusion for blind, low vision, and deafblind employees and applicants. The recommendations provide actionable steps derived from the research that outline a path forward.

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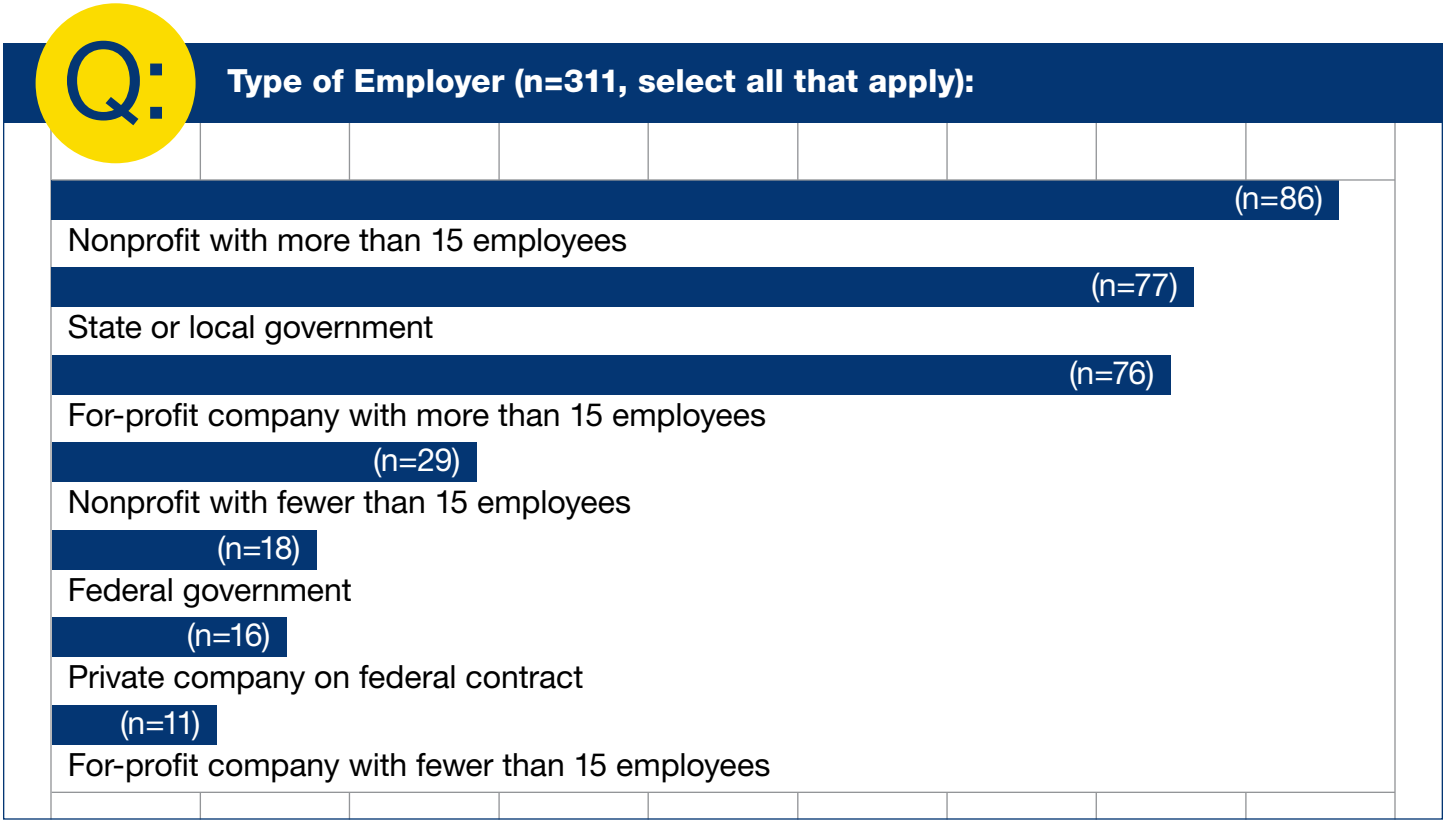
PARTICIPANT SNAPSHOT

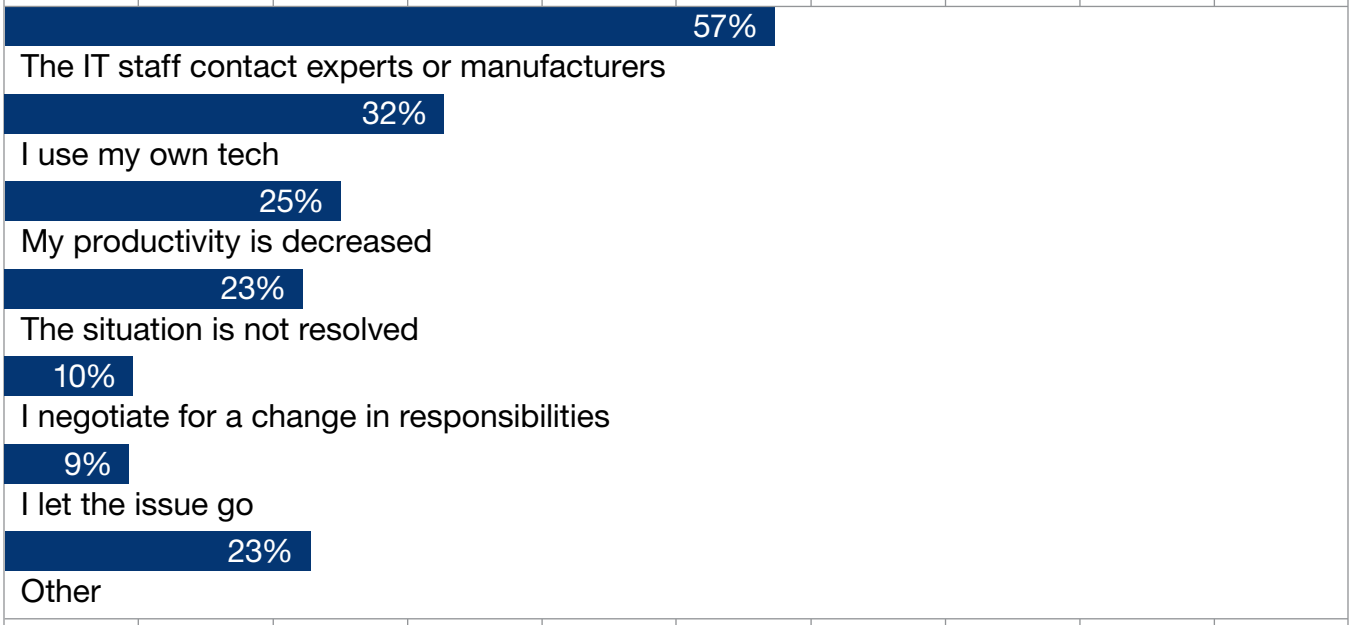
- Location: All 50 U.S. states and Washington, D.C., were represented in the study.
- Participant gender: 57.3% female, 41.4% male, 0.3% non-binary or third gender, 1.0% no response.
- Race/ethnicity: 78.8% White, 6.0% Hispanic/Latinx, 4.1% Asian/Asian American, 3.8% multiracial, 3.5% Black/African American, 1.3% Native American/Pacific Islander, .6% other, 1.9% no response.
- Age range: 21-78 years (average=47 years).
- Additional disabilities: 40% of the participants had at least one additional disability besides blindness or low vision.
- Education: Almost 85% of the participants (n=265) reported they had a college degree with 41% (n=130) having an associate's or bachelor's degree and 44% having an advanced degree.
- Reading medium: To access written information, 67% use audio, 34% use braille, 31% use large print, and 3% use standard print.
- Employment: 79% were traditionally employed (receiving a form W-2 from an employer); 15% self-employed; and 6% both traditionally employed and self-employed. The participants worked in a variety of industries including education (n=94), government and human services (n=92), information technology (n=57), and healthcare (n=36). Less than 15% of participants were employed in other sectors including office and administrative support; arts, entertainment, and media; business management and administration; and sales and retail.



KEY FINDINGS

- Participants frequently faced accessibility challenges during the process of being hired and onboarding for their jobs. For example, about a third of the participants who were required to take an automated test or screening during the hiring process reported accessibility challenges. In addition, 59% of the participants reported facing accessibility challenges when completing onboarding forms on paper and 48% reported accessibility challenges with electronic onboarding forms.
- About 25% of participants reported that they could not fully access trainings required for their jobs. This impacted their productivity and sense of inclusion in the workplace.
- Participants reported using multiple types of software to perform their job responsibilities. Nearly all participants used Microsoft products, while about a third used Google products, and about one-tenth used Apple products. Many participants used multiple web browsers and email clients during a typical workweek.
- The participants reported a variety of accessibility challenges with mainstream technology tools, particularly with video conferencing, instant messaging, and documents prepared by sighted colleagues that were not properly formatted for accessibility.
- Most participants requested accommodations from their employer, including purchase of assistive hardware, software, or both. There was tremendous variability in the accommodations request process and outcome, with some participants receiving accommodations easily and quickly, while others reported long waits for accommodations, denied requests, or even job reassignment or termination.
- About one in five participants (21%) reported that they considered not requesting a needed accommodation because they were worried about backlash from their employer, coworkers, or clients.
- Participants reported diverse experiences working with IT staff. Some found their employer's IT staff to be knowledgeable and receptive to their technology needs, whereas others reported that IT staff knew little about assistive technology and that they needed to do much of their own technology troubleshooting.
- Telework was described as a generally positive innovation for many participants, enabling them to enjoy a more level playing field in the workplace.
- Self-employed participants reported using creative strategies to procure assistive technology, keep up with technology updates, and meet their own accessibility needs.

Q: When IT staff at your current or most recent employer or contract are unable to assist you with your accommodation needs, what occurs? (n=227, select all that apply)



OUR RECOMMENDATIONS

- Employers should implement an accessibility policy that requires all documents, tools, procedures, and procurement to be accessible, usable, and compatible with assistive technology. All departments, including Human Resources (HR) and Information Technology (IT), should actively oversee implementation.
- Employers should implement an accommodations policy that is visible on the employer's website and referenced in relevant documents used throughout the application process, hiring, onboarding, and employment. The accommodations policy should standardize requesting and fulfilling accommodations, only require pertinent disability documentation, ensure employees benefit from an interactive process, result in timely action, offer appeal procedures, and allow for changes when the disability or technology changes.
- HR staff and hiring managers must make all HR materials – including websites, applications, automated screening systems, forms, manuals, electronic documents, training materials, and paper materials – fully accessible to those who use assistive technology, such as screen reader software; implement accessible forms with e-signatures to reduce the reliance on paper forms; and provide accommodations for hiring activities, such as applications or performance tests.

- Employers should ensure employee training programs are fully accessible to employees with disabilities and assistive technology users, procure accessible products and platforms, provide appropriate accommodations before and during trainings, and require presenters to use accessible meeting and presentation practices.
- IT staff should actively collaborate with and understand the needs of employees with disabilities, their assistive technology, and their accommodations requests. When a product is inaccessible, IT professionals should work with the employee and vendor to address concerns or select alternative products.
- Employers should seek feedback from employees with disabilities on the accessibility of new procedures and tools and ensure that procuring and implementing new technologies account for the accessibility, technical support, and training needs of employees with disabilities.
- IT staff should develop the knowledge and processes to purchase new tools that are fully accessible to employees with disabilities. In some cases, a tester with expertise in accessibility may need to be hired.
- Developers of products, websites, and apps used in employment contexts should develop a corporate commitment to creating accessible products, hiring accessibility and usability testers, offering accessibility support to users, and providing accessible sales and technical documentation.
- Assistive Technology (AT) developers should make documentation and training materials available in multiple formats that are accessible to a wide array of users with a spectrum of skills, preferences, and accessibility needs.

"Technology and availability of accommodations have changed over the years. I don't think I could have done the same job I'm doing now if it were 25 years ago. Technology has enabled me to be a productive person."—*White female in her 40s who is congenitally visually impaired*

FINAL THOUGHTS

Technology plays a crucial role in the modern workplace. Workers who are blind, have low vision, and are deafblind are expected to use multiple mainstream technologies in order to fulfill their job responsibilities. Despite longstanding requirements for workplace accessibility under the Americans with Disabilities Act, the participants in this study reported frequent technology-related access challenges with essential facets of employment: being hired, onboarding, completing required training, using technology for day-to-day job responsibilities, and receiving needed accommodations. These barriers, which occurred in nearly every aspect of employment, were reported to have a variety of effects ranging from loss of productivity to termination of employment. Removing these barriers is essential to increase employment opportunities and career advancement for people who are blind or have low vision, and the research reveals that nearly every employee and leader has a role in creating an inclusive workplace.

Notably, the participants also shared that, when provided with accommodations and a culture of inclusion, they can participate fully in the modern workforce. Collaboration between employees, supervisors, HR departments, IT departments, and technology developers is necessary to ensure that barriers are removed and that workers who are blind, have low vision, and are deafblind are fully valued and productive in the workplace. Employers should take rapid actions to close the gaps on workplace accessibility and fulfill their obligations to promote inclusion and nondiscrimination.

INTRODUCTION

"Just because you have vision loss doesn't mean you're not capable. It's transforming and educating the employers that visually impaired people are capable."—*White male in his 70s who became visually impaired as an adult*

INTRODUCTION

The research question that guided the *Technology and Accommodations* study was:

How does technology and the need for accommodations shape the employment experiences of U.S. adults who are blind or have low vision?

Technology and accommodations are not "one size fits all." Even when you have two individuals performing the same job tasks who have identical eye conditions and similar visual acuity (the clarity with which one sees an image) and visual fields (peripheral or side vision), their needs for accommodations and the technology tools they use will vary. Not all individuals who are functionally blind read braille. If they opt to use screen reader software, they vary in the settings they use within programs and how they approach reading and writing tasks.

Employees who are blind or have low vision have protected rights in the workplace under the Americans with Disabilities Act (ADA) and other laws, prohibiting discrimination on "the basis of disability in regard to job application procedures, the hiring, advancement, or discharge of employees, employee compensation, job training, and other terms, conditions, and privileges of employment."[1] As part of the prohibition on discrimination, employers must provide reasonable accommodations. Accommodations are considered "reasonable" if they do not create an undue hardship requiring significant difficulty or expense or a direct threat to the health and safety of the individual with the disability or others. Individuals generally must request an accommodation based on their disability, and employers must engage in an interactive process to clarify the individuals' needs before the employer chooses an accommodation. The employer may make the final decision about which accommodation to provide, but it must be effective and provided expeditiously.

[1]Americans with Disabilities Act of 1990, 42 U.S.C.A §12112(a)

The Equal Employment Opportunity Commission and Department of Labor have set forth regulations, technical assistance, guidance, and compliance documents related to employers' obligations to provide reasonable accommodations and the rare circumstances in which accommodations are not required.[2] This study considers both the accommodations that individuals request under the law and other technology practices that are conducive to producing an inclusive and welcoming workplace for people who are blind, have low vision, or are deafblind. The findings presented in this research serve as a window into how well common practices in the employment process are functioning and indicate the need for improving employer practices and protection of the rights of people who are blind or have low vision.

People who are blind, have low vision, or are deafblind, like all individuals, generally go through multiple stages of the hiring process – applications, interviews, assessments, and onboarding – before beginning work. Through this process they have contact with HR staff, IT staff, supervisors, coworkers, and others. The knowledge about disability these individuals bring, or in many cases do not bring to the table, coupled with the culture of the company or organization, the demands of the job, and the strengths and needs of the worker who is blind, has low vision, or is deafblind, all come together in an ever-changing way. Once an employee has their initial technology and accommodation needs met, the story does not end. As job tasks, tools, and personnel change within the company or organization, the visually impaired employee's needs will change. Other factors such as new technologies that come on the market, changes in the employee's visual abilities, the introduction of new company policies, and changes in supervisors and coworkers can all impact the productivity and inclusivity of the worker who is visually impaired.

In this report we examine the nuances of technology and accommodations used by employees who are blind, have low vision, or are deafblind within the context of strategies, consequences, and solutions that ultimately lead to recommendations. Our findings and recommendations, derived from our analysis of the data, will be of value to HR staff, IT staff, ADA coordinators, supervisors, VR professionals, technology developers, and those who are blind, have low vision, or are deafblind. Throughout the report we provide examples shared by participants that describe the products they use. The manufacturers of these products, in addition to developers of future products, can deepen their understanding of the need for products to be developed with accessibility considerations playing a pivotal role from conception, rather than being an afterthought.

[2]https://www.eeoc.gov/laws/guidance/enforcement-guidance-reasonable-accommodation-and-undue-hardship-under-ada#general

STUDY DESIGN AND ANALYSIS

This was a mixed method study with four phases.

- **Phase 1, Literature Review:** Researchers gathered information from peer-reviewed articles on topics including employment, technology, assistive technology, blindness, and low vision. In addition, they examined the prevalence of individuals with disabilities in different employment fields, for example, healthcare, information technology, and finance. The literature review informed the researchers as they developed Phase 2 of the study.

- **Phase 2, Focus Groups:** In fall 2020, two researchers conducted nine focus groups with those who were screen reader users (n=4), those who had low vision (n=3), and those who were typically sighted (n=2). Through a series of open-ended questions, the researchers examined participants' experience with the hiring process, how they made accommodation requests, accommodations they used, and the mainstream and assistive technology tools that enabled them to maintain productivity at work. Researchers also examined participants' relationships with HR staff, IT staff, and coworkers. The two researchers reviewed notes and audio recordings from the focus groups and identified themes. The themes from the focus groups were used to develop questions for the final two phases of the study.

- **Phase 3, Survey:** Using the information gathered through the literature review and focus groups, researchers designed an accessible, online survey that was made available to U.S. adults who met at least one of the following criteria:

  –Employed and receiving a W2 from an employer

  –Self-employed and receiving a 1099

  –Not currently employed, seeking employment, and employed within the last 5 years

  –Not currently employed, not seeking employment, and employed within the last 5 years

  –Retired after January 1, 2016

Descriptive statistics were calculated for quantitative data. Responses to open-ended questions were coded by four researchers to identify themes and sub-themes.

- **Phase 4, Interviews:** After coding the open-ended responses to the survey questions, the researchers selected participants whose responses to the open-ended questions were especially rich and informative. If a participant whose quote was selected provided an email address, they were contacted and invited to take part in a one-hour interview. Interviews were audio recorded. One researcher led the interview while a second researcher took notes to verify the recorded transcript. The interview notes and recordings were analyzed to extract additional themes and quotes.

This report is based on the data from the 323 survey participants who were currently either employed and receiving a W-2 or were self-employed, and 25 currently employed participants who were interviewed. Not all participants answered each question.

PARTICIPANT RECRUITMENT AND LIMITATIONS

For both the focus groups and survey, an email was developed that explained the study. The email was sent to individuals on AFB's extensive mailing list. In addition, information about the study was posted on social media. Organizations and companies in the blindness field were asked to share the recruitment announcement with their members/customers.

A limitation of this study was that participants were recruited through digital means. Thus, individuals who did not use email or did not use social media did not have an opportunity to participate. The sign-up procedure for the focus groups and the survey were online, again limiting the potential participant pool. The study was conducted from February through June 2021, when the United States was in the midst of the COVID-19 pandemic, which may have influenced participation and responses. All data collected was self-reported and not verified by the researchers.

DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

The survey participants were from all 50 states and the District of Columbia, with California (n=30), Washington (n=25), and Texas (n=21) having the largest number of participants. The interview participants were from 17 states. Demographic data is provided in Table 1 for gender and Table 2 for race/ethnicity.

TABLE 1:

Demographic Data of Participants by Gender

Characteristic	Survey (n=316)	Survey Percentage	Interviews (n=25)	Interviews Percentages
Female	181	57.3	14	56.0
Male	131	41.4	11	44.0
Non-binary/ Third gender	1	0.3	0	0
Self-described	0	0	0	0
Not provided	3	1.0	0	0

TABLE 2:

Demographic Data of Participants by Race/Ethnicity

Characteristic	Survey (n=316)	Survey Percentage	Interviews (n=25)	Interviews Percentages
White non-Hispanic	249	78.8	19	76.0
Hispanic/Latinx	19	6.0	1	4.0
Black/African American	11	3.5	1	4.0
Asian/Asian American	13	4.1	1	4.0
Multiracial	12	3.8	1	4.0
Native American/ Pacific Islander	4	1.3	1	4.0
Other	2	0.6	0	0
Not provided	6	1.9	1	4.0

The survey participants ranged in age from 21 to 78 years with a mean (and median) of 47 years (SD=14.0). The interview participants ranged in age from 23 to 72 years with a mean age of 51 years (SD=15.5).

The majority (n=205, 64.9%) of the 316 participants were congenitally visually impaired, while 56 (17.8%) participants acquired their visual impairment between 2 and 19 years of age, and the remaining 51 (16.0%) acquired their visual impairment in adulthood. Four participants (1.3%) chose not to provide this information. The leading cause of visual impairment among the 312 participants was retinopathy of prematurity (n=55, 17.6%), followed by retinitis pigmentosa (n=29, 9.3%), and glaucoma (n=29, 9.3%).

When asked how they accessed ordinary print, with multiple responses permitted, participants reported that they accessed print by:

- Listening to it (n=215)
- Enlarging it (n=100)
- Reading braille (n=111)
- Reading it as is (n=9)

On the question of whether their method of accessing print had changed within the last 5 years, 322 participants responded. Of these, 112 (34.8%) reported there had been a change, for example, they had started using a screen reader such as JAWS or VoiceOver.

There were 129 (39.9%) of 323 participants who reported having additional disability(ies) or health condition(s). The most common was a chronic health condition (n=73), being D/deaf or hard of hearing (n=35), having mental health challenges (n=30), and a physical disability (n=25).

Almost 85% of the participants (n=265 of 316) reported they had a college degree with 41% (n=130) having an associate's or bachelor's degree and 44% having advanced degrees.

CURRENT EMPLOYMENT SECTOR, HOURS, AND WORK LOCATION

It is not uncommon for individuals to hold multiple forms of employment simultaneously. Of the 323 participants, 256 received W2 income only, 47 were self-employed only, and 20 both received W2 income and were self-employed.

The 323 participants were currently employed in varied employment sectors and were allowed to select multiple responses when asked. These employment sectors included the following:

- Education and instruction (n=94)
- Government, community, and human services (n=92)
- Information technology (n=57)
- Healthcare (n=36)

Less than 15% of participants were employed in other sectors, which included office and administrative support; arts, entertainment and media; business management and administration; and sales and retail.

Thirty-three participants reported they were small business owners. When asked to select the type of employer they worked for, 311 responded with some selecting more than one option. These included the following:

- Nonprofit with more than 15 employees (n=86)
- State or local government (n=77)
- For-profit company with more than 15 employees (n=76)
- Nonprofit with less than 15 employees (n=29)
- Federal government (n=18)
- Private company on federal contract (n=16)
- For-profit company with less than 15 employees (n=11)

No question specifically asked whether the participant worked for an organization that provides services or support to people with disabilities, or specifically those with visual impairments. However, based on responses to questions about their job responsibilities and information provided in long-answer narrative, it was estimated that more than one-third (approximately 127 of 323 participants) work for this type of organization. These employers should be more aware of and more responsive to providing accessible technology and accommodations.

When asked how long they had worked for their current employer, 317 participants responded that they had worked for their current employer for:

- Less than 2 years (n=79, 25.0%)
- 2–5 years (n=75, 23.7%)
- 5–10 years (n=63, 19.9%)
- 10–20 years (n=61, 19.2%)
- More than 20 years (n=39, 12.3%)

When asked how many hours per week they worked, 308 respondents reported the following:

- 1 and 20 hours a week (n=40; 13.0%)
- 21 to 40 hours a week (n=179; 58.1%)
- More than 40 hours a week (n=61; 19.8%)
- Varying hours each week (n=22; 7.2%
- Prefer not to answer (n=6; 1.9%)

Of the 309 participants who provided information about whether they worked on site or remotely prior to the COVID-19 pandemic and in February 2021, 192 (62.1%) reported a change in where they worked. Of these, 149 (77.6%) reported that they moved to working remotely exclusively.

TABLE 3:

Work Location in February 2021 and Pre-COVID

Work Location	February 2021	Pre-COVID-19
Worked remotely exclusively	63.5%	17.6%
Worked both remotely and on site	13.7%	12.8%
Worked on site exclusively	22.8%	69.6%

n=309

EMPLOYMENT OF PARTICIPANTS

"In-person interviews are very awkward because some people don't like guide dogs. Filling out paperwork is very difficult and asking for assistance makes me feel inadequate....When applying to federal or state jobs, it is difficult to reach someone to receive reasonable accommodations for online tests."—*Asian/Asian American female in her 20s who is congenitally visually impaired*

THE HIRING PROCESS

During the hiring process, many individuals who are blind, have low vision, or are deafblind carefully consider when, or if, to disclose their visual impairment to the potential employer and how to request accommodations, and each individual has a different level of knowledge of their rights and responsibilities. Individuals are not required to disclose their visual impairment, but they may be required to provide information about their functional limitations or reasonable documentation that they are an individual with a covered disability when requesting accommodations.
Of 323 participants, 270 (83.6%) reported they disclosed their visual impairment during the hiring process. Most often, disclosure occurred during the interview (n=74), in the cover letter or resume (n=59), when completing the job application (n=36), or when scheduling the interview (n=30). Some participants had disclosed their visual impairment prior to applying for the position through means such as personal contacts within the organization or having completed volunteer, internship, or prior work with the organization.

RIGHTS AND RESPONSIBILITIES

Until a job offer has been extended, the ADA and the Rehabilitation Act of 1973 do not allow employers to ask an applicant about the nature or condition of their disability. Employers may ask whether the individual will require an accommodation and what type if they voluntarily disclose. After the job offer has been made, the employer may ask additional questions of future employees with disabilities for the purpose of providing accommodations and determining whether the disability poses a direct threat to health or safety. In general, employers may not discriminate if the employee can safely perform essential job tasks with or without a reasonable accommodation.

For more information on employers' responsibilities, see "Blindness and Vision Impairments in the Workplace and the ADA" published by the Equal Employment Opportunity Commission.

In an open-ended question, participants were asked what reaction, if any, they received after disclosing their visual impairment. Several participants worked in the field of visual impairment and reported that there was no reaction to their disclosure of their visual impairment since hiring managers already knew or were seeking a candidate who was blind or had low vision. Some participants also indicated that the company they were seeking employment with was pleased to learn of their visual impairment because it was open to hiring people with disabilities or because it valued employees with diverse backgrounds. Participants also indicated that their visual impairment

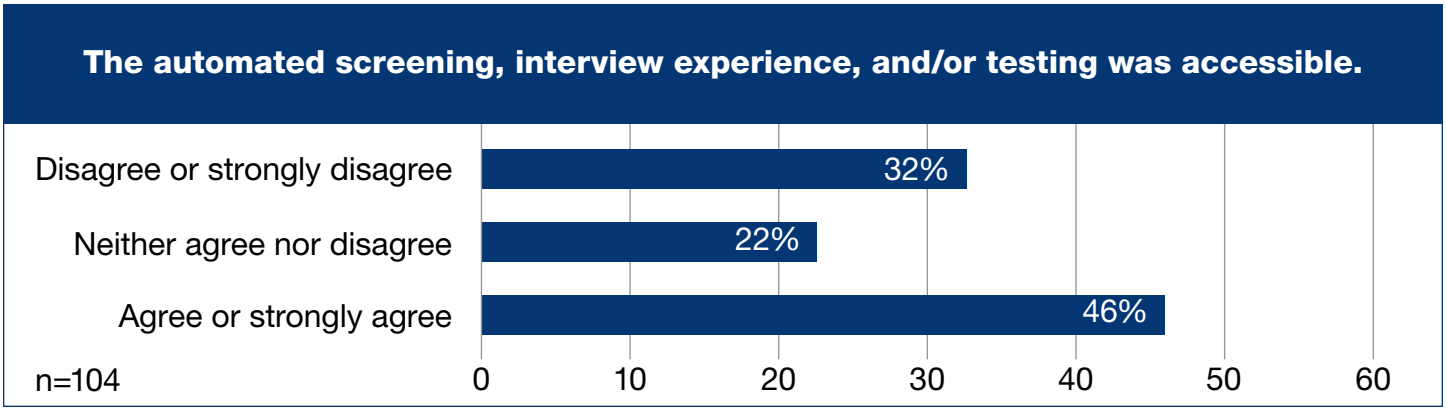
was a nonissue as long as they could perform work tasks required in the job description. A few participants also reported that employers had questions about how they performed tasks and were surprised at what they could do because employers had never seen the use of AT to perform tasks which they thought could only be done using vision.

The 53 participants who did not disclose their visual impairment were asked in an open-ended question to explain why they did not do so. These participants reported they wanted to get their foot in the door first and previous experience had taught them that if they disclosed their visual impairment early, they would be denied that opportunity. One reason provided by one participant is the fact that the population they work with is not accepting of people with disabilities, has negative attitudes and would possibly discriminate against them. Several participants elaborated on this in the interviews and explained that they worked remotely with people from countries where disability is typically viewed more negatively and legally treated differently than in the United States. Other participants also said there was nowhere on the application to disclose their visual impairment and the process did not seem conducive to offering this information because of time constraints or lack of individual attention to the job candidate.

Almost a third of the 323 participants (n=105) reported that part of the hiring process for their current job involved an automated process in which they had to complete a screening, interview, or testing using a computer. Figure 1 shows how participants viewed the accessibility of the hiring process.

The participants were asked to select their level of agreement with the statement: The automated screening, interview experience, and/or testing was accessible. Of the 104 participants who responded, 33 (31.70%) disagreed or strongly disagreed with this statement, indicating some degree of inaccessibility for 3 out of 10 candidates.

Figure 1. Accessibility of Hiring Process



"At [a university], I needed to take an automated test with a monitor that was secured at the back of the table and was very small. It was a timed test. I tried to talk with the director of employment who was not amenable to adaptations, [who said] I would then have a leg up on the other applicants. I brought suit against the office and won the case. Afterward, the office asked if I could help them make the office more accessible, which I did. But I never did get a job at [the university]. I did get a letter of apology from the Executive Vice Chancellor."— *White female in her 60s who is congenitally visually impaired*

Participants described the accessibility challenges they experienced with automated systems. These included a variety of challenges such as difficulty keeping up with timed assessments, incompatibility with screen readers, small fonts, needing to respond to pictures during the assessment, or needing to take the test on a computer without screen reader software or screen magnification software installed. However, some participants reported positive experiences working with these automated systems.

Fifty-eight of 323 participants reported that as part of the interview process for their current job, they were asked to demonstrate their technology competence, for example, by taking a typing test or showing how they used a specific software program. Of these, 36 participants requested accommodations, such as being allowed to use their own computer for the test, to use screen reader software or a larger monitor at the worksite, or to be given extended time. These requests were usually granted. Additionally, 53 participants chose to give reasons why they did not ask for accommodations. These reasons included using their own equipment (n=29), not requiring accommodations (n=9), believing that if they requested accommodations, they would not get the job (n=4), not wanting to call attention to their visual impairment (n=3), and believing the employer would not be able to provide the accommodations (n=3). Several participants indicated that they did not need to request any accommodations during a technology competence test because their employer, having had experience with workers with visual impairments, made all processes accessible. One participant completed the demonstration of competency from home and therefore already had their AT available.

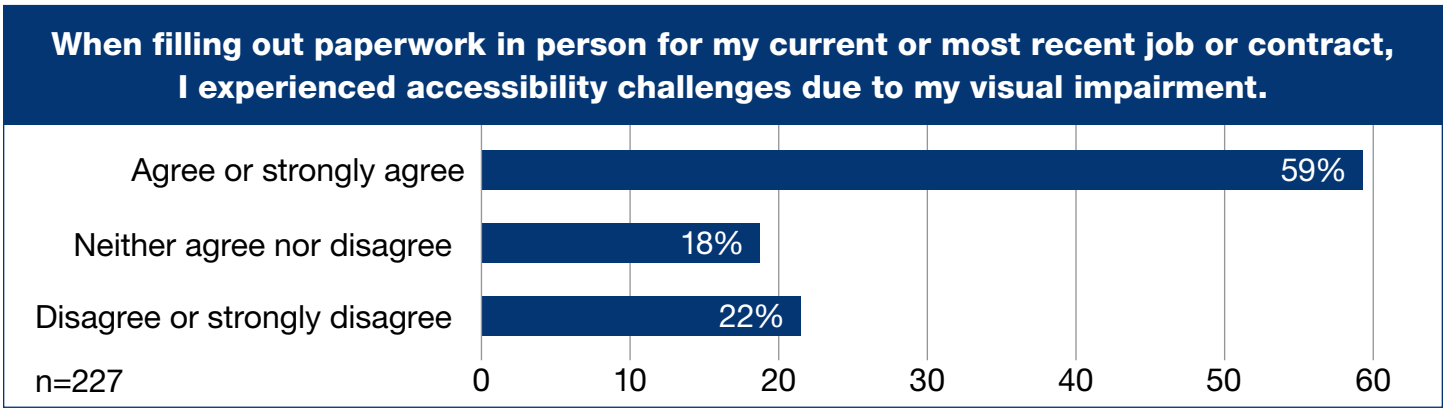
ONBOARDING

Participants reported completing typical onboarding activities such as filling out paperwork and setting up their email account. They were asked to rate the accessibility of the paperwork they needed to fill out. Figures 2 and 3 show how participants experienced accessibility challenges when filling out paperwork in person and electronically.

Participants were asked to select their level of agreement with the statement: When filling out paperwork in person for my current or most recent job or contract, I experienced accessibility challenges due to my visual impairment. Of the 227 participants who responded, 134 (59.0%) agreed or strongly agreed with this statement, indicating that they

> experienced accessibility challenges when filling out paperwork in person.

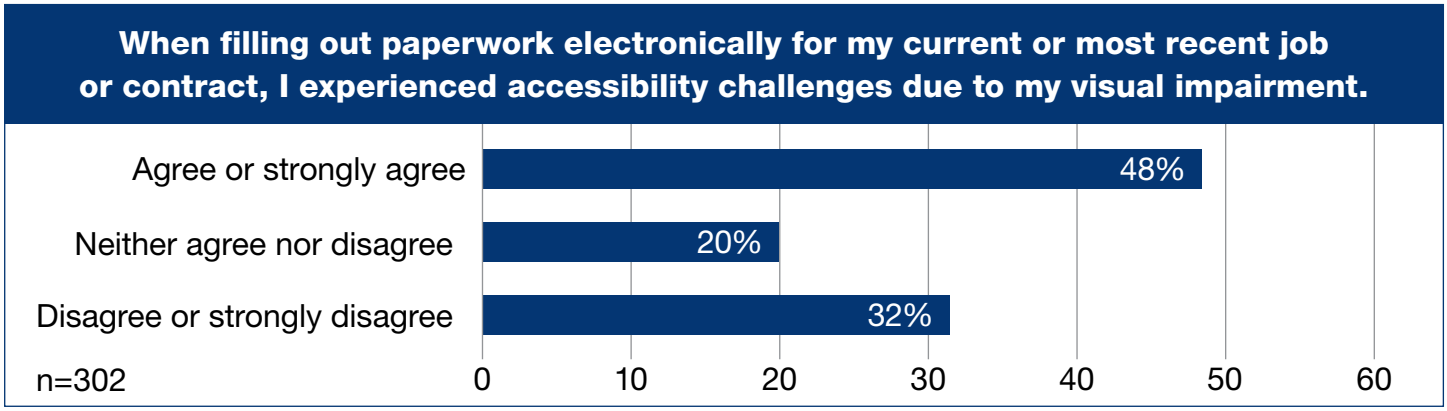
Figure 2. Experienced Challenges When Filling Out Paperwork in Person



Participants were asked to select their level of agreement with the statement: When filling out paperwork electronically for my current or most recent job or contract I experienced accessibility challenges due to my visual impairment. Of the 302 participants who responded, 144 (47.7%) agreed or strongly agreed with the statement, so almost half of those going through onboarding

> experienced accessibility challenges with online paperwork.

Figure 3. Experienced Challenges When Filling Out Paperwork Electronically



Participants were more likely to experience accessibility challenges with paperwork they needed to complete in person than when filling out paperwork electronically.

LEARNING TO USE AND KEEPING CURRENT WITH ASSISTIVE TECHNOLOGY

"Technology and availability of accommodations have changed over the years. I don't think I could have done the same job I'm doing now if it were 25 years ago. Technology has enabled me to be a productive person."—*White female in her 40s who is congenitally visually impaired*

The 323 participants were asked how they learned to use AT. Though 63 participants said they had never received formal training with AT and 16 were self-taught, the remaining participants reported one or more ways in which they initially learned to use AT including:

- By requesting to learn how to use the new technology (n=143)
- As part of K-12 education (n=137)
- When a VR staff member recommended the training (n=92)
- When an employer introduced new technology (n=69)
- When the individual experienced a significant decrease in vision (n=41)
- When the individual could not find employment and sought out training (n=39)
- As an adult when first experiencing vision loss (n=37)
- At college or a learning center (n=10)

When asked who provided their AT instruction, 300 participants selected at least one of the following in a multiple answer question:

- VR staff (n=130)
- Teacher of students with visual impairments (n=127)
- Staff at an agency or training center for those with vision loss (n=83)
- Staff at an AT company (n=65)
- Another individual who was blind or had low vision (n=62)
- Self-taught (n=34)

Other ways in which participants learned to use AT included receiving training from other professionals such as librarians and their employer's internal IT department staff.

Learning to use AT is one thing but improving one's AT skills takes commitment and time on the part of the individual. Some participants indicated using resources from specific agencies such as Hadley and Vision Forward to improve their AT skills. Participants also reported that they read AT newsletters, such as *Top Tech Tidbits for Thursday* and *AFB's AccessWorld*.

Participants were provided a list of resources to use to keep their AT knowledge current. They were asked to rate the usefulness of each resource from "Strongly disagree" to "Strongly agree." The number of participants who rated each resource as "Agree" or "Strongly agree" are:

- Podcasts of other AT users (n=122)
- Podcasts from AT companies (n=106)
- Reading manuals (n=146)
- Videos/webinars by AT users (n=125)
- Online discussions about AT (n=111)

- Videos/webinars by AT companies (n=145)
- Conventions or activities of consumer organizations (n=99)

When asked about other resources that may increase their AT skills, participants reported wanting in-person training (n=72), with 13 specifically wanting one-on-one training and 6 asking for small group training. When participants mentioned a reason for wanting in-person training, they said they wanted to have hands-on experience with products, or they wanted to more easily have their questions answered. This format would allow them to learn specific skills relevant to their current work needs.

Like most employees, people who are blind or have low vision use a variety of means to keep their technology skills sharp. However, if users learn to use new assistive technology at the employer's request, the employer is obligated to ensure employees have appropriate training to do their essential job functions.

ACCOMMODATIONS AND ACCESSIBILITY

"Coming to a new company as somebody who has accessibility needs is usually a nightmare[….] to navigate processes that are optimized for the 99th percentile and they just don't know how to handle people who have different needs."—*White male in his 40s who became visually impaired as an adult*

There were some survey and interview participants who never made an accommodation request because they reported they did not need accommodations, had accommodations already set up prior to hiring, were self-employed and thus had control over the equipment and accommodations needed, or feared denial or a negative reaction from the employer if they made a request.

As part of the hiring process, 317 participants shared one or more ways in which they went about requesting accommodations when hired. These included:

- Talking to a supervisor to help them understand individual needs (n=156)
- Working with coworkers to help them understand individual needs (n=151)
- Asking an employer to purchase needed AT software (n=138)
- Working with IT staff to help them understand individual needs (n=134)
- Talking with HR staff to help them understand individual needs (n=104)
- Asking an employer to purchase AT hardware (e.g., braille embosser, CCTV/video magnifier) (n=95)
- Working with IT staff to integrate AT software with mainstream or proprietary software (n=73)
- Asking an employer to purchase workstation accommodations (e.g., adjustable monitor arm) (n=51)

Both when making initial accommodation requests and requests once employed for some time, participants reported tremendous variability in the process for requesting accommodations, the review process once the accommodation request was made, the reactions of others, and the amount of time it took to receive a final answer to the accommodation request.

"With my work computer being a 'managed device,' it was very difficult to obtain approvals to get ZoomText installed as it required ADMIN rights and wasn't on their list of approved software. Getting IT to assist and bypass approvals was very difficult at the time."—*White male who became visually impaired as an adult*

The researchers wanted to examine the current accommodations workers use. Participants were provided an extensive list of accommodations and asked to select all that applied to them. There were 317 participants who selected at least one accommodation. The mean number of accommodations selected was 5.9 (SD=3.1). The 12 most frequently selected accommodations were:

- Screen reader software (n=216)
- Built-in screen reader (n=174)
- Sighted assistance (n=173)
- Built-in voice assistant (n=136)
- OCR software (n=117)
- Built-in visual features of the computer (n=108)
- Refreshable braille display (n=108)
- Large monitor (n=93)
- Screen magnification software (n=84)
- Braille notetaker (n=79)
- Visual interpreter service (e.g., Aira, Be My Eyes) (n=78)
- Changes in lighting (n=65)

> "It's uncomfortable [to ask for accommodations] because I don't think they're knowledgeable about the needs of blind and visually impaired people."—*Hispanic/Latinx female in her 50s who became visually impaired in childhood*

Thirty-eight of 126 participants with additional disabilities or health conditions reported requesting an accommodation for their additional disability(ies) or other health condition(s). Examples of accommodations requested by participants with additional disabilities included: flashing phones or fire alarms for those who were deaf or hard of hearing, changes in lighting to accommodate those who experienced migraines, and changes to the environment, such as lowering materials or installing a ramp, for those with physical disabilities.

The researchers wanted to understand under what conditions employees made accommodation requests. At least one of the following responses was selected by 278 participants:

- During the hiring process (n=150)
- When given new work responsibilities (n=121)
- When new technology was introduced by the employer (n=115)
- When the participant learned of new accommodation options (n=71)
- When the participant experienced a change in vision (n=48)
- When the participant experienced a change because of another disability or health condition (n=23)

Participants were asked who paid for the accommodations that they use in their job. When given a list of possible sources for paying for accommodations, 281 participants selected at least one option. Most often the employer paid for the accommodations (n=207), followed by the employee purchasing their own accommodations (n=86), VR (n=82), or other sources, which included private agencies and service organizations.

RIGHTS AND RESPONSIBILITIES

The law requires employers, in a timely manner, to provide and pay for accommodations that employees need to perform their job. Although the law allows an exception for an accommodation that would pose an "undue burden," it is a high threshold for employers. The employer may work with an employee to provide alternative but effective accommodations in such cases. The accommodations process should be iterative and tailored to the unique needs of the employer, the individual employee, and the job.

Table 4 shows who participants typically requested accommodations from and what occurred when the employee made accommodation requests after they were hired. In addition to the data in the table, there were four participants who reported they were reassigned to a new position because of their request for accommodations.

TABLE 4:

Persons From Whom Accommodations Were Requested and Their Responses

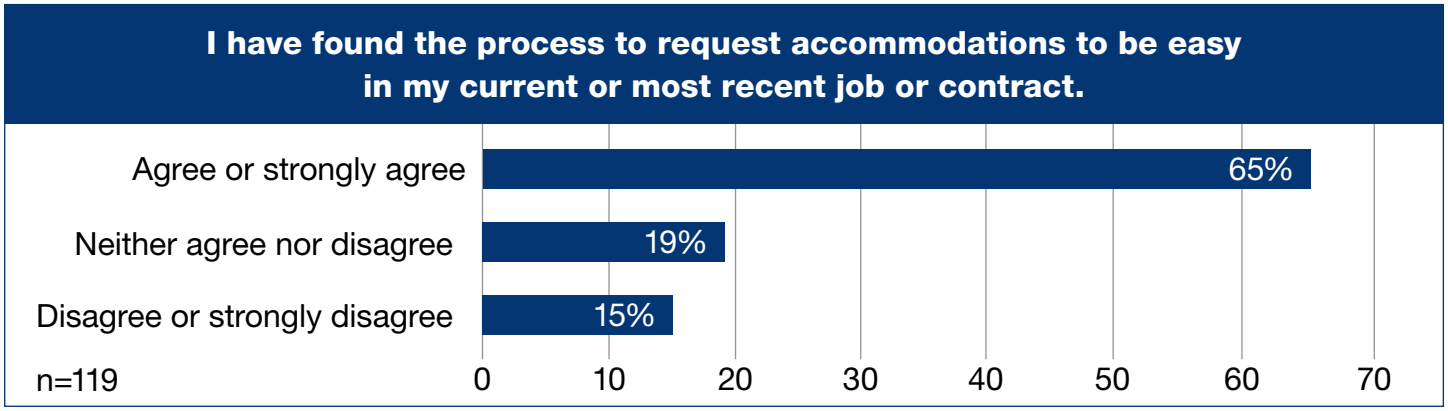
	Accommodations Provided (n=211)	Accommodation Requests Questioned (n=35)	Job Responsibilities Restructured (n=16)
Supervisor/Dept. representative	126	19	6
HR staff	24	9	6
IT staff	27	0	2
Office for employees requesting accommodations	23	6	1
Other	11	1	1

Most participants reported that accommodation requests were eventually granted. However, the time it took for those accommodations to be provided and the ease with which they were obtained varied greatly. Some participants reported no issues with procuring accommodations. Other participants had to wait weeks, months, or even years to receive accommodations, which affected their productivity. Providing accommodations that employees with disabilities require in a timely manner is part of an employer's obligation under the law, and a failure to do so may constitute discrimination. Figure 4 shows how participants responded to the question about the ease of requesting accommodations.

"My latest request was for Aira. It took two years to approve this request. Numerous battles with the legal department regarding nondisclosure agreements resulted in reducing where I can use the service. I eliminated my responsibilities as a coordinator as a result. There are still a few other areas where I am not allowed to use this service, but HR has provided no alternative other than using fellow employees."—*White female in her 60s who is congenitally visually impaired*

Participants were asked to select their level of agreement with the statement: I have found the process to request accommodations to be easy in my current or most recent job or contract. Of the 119 participants who responded, 78 (65.5%) agreed or strongly agreed with the statement. However, another 18 participants (15.20%) disagreed or strongly disagreed, suggesting that they experienced difficulty.

Figure 4. Ease of Requesting Accommodations



In an open-ended question, participants were asked what additional accommodations they believed would allow them to perform their work responsibilities more efficiently. The most mentioned accommodations were:

- multiline braille displays or other improvements to the smooth functioning of braille displays (n=24)
- artificial intelligence (n=18)
- some form of smart glasses (n=17)
- an indoor GPS (n=9)
- some form of visual interpreting service (n=7)

Overall, it seems participants wished for greater understanding by employers and colleagues about their needs and trust that the accommodations they are requesting are indeed worthy of their employer's logistical and financial support.

TECHNOLOGY PRODUCTS USED BY PARTICIPANTS IN A TYPICAL WORKWEEK

Job responsibilities for almost all employees require some use of technology. The combination of mainstream and AT can increase a worker's productivity, but if the products do not work well together, a worker's productivity can be decreased. In the same vein, those who do not use AT but have low vision and use built-in features of software may not use the software as efficiently as they could, and thus their productivity is decreased.

Participants in the survey and interviews provided a wealth of information about the work tasks they completed and the technology tools they used. The technology tools used in a typical workweek, as reported by 308 participants, are:

- Email (n=293)
- Browsing the Web (n=284)
- Word processing (n=284)
- Web conferencing (n=270)
- Accessing PDFs (n=242)
- Spreadsheets (n=208)
- File sharing (n=182)
- Instant messaging (n=142)
- Presentation tools (n=118)

Mainstream Products

Most of the participants reported using Microsoft products: of the 284 who reported using word processing, 267 used Microsoft Word; of the 115 who reported using presentation tools, 106 reported using PowerPoint; and of the 208 participants who used spreadsheets, 195 used Microsoft Excel. Smaller numbers of participants reported using Google products (n=26 for Google Docs; n=31 for Google Slides; and n=58 for Google Sheets). Google products were used more frequently than Apple products: only 26 participants reported using Pages; 10 used Keynote; and 13 used Numbers. Of 285 participants, 170 reported using only Microsoft products, 6 reported only using Google products, and 6 reported only using Apple products.

To use mainstream technology, people who are blind or have low vision often have to find workarounds as described in the section in this report on efficiency. The quote on the next page describes the multiple challenges faced by a screen reader user. The extent to which a user relies on workarounds reflects the accessibility of the tools they are using, the adequacy of their training, and the commitment of their coworkers to use shared tools and programs in an accessible manner.

"Two challenges across the board for all applications are navigating the menus…and controls not indicating status. Using JAWS means you have to look at each item in a menu and remember where it is when you want to find it again…Sometimes when I use the JAWS cursor to read the title bar or other toolbars, it says nothing. Often you can't tell what is selected, if a checkbox is checked or not, etc.…In particular, I have trouble formatting documents in [Microsoft] Word. I write in Notepad then paste into Word so I can apply the formatting I want because it is too hard to adjust the existing Word format. I also paste Word documents into Notepad to strip the formatting before pasting into Duxbury [a braille translation program] for brailing. The worst thing in Word is using track changes and comments. When receiving a marked-up document, I can't tell what's old and what's new. I can't consistently find the comments. Entering my changes just adds to the nightmare."—*Multiracial female in her 50s who became visually impaired in childhood*

Additional mainstream products that participants mentioned specifically by name were Zoom, Webex, Dropbox, Discord, Microsoft Outlook, Microsoft Office 365, Microsoft Teams, GoToMeeting, BlueJeans, Mozilla Firefox, BRAVE, Edge, Google Meet, Google Classroom, Amazon Chime, Salesforce, and Amazon WorkDocs.

Participants were asked what email client they used in a typical workweek. The 293 participants were more varied in their email use. There were 242 who used Microsoft Outlook, 143 who used Google Mail, and 75 who used Apple Mail. One hundred forty-five participants reported only using one of the three email clients, while 117 reported using two of the clients, and 26 reported using all three email clients. Participants were not asked to provide information on whether they accessed their email via a mobile device or computer.

Participants were asked which web browsers they used in a typical workweek. Similar to email, there was variability in the web browsers they used. There were 239 participants who used Chrome, 149 who used Safari, 87 who used Firefox, 83 who used Edge, and 41 who used other browsers such as Internet Explorer. Eighty-one participants reported only using one web browser, while 122 reported using two web browsers, 55 reported using three web browsers, and 17 reported using four web

browsers. Regardless of what web browser they used, participants had challenges accessing websites that were not accessible to them or compatible with their assistive technology.[3] Screen reader users experienced issues such as headings not being used, unlabeled checkboxes and buttons, and image descriptions not provided. Low vision users described issues such as poor color combinations, difficulty telling where buttons are located, text written over images, and poor organization of information.

One hundred thirty participants reported on the instant messaging tools they used. Forty-one participants used Google Chat, 36 used Slack, and 70 used other messaging programs. Due to an error with the survey, participants were not able to list the other tools they used. Several participants pointed out that Slack was accessible with an iPhone, but not with the desktop client for those using screen reader software.

File sharing was a task reported by 175 participants. In a typical workweek, 91 used Dropbox, 87 used Google Drive, 76 used Microsoft OneDrive, 16 used Box, and 20 used other file-sharing tools.

Preparation and Usability of Work Products

In addition to accessibility, there is also a question of usability. The way the creator structures a document, spreadsheet, presentation, PDF, website, or app affects the use of the item by those with visual impairments. Though not every individual will experience the same challenges, challenges described by participants included:

- Difficulty accessing material containing unlabeled graphics
- Google Docs being less efficient than Microsoft Word due to single-stroke table navigation commands and general sluggishness
- Sharing documents, especially for those using screen reader or screen magnification software, causing issues with navigation and editing
- Difficulty with navigating large spreadsheets for both screen reader users and those with low vision whether or not using screen magnification software
- Requiring training or more time to learn keyboard shortcuts compared with sighted coworkers

[3]The Web Content Accessibility Guidelines offer industry best practices for designing websites and software to be accessible to and usable by people with disabilities, including those using assistive technology. https://www.w3.org/WAI/standards-guidelines/wcag/

Web Conferencing

"We do Zoom meetings with our corporate office. They show things on the screen and refer to them. My coworkers are great at describing these things, but these materials are never provided to me in advance."—*Hispanic/Latinx female in her 30s who became visually impaired as an adult*

Web conferencing tools have been used more widely during the COVID-19 pandemic. Of 268 participants, in a typical workweek, 239 used Zoom, 116 used Microsoft Teams, 63 used Google Meet, and 52 used Webex.

When asked to describe their biggest challenges with technology during the COVID-19 pandemic, participants described a wide variety of challenges. One common theme was difficulty with videoconferencing applications. In examining the comments, the following issues were described in reference to web conferencing:

- Content shared from another user's screen is inaccessible to screen reader users when it is represented as an image.
- For those with low vision, content shared by others may be difficult to enlarge or manipulate.
- For those with low vision, it is difficult to view a videoconference while also viewing another window, for example, a document the speaker is referencing.
- Navigating and using Teams was difficult for some screen reader users, including knowing what one's last message was or where to find a file that may not be readable.
- When using a screen reader in Zoom, the program speaks participants' names as they enter and leave the room which can be distracting.
- Difficulty muting and unmuting when using a screen reader.
- In Webex, use of the chat feature was difficult or impossible for some participants.

"The biggest challenge for me has been to use our electronic health record system for videoconferencing and to do teletherapy counseling sessions. It has been difficult to know if I am on camera, and to ensure the system is working and there [are] no[t] technology issues. This is done with JAWS on a Windows PC and Google Chrome."—*White female in her 30s who is congenitally visually impaired*

Compatibility of AT and Mainstream Products

Participants in our survey and interviews provided examples of situations in which their mainstream technology and AT did not work together effectively. We found that many participants solved problems for themselves rather than seek support from IT staff when there was a compatibility issue with their mainstream technology and AT. For example, they posted questions on listservs, did online searches for information, contacted other AT users, used visual interpreting services, and read manuals.

"[The time tracking program used at my work], Workday will keep me out of the kingdom of Heaven because it gets me cussing and pounding. We just implemented it and it's doable, but it takes a long time for me to do simple, simple things. If I want to take a vacation and do more than one day, the length of time it takes [to enter my information into Workday] is mentally taxing and morale destroying. They are aware of it [at my job]. We have people who are constantly trying to convince the Workday folks that 'This is what you have to do to beef this up.' I try myself first [to use Workday with my assistive technology as] it's a pride thing, I gotta be able to do this. [Eventually] I will open TeamViewer and call the Aira agent [when] I can't take it anymore. Then it takes mere minutes instead of hours [to use Workday]." —*White male in his 70s who is congenitally visually impaired*

Participants were provided a list of possible actions they may take when mainstream technology and AT do not work together. Three hundred three participants reported taking the following actions:

- Work with IT staff with expertise in troubleshooting compatibility issues or software changes (n=174)
- Work with staff from VR or a private agency (e.g., Lighthouse for the blind, local non-profit) in troubleshooting compatibility issues or software changes (n=40)
- Consult a contractor the employer hires with expertise in troubleshooting compatibility issues or software changes (n=36)

One hundred fifty-three selected "Other" and many of the participants indicated that they were primarily responsible for their own troubleshooting and used strategies such as collaborating with friends or coworkers who are also AT users; writing their own JAWS scripts, using a visual interpreting service or sighted person for assistance; and contacting vendors on their own.

A few self-employed participants chose not to share with their clients that they had a visual impairment. When they experienced challenges with mainstream and assistive technologies, they often would use a visual interpreting service to assist them with access, sometimes at the same time they were remotely working with a client.

"With an update, you always approach it with trepidation because you don't know what might break."—*White male in his 60s who is congenitally visually impaired*

Use of One's Own Technology for Work

The participants were asked to select which personal technology tools they used to complete job tasks for which they did not have adequate accommodations, with multiple responses allowed. The 210 participants reported they used the following:

- A computer or laptop with screen reader software (n=88)
- A tablet (e.g., iPad, Android) (n=60)
- A braille notetaker or refreshable braille display (n=55)
- A computer or laptop with screen magnification software that also might have screen reader software (n=33)
- A CCTV or video magnifier (n=32)

Seventy-one participants also reported that they used other things of their own that they used including paying for visual interpreting services, using a monocular telescope, and providing their own braille embosser. Twenty-six participants described using their own smartphone (or cell phone), with 18 specifically naming the iPhone, when they did not have adequate accommodations.

For most participants who used their own equipment when there were problems with their work setup, there had been no issue with their employer so far. It was understood that to get their job done they sometimes used their own equipment. Those who were self-employed had the ability to select which equipment they purchased and used. Nonetheless, in rare instances, employers would not allow employees to use their own technology.

Although participants often reported that they used their own technology in our sample, this could be problematic for both employees and employers when it comes to security and privacy concerns, IT support, control of employer work product, and legal issues. Using their own technology may resolve individuals' immediate issues, but it does not absolve an employer of their duty to provide adequate accommodations to perform work tasks.

One participant who was interviewed shared that when he provided his own magnifier and was using it in front of a client, the CEO stopped the meeting and fired the employee for using equipment that caused the client to know he had a visual impairment.

In this example, presumably, the use of the participants' own technology as an accommodation proved problematic for the employer, but the employer also failed in other aspects of its obligation to prevent discrimination against its employee with a disability.

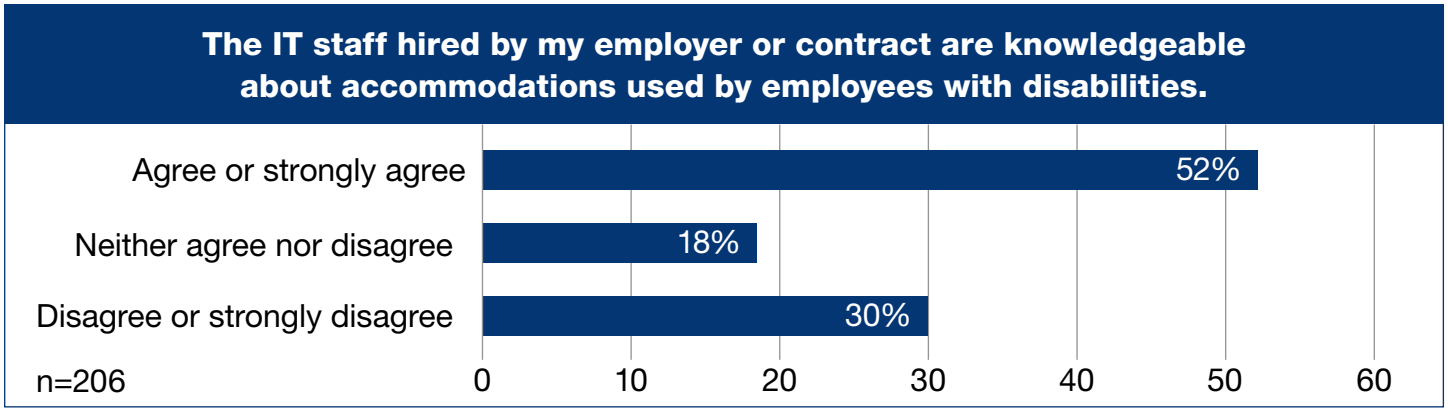
WORKING WITH IT STAFF

"At first, [working with IT staff] was a little difficult because they were not understanding [of my] needs and were going off of the basic requirements for the ZoomText program, not considering how basic requirements were not designed for the workplace and large data systems. Then I had one IT person who took initiative to do more research on the program and even called the company to learn more. That person became my primary point of contact anytime I had issues because I knew he understood, and I didn't have to explain over and over."—*White female in her 30s who became visually impaired in childhood*

Of 300 participants, 225 (75.0%) reported that their employer hired IT staff. There were 210 (84.3%) of 249 participants who reported they had interactions with the IT staff. Figure 5 shows participants' response to the question about IT staff knowledge about accommodations used by employees.

Participants were asked to select their level of agreement with the statement: The IT staff hired by my employer or contract are knowledgeable about accommodations used by employees with disabilities. Of the 206 participants who responded, 106 (51.5%) agreed or strongly agreed with this statement, indicating that just over half reported the IT staff had knowledge about the accommodation needs of those who are visually impaired.

Figure 5. IT Staff Knowledge about Accommodations



Recognizing that there are times when IT staff are not able to support employees with their accommodation needs, participants were asked to select all the things that typically occurred in this situation. There were 196 participants who reported that:

- The IT staff contacted experts or the manufacturer to get assistance in solving the issue. (n=112)
- The employee used personal technology, rather than technology provided by the employer. (n=63)
- The situation was not resolved, and the employee's productivity was decreased. (n=48)
- The situation was not resolved because the IT staff were unable to help. (n=47)
- The situation was not resolved because the employee was hesitant to request ongoing support because of how others might perceive the employee. (n=20)

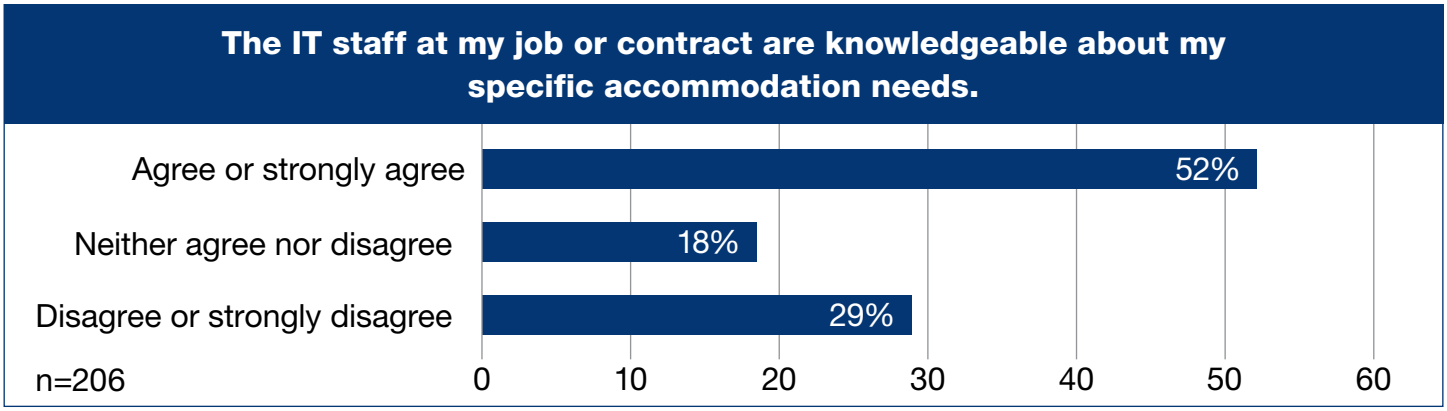
- The employee negotiated with a supervisor or coworkers to change responsibilities so the task(s) that were not accessible were done by others. (n=16)
- Participants also selected "Other" (n=45) and reported that they would problem solve to find other ways to meet their accommodation needs such as obtaining help from others who are knowledgeable about AT, contacting VR, or contacting manufacturers.

"I have tried to explain how I need access to a screen reader to complete all word processing and work with forms; however, the IT staff had no idea how to help, install the software, and sometimes didn't even show up when an appointment has been made to work with them!"—*White female in her 60s who became visually impaired in childhood*

There were few participants who reported in the interviews that IT staff had knowledge about AT. Most participants reported it was their own responsibility to figure out how AT could support them in their work tasks. There were a few participants who reported that when they explained to IT staff what they needed, the IT staff would allow them to make changes to the equipment or, in some cases, give them administrative privileges. It was rare that IT staff took time to research accommodation needs. Figure 6 shows participants' responses to a question about IT staff knowledge about employee's specific accommodation needs.

Participants were asked to select their level of agreement with the statement: The IT staff at my job or contract are knowledgeable about my specific accommodation needs. Of the 201 participants who responded, 105 (52.2%) agreed or strongly agreed with this statement, indicating that just over half of the participants believed the IT staff understood their specific accommodation needs.

Figure 6. IT Staff Knowledge about Employees' Accommodation Needs



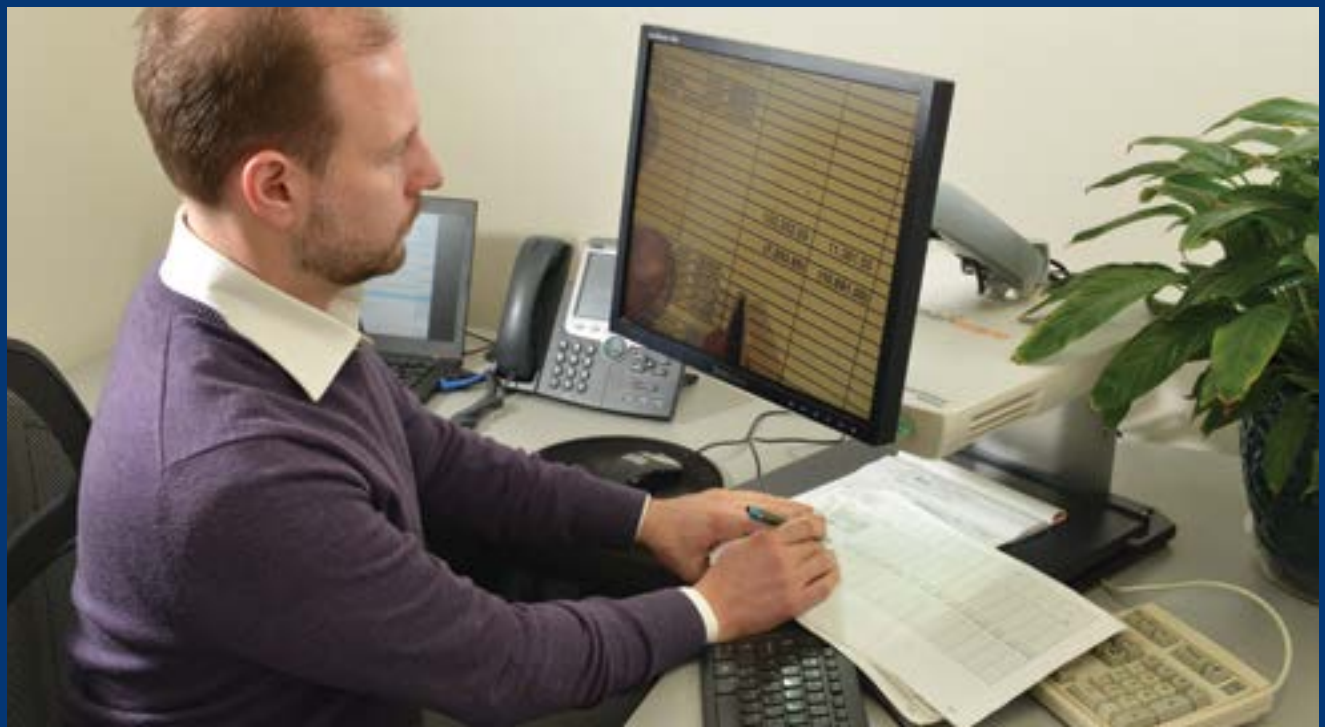
In an open-ended question, participants were asked to describe the steps they took to educate IT staff about their accommodation needs. They were very specific about their AT needs to IT staff in an effort to educate them about hardware and software accommodations. Collectively they worked to solve technology issues. Some participants reported that IT staff at their jobs were unwilling to attempt to help them with their AT needs; others reported that the IT staff at their jobs went the extra mile to make sure they had the appropriate accommodations to perform their job duties efficiently. Some participants reported that VR or private AT contractors were helpful in providing training to IT staff about AT.

"The IT guys where I work are very open to learning new things. ZoomText scares them a bit, but they always keep trying to figure out how to fix what needs to be [fixed]. They ask questions when they need to, and they are not afraid to say when they don't know. They make phone calls on my behalf all the time to get workarounds, so I have what I need."—*White female in her 50s who is congenitally visually impaired*

Some participants who were interviewed gave specific examples of how, over time, IT staff and the participant worked together, so both became more knowledgeable about mainstream technology and AT. In the end, this collaboration was mutually beneficial to all.

PRODUCTIVITY

"I know that, on any job in almost every situation, I am just never going to have the same amount of raw speed as a sighted peer, but I make up for that with much higher quality work output. I catch misspellings using JAWS and/or the Optacon [a tool that uses a small camera to transmit an image of print to pins that raise and lower and are read with a fingertip]. With the Optacon, I once caught a misspelling seven sighted people missed, and they were astounded because they were all trained in proofreading, and I was not. I also catch duplicate entries in our software program much faster than others, as I pay close attention to detail."
—White male in his 40s who is congenitally visually impaired



The bottom line for employers is that they want productive workers who can get the job done. For some participants, "simple" tasks present challenges. Participants were asked about three common tasks that may present unique challenges to employees who are blind, have low vision, or are deafblind: organizing/submitting receipts, completing expense reports, and completing CAPTCHAs, automated tests to tell humans and computers apart. Additionally, changes in one's visual abilities often necessitates needing to learn new ways of doing things and using new technology tools to maintain productivity and retain one's employment.

Receipts and Expense Reports

Many employees must organize/submit receipts and/or complete expense reports. Of 310 participants, just over half (n=163, 52.6%) reported that they had to organize, submit, and complete receipts and/or expense reports. The 163 participants were provided a list of statements that described their experience with these tasks with multiple responses permitted. Their responses included that they:

- Requested receipts be sent electronically (n=104)
- Used a person to assist with viewing and organizing receipts (n=83)
- Independently completed the process to submit an expense report (n=67)
- Used an app or OCR to view and organize receipts (n=58)
- Required assistance to complete the process to submit an expense report (n=58)
- Used a visual interpreting service when viewing and organizing receipts (n=36)
- Had someone else complete the process to submit an expense report because the process was not accessible (n=29)
- Were able to see and organize receipts (n=26)

CAPTCHAs

To maintain security, some websites use CAPTCHAs which often require interacting with visual elements. The researchers wanted to understand the CAPTCHA experiences of people who are blind or have low vision. When provided a list of CAPTCHA types, participants could select all those that were not accessible to them. The 237 participants selected CAPTCHAs that included:

- Identifying pictures in a group (n=213)
- Reading and typing a combination of letters and numbers (n=199)
- Checking a box such as "I am not a robot." (n=72)
- Completing a math problem (n=40)

The most common complaint participants had with CAPTCHAs was the poor audio quality of audible CAPTCHA alternatives, which participants often found difficult to understand and accurately decode. Some participants with low vision also reported that visual CAPTCHAs were difficult to decipher since the picture was often deliberately distorted or scrambled.

Participants were asked to select their level of agreement with the statement: Typically, I find that the alternative CAPTCHAs are accessible to me. Of the 224 participants who responded, 119 (53.2%) agreed or strongly agreed with this statement; however, 66 (29.5%) disagreed or strongly disagreed, indicating that CAPTCHAs encountered by study participants are a significant accessibility problem.

Changes in Visual Abilities

"I had recently been employed when I lost my vision, and the company thankfully kept me on. I was steadfast in my communication during [training from] VR with them; sending bi-weekly updates on my training and updating them constantly on what I was learning and my return-to-work date. I also had two hard conversations with my current boss about projects I was working on that just didn't feel like the most efficient job for me anymore. I feel being honest and leading with what I could bring to the table was good for my successful return."—*White male in his 70s*

Though 65% of the participants had acquired their visual impairment before 2 years of age, the others acquired their visual impairment at a later time — 18% before 19 years of age and the remaining 17% as adults. Regardless of when one becomes visually impaired, there are many eye conditions that result in a decrease in visual ability over time, for example, retinitis pigmentosa. In the survey, participants were asked if their ability to read print had decreased in the last 5 years with 57 (55.9%) of 102 participants reporting this was the case. They reported that the tools they had begun to use to access print included screen magnification software (n=37), screen reader software (n=36), large print (n=26), and/or braille (n=10) because of the decrease in their ability to read print. Of 99 participants, 31 (31.3%) expected their visual abilities would change in the next 5 years, 17 (17.2%) were unsure if there would be a change, and 51 (51.5%) reported they did not expect a change.

The 57 participants who reported a decrease in their ability to read print in the last 5 years were asked if they made accommodation requests of their employer as their visual ability decreased. Thirty-two (56.1%) participants asked for accommodations.

In an open-ended survey question, the 57 participants were asked to discuss the process they underwent for requesting accommodations and the outcome of the request. Participants requested a variety of accommodations including new hardware or software (braille display, CCTV, screen reader); changes to workstation setup to improve lighting; receiving printed materials by email; sighted assistance; or additional technology training. For many participants, the accommodation process was straightforward, and requests were granted. However, a few participants reported that some or all the accommodations they requested were denied or delayed, resulting in frustration or reduced productivity.

The 57 participants were also asked about what technology accommodations they considered incorporating into their workday. Most participants reported that they did incorporate new technology or increase their use of AT that they had already begun using before their recent decrease in vision. Specific technologies included CCTVs/video magnifiers, screen magnification software as well as screen reader software and braille displays. A few participants stated that they did not have the time or resources to learn new technology.

Finally, the 57 participants were asked about what technology and accommodations they believe they would need going forward if they were to lose more usable vision. A mix of responses were offered for this question, including some participants mentioning fears of having to retire, quit, or even of being fired if they lost more vision. The most frequently mentioned specific technology and accommodations that would be needed if more vision was lost included JAWS (screen reader software), ZoomText (screen magnification software), and braille.

Efficiency

"My biggest issue is multiple windows open at one time. With Windows 10, Microsoft has made it much harder to [visually] distinguish the title bars of open/active applications/windows from others. Windows 7 was much easier in this regard. I find it very frustrating with many windows open finding the 'right' close box, and I am frequently closing the wrong window application. With Microsoft Office products and some other applications, they seem to rely more and more on icons and 'ribbons.' I find icons hard to determine what they mean. I prefer words and labels. I would rather options be within menus to find them, rather than icons on a 'ribbon.'"—*White male in his 50s who is congenitally visually impaired*

In any workplace there are certain employees who are more efficient at one task than other employees. Participants were asked to describe the types of technology-related tasks they believed they did less efficiently than sighted colleagues.

Participants agreed that accessibility limitations directly impacted their efficiency and productivity at work. They reported needing more time than sighted colleagues to complete tasks, such as working on spreadsheets or skimming large documents. While some challenges may be inherent to visual impairment (e.g., difficulty simultaneously listening to a screen reader and a client on the phone; difficulty seeing a document all at once with screen enlargement software), other challenges may be mitigated with improved accessibility of mainstream technologies. Training is important as well; for example, if an individual learns to use shortcut keys, they can quickly and efficiently move between windows and close them.

Similarly, the participants were asked to share about the types of technology-related tasks they believed they did more efficiently than sighted colleagues. Participants stated that although they may need more time than their colleagues to complete a task, they could complete the task more accurately or precisely. For example, 49 participants said they read faster in general, 66 reported they were more detailed proofreaders, and 13 participants described reading documents in more depth than sighted colleagues because they needed to listen to the entire document rather than skim it. This enabled them to catch spelling and grammatical errors that others may miss, or to gain a deeper understanding of the material. Some participants also stated that the need to memorize information improved the quality of their work.

"I do think there is more effort and intentionality required for my work to get accomplished compared to a nondisabled peer. However, I make this effort a part of my work ethic that compliments the services I offer. My lifestyle does not lend [itself] to poor planning and poor communication. My clients get both a committed individual that accomplishes the various tasks assigned, but as well thinks forward on what is necessary to be a part of the team. If I do not do this, I end up being left out, so much of my value proposition to my clients is that I can work independently without oversight while striving to be a team player."—*White male in his 30s who became visually impaired in childhood*

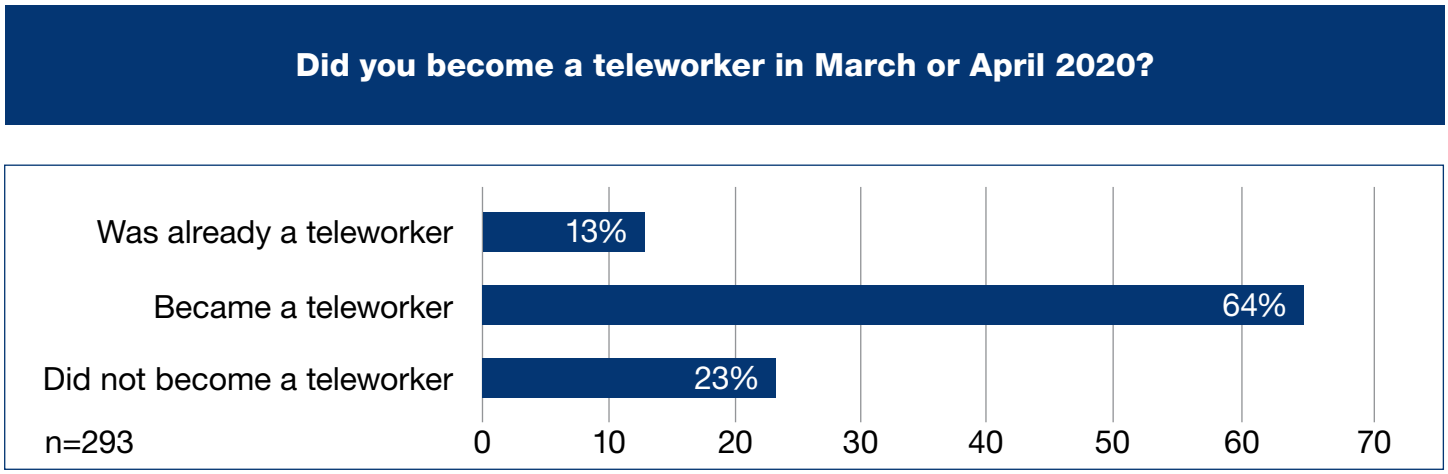
When asked about technology they would like to see developed that would increase their productivity, participants responded that they would like companies to create content and technology that is accessible from the onset. They would like to see the enforcement of laws related to accessibility and improvements to products, such as better OCR software, more enhanced voice controls, and affordable multiline braille displays.

Telework and the COVID-19 Pandemic

"I think [the] COVID-19 [pandemic] has demonstrated that we are rethinking the conventional workplace model. Working from home is an attractive choice for all, not just the disabled community. Technology is overcoming the sense of disconnectedness typically associated with working from home." —*White male in his 40s who became visually impaired in childhood*

Teleworking was part of the U.S. employment structure prior to the COVID-19 pandemic. There were 125 (41.4%) of 327 participants who reported they were part-time or full-time teleworkers prior to March 2020 when the COVID-19 pandemic began. There were 293 of 327 (89.6%) participants who reported that they teleworked in either March or April 2020. Figure 7 shows the effect of the pandemic on telework.

Figure 7. Effect of COVID-19 Pandemic on Telework



Teleworkers were asked to select the statement that best described their experience since the start of the COVID-19 pandemic. Of the 224 participants who responded, 165 (73.7%) had worked consistently as a teleworker, 29 (12.9%) worked some of the time as a teleworker and some of the time at the worksite, 13 (5.8%) worked as a teleworker for a few weeks to 3 months and then returned to the worksite, and 17 (7.6%) had other experiences, including returning to the worksite after more than 3 months had passed.

Two thirds — 201 of 302 participants who teleworked — reported changes in how they worked because of the COVID-19 pandemic, such as having meetings using Zoom. When asked to select the changes they experienced, 200 participants selected at least one change, including:

- Attending meetings, conferences, or workshops online (n=152)
- Having to learn to use at least one web conferencing tool (e.g., Zoom, Microsoft Teams) (n=148)
- Starting to work from home (n=138)
- Using web conferencing tools in different ways than before the pandemic (n=120)
- Attending training online that before the pandemic they would have attended in person (n=116)
- Meeting with clients using online meeting tools (n=112)
- Presenting to others remotely (n=98)
- Working jointly on projects in which people are sharing their screens (n=92)
- Learning how to present remotely (n=89)
- Using file-sharing services (e.g., Google Drive) (n=78)

- Using visual interpreting services in a different way than before the pandemic (n=37)
- Learning to use file sharing (n=33)
- Using instant messaging tools in a different way than before the pandemic (n=29)
- Having to learn to use instant messaging tools (e.g., Slack) (n=18)
- Learning to use visual interpreting services (e.g., Aira) (n=14)
- Experiencing technology challenges at the worksite due to pandemic protocols (n=12)

Workers may not have an option when it comes to where they must work. However, the researchers wanted to know if participants, given a choice, would want to continue teleworking post-pandemic based on their experience with technology during the pandemic. Of 190 teleworker respondents, 74 (39.0%) strongly preferred or preferred to continue to work from home and 86 (43.3%) preferred or strongly preferred to return to the worksite.

Accommodation Requests During the COVID-19 Pandemic

Due to the COVID-19 pandemic, many workers made a quick shift from working at a worksite to working at home. Fifty-three (27.5%) of 193 participants requested accommodations from their employer as a result of becoming teleworkers. In an open-ended question, participants were asked to describe their experience requesting accommodations. Accommodations requested included having access to assistive hardware or software at home (e.g., screen reader software, braille display, large monitor) and assistance setting up videoconferencing applications. Six participants also requested permission to stay home after other employees returned to the worksite due to their health conditions increasing their risk for COVID-19 or a perception that their visual impairment put them at greater risk than others. Most participants reported that their accommodations were granted with little difficulty; however, a few reported facing delays or denials when requesting accommodations.

Technology Challenges During the COVID-19 Pandemic

In an open-ended question, participants were asked to describe the three greatest technology challenges they experienced during the pandemic. Many of the challenges cited involved the inaccessibility of videoconferencing. While these challenges were more widespread during the pandemic, they were already present for workers with visual impairments. With greater numbers of workers who are blind, have low vision, or are deafblind using videoconferencing, challenges were discussed and documented more often. Additionally, some participants reported difficulty getting IT support or sighted assistance with accessing materials when colleagues or IT staff were not in the same physical space. They described the frustration of needing to wait for remote support instead of quickly receiving in-person support.

"Zoom has been a big challenge, especially the screen-sharing. I struggle when teaching students via Zoom because it is hard for me to see the screen that they are sharing. It is also hard to keep up with the chat functions. This leaves me always feeling behind my colleagues."—*White female in her 20s who became visually impaired in childhood*

Benefits of Teleworking for Employees Who Are Visually Impaired

"I'm able to work a lot better at home just because it's more predictable but also because I'm not impacted by people seeing the magnifier and saying, 'Wow your font's so big!' or "Wow why are you doing it that way?'" —*Black female in her 40s*

Participants who were teleworkers also spoke of the positives they experienced. These included not having to travel to and from a worksite, having equipment set up in a way to maximize their productivity, not having auditory distractions, not feeling that one's screen reader was disrupting others, and not experiencing actual or perceived discrimination because of their visual impairment. Some participants felt that their visual impairment was less noticeable or not known to others at all when meeting remotely.

EMPLOYERS ADOPTING NEW TECHNOLOGY

"The biggest accommodation I would request is just a little bit of patience here. I need a little bit of patience to learn the system and work out all the kinks and quirks."—*White male in his 30s who became visually impaired in childhood*

Accessibility and Usability of Newly Adopted Technology

Participants were asked if their employer adopted and introduced new hardware or software to employees that was not accessible or usable for them. Half of the 297 participants (n=149, 50.2%) reported that they had experienced this situation. When asked about the policies and procedures their employer had in place when new software, tools, or apps were being adopted for employee use, 292 participants reported the following:

- There are policies and processes that take into consideration the needs of employees who use accommodations. (n=130, 44.5%)
- They were not sure if there are policies and processes that take into consideration the needs of employees who use accommodations. (n=75, 25.7%)
- There are no policies and processes that take into consideration the needs of employees who use accommodations. (n=45, 15.4%)
- There are processes that take into consideration the needs of employees who need accommodations, but they don't result in protecting our interests (n=42, 14.4%)

Participants were asked to select their level of agreement with the statement: When adopting new software, tools, or apps, my current employer or contractor takes into consideration the accessibility and usability needs of those with visual impairments. Of the 299 participants who responded, 150 (50.2%) agreed or strongly agreed with this statement indicating that about half of the participants believed their employer took their needs for accessibility and usability into consideration while half did not.

Training on Newly Adopted Technology

"[I had to take a] virtual certification exam [on a new tool]…The exam I chose to take from home thinking this would be less travel and I can use my own equipment. The exam was conducted by a proctor of a third party that observes you via webcam. [So that I could be monitored via webcam] I had to take out all my large monitors and take the test via my laptop…I have to really have my face close to the laptop screen and when I have to move my head to look at the remaining time at the right edge of the screen (in small font) the proctor would warn me about keeping my head still. Then after doing this twice, he said next time, he will have to forfeit and cancel the test because it is against policy to move your head…Fortunately I passed the test but the whole point of taking [the] test at home was to accommodate for my vision [impairment] — which backfired."—*Native American/Pacific Islander female in her 40s who is congenitally visually impaired*

When a new technology is adopted in the workplace, assistive technology users may need training that directly facilitates the use of the new tool with their assistive technology. Participants were asked what they experienced as assistive technology users when their employer introduced new technology tools. Eighty (38%) of 208 participants reported they had no issues when new technology was introduced. The other 154 participants reported that:

- The employer provides timely and effective training; however, participants experienced periodic challenges as software is updated or other changes are made. (n=52, 25.0%)
- The employers' training is not timely; therefore, employee productivity is impacted because the new tools or technology are not compatible with employees' AT. (n=25, 12.0%)
- The employer provides timely training, but it is not effective for the type of accommodations employees need. This may impact how others perceive employees who use AT and/or employee productivity. (n=18, 8.7%)
- The employers' training is not timely; therefore, others may perceive employees who use AT are not capable because the new tools or technology are not compatible with their AT. (n=16, 7.7%)

"Mostly, it was the wording that the presenter or instructor would use. For example, they would say, 'Click this blue icon,' or 'Move your mouse over here.' I would've benefited from something saying, 'Click the blue icon that says 'Submit'.' Also, if the person could identify whether it was a link, a button, a radio button, etc. and use a combination of blind and sighted verbiage. Plus, the pace was VERY FAST, and I became frustrated because of not being able to quickly navigate with JAWS and to know what I'm looking for. I finally decided that I needed more one-on-one training but would always forget to ask for it because something else would come up that demanded my immediate attention."—*White female in her 30s who is congenitally visually impaired*

Participants were asked about their experience when their employer adopted new technology that required that employees be trained in its use. Of the 285 participants who answered this question, forty-six were not faced with a situation in which their employer adopted new technology while they were employed, while forty-two reported that their employer did not require them to complete training that wasn't accessible. The remaining 197 of 285 participants selected one or more ways in which they were able to get training on the new technology. They reported they were:

- Required to complete the same training as other employees without being provided accommodations (n=156)
- Provided training that their employer worked to make accessible to them (n=118)
- Able to use online search (e.g., Google) to learn the information (n=114)
- Able to use sighted assistance to complete the training (n=108)
- Provided accessible training (n=107)
- Able to learn the information from other employees who may or may not use assistive technology (n=98)
- Able to gather information from talking to others who are visually impaired (n=98)
- Able to learn the information through watching videos (n=69)
- Able to use a visual interpreting service to complete the training (n=35)

EMPLOYER-REQUIRED TRAINING

Most employers require employees to complete some type of training, whether it is compliance training such as sexual harassment, training on new proprietary products, or training focused on policies or procedures employees must follow. In a typical year, an employee may be required to complete online training that is self-paced and consists of the presentation of content delivered through slides, text, photos, and/or videos followed by test questions. Group in-person training may take the form of providing attendees with documents, a speaker giving a presentation, or hands-on activities attendees must complete to demonstrate competence in the subject matter.

Online Training

"The entire online module is not screen reader accessible. It is impossible to access the controls on the page to advance forward or back. The multimedia player is not accessible, and the videos are not described. The only way to complete this training was to have a human reader voice the information, which, in most cases, meant a colleague. So much for anonymity."—*White male in his 50s who is congenitally visually impaired*

Just over three fourths of the 323 participants (n=253, 78.3%) reported they were required to complete online training.

Participants were asked to select their level of agreement with the statement: The majority of online training I am required to complete is accessible to me as a person with a visual impairment. Of the 252 participants who responded, 152 (60.3%) agreed or strongly agreed with this statement, yet 25% disagreed or strongly disagreed that online training was accessible. (14% neither agreed nor disagreed).

In an open-ended question, participants were asked to explain what aspects of the online training were not accessible to them. Of the 95 responses, 63 participants reported frustrations with being forced to complete mandatory trainings that were built either solely for people with typical vision, or with accessibility features added as an afterthought. Even when added, these features quite frequently did not work. Trainings were not accessible with JAWS or other screen reader software (n=51), or participants were unable to use their typical accommodations such as changing color, contrast, or magnification (n=7). Other participants described interactive quizzes and other elements that only worked with a mouse, not with keyboard commands, or pictures and videos containing no text or audio descriptions. Some participants stated that they could not complete the online training without assistance from sighted colleagues.

"We have online training to prevent security breaches, and a sighted person has to sit with me to describe what is on the screen, then has to click the mouse on my choices, as JAWS doesn't work with the training site."—*White female who became visually impaired in childhood*

In-Person Training

> "[For] the presentation (PowerPoint), physical handouts and the books for the class, I try to request these materials before the class, but I receive a lot of problems from the instructor. I have even been accused of wanting the materials so that I could post them to the Internet thus taking money from the pockets of the instructor."—*Individual in their 50s*

There were 215 (67.4%) of 319 participants who reported they were required to complete in-person training.

Participants were asked to select their level of agreement with the statement: Most of the training with other employees I am required to attend is accessible to me as a person with a visual impairment. Of the 217 participants who responded, 132 (60.8%) agreed or strongly agreed with this statement, similar to the data reported for online training.

In an open-ended question, participants were asked to explain what aspects of the online training were not accessible to them. PowerPoint presentations were the most cited inaccessible aspect of training due to the visual display of the slides, lack of description of visual description of the slides, and not being given materials ahead of time to preview and/or follow along with on one's own device. Participants also described a lack of alternative text on images or videos in addition to other aspects of the online training materials, such as labeled buttons. While PowerPoint presentations can be accessible, they must be prepared to include attributes such as alternative text for images and use of high-contrast colors.

Impact of Inaccessible Training

Participants were asked to describe how training that was not fully accessible impacted their productivity or job performance. Impacts included participants feeling that their productivity was negatively affected and that completing tasks or figuring out training was incredibly time consuming. Participants reported frustration, feeling intimidated, and experiencing higher levels of stress as a result of being required to complete training that was not accessible to them.

Lack of accessible training also can affect employees' relationships with others in the workplace. This particular survey question yielded a mix of responses with some participants reporting positive interactions, some reporting no impact, and some reporting negative impacts. The negative impacts seemed to be reported slightly more often and included being unable to engage or connect with others, feeling like a burden, experiencing dismissive or unhelpful attitudes, and even compromised privacy.

As with other components of employment, employers are obligated to provide accommodations and otherwise ensure accessibility in all types of workplace trainings. In an open-ended question, participants were asked how employers can improve training opportunities to make them more accessible to those who require accommodations. Overall, it seems the participants would like employers to be thoughtful before trainings occur. They urge employers to consider how to make materials more accessible, to consider the needs of employees who use accommodations when purchasing and using training platforms, and to educate themselves and other colleagues on accessibility matters.

SOCIAL-EMOTIONAL WELL-BEING OF EMPLOYEES WITH VISUAL IMPAIRMENTS

"I'm always a second thought, never in the forefront. You either fit in or you don't."

—White female in her 40s who became visually impaired in childhood

Each individual's social-emotional experiences will be different based on their individual personality, feelings about their disability, their internal and external coping strategies, and the actual and perceived supports they experience in the workplace. Participants were asked if at their current job they ever considered not bringing up an accommodation request because they had a fear of backlash from a supervisor, coworker, HR staff, or others, including individuals directly served by the employer such as students or clients. One in five participants — 61 of 287 (21.3%) — reported they did have this concern. Some participants explained the reasons for their concerns, including fearing for their job security, being blamed for ineffectiveness or lack of productivity when accommodations were not provided, and feeling they are constantly facing issues but never mentioning them.

> "I was being judged on the same metrics as fully sighted coworkers…which put me at the bottom of the employee ranking, then I was harassed by my supervisor to bring up my numbers…I explained that because of my vision I could not work as fast, I can only see from 1/10 of one eye. My supervisor and HR asked for more medical documents, which I gave, then [they] gave me options which forced me out of my job."—*Female who is congenitally visually impaired*

Survey and interview participants spoke about often needing accommodations, while at the same time not wanting to be "needy" or appearing that they "can't do the work." Participants shared their experiences with how they worked to achieve a balance. Often, they tried to find solutions to problems on their own as much as possible before asking for help. However, they also emphasized the importance of asking for help when needed in order to remain productive. Some participants felt hesitant to ask for help for fear of being seen as a burden or as less competent than sighted coworkers. They described a desire to "prove themselves" and some even volunteered to perform additional work tasks to compensate for the difficulty of performing other tasks because of access challenges. Finally, some participants received negative reactions from colleagues or supervisors when requesting help.

"When asking for accommodations, my supervisor says that I cannot have special treatment over other coworkers even though they are accommodations. She considers what others would think if I received accommodations. She says that I am difficult when I am specific on what I need. It is embarrassing and awkward asking for reasonable accommodations because I look needy."—*Asian/Asian American female in her 20s who is congenitally visually impaired*

Participants were asked to select their level of agreement with the statement: At my current job or contract, I am concerned that when I ask for assistance or information (e.g., the location of the light switch in a conference room I rarely use, the location of a button in Zoom), others think I am not capable because of my visual impairment. Of the 293 participants who responded, 167 (57.0%) disagreed or strongly disagreed with this statement, indicating that almost three of five participants did not have concerns that others thought they were not capable. Still, 24% agreed or strongly agreed that they had concerns. (19% neither agreed nor disagreed.)

Participants were asked to select their level of agreement with the statement: At my current job or contract, I am comfortable asking coworkers for help with a visual task (e.g., description of an image on a website, reading a document, location of controls on the copy machine). Of the 285 participants who responded, 220 (77.2%) agreed or strongly agreed with this statement, indicating that more than three out of four participants were comfortable asking for assistance.

SELF-EMPLOYMENT

"In my industry I find that having a vision impairment will make it more difficult to get jobs or to be considered as good as my sighted competition. Many of my clients who find out I don't see after I have worked for them awhile are amazed at what a good job I do for them despite being legally blind. They often confide in me that they would have been less likely to hire me if they knew. There is a lot of bias against the blind in caregiving industries. I watch and care for people's pets in my in-home kennel. Why hire me when you can get a sighted sitter for the same price?"—*White female in her 40s who became visually impaired in childhood*

There are advantages and disadvantages to self-employment. The researchers wanted to understand reasons why some workers who are visually impaired opt for self-employment. Sixty-seven participants reported they were self-employed. When provided a list of reasons they chose to be self-employed, 61 participants selected one or more reasons, including:

- Reasons not pertaining to the participant's visual impairment (e.g., flexibility, family responsibilities) (n=35)
- Reasons pertaining to the participant's visual impairment (n=22)
- Limited transportation options in the community (n=15)
- Inability to obtain employment with a company or organization (n=13)
- Attending school or training so self-employment is a good option (n=4)

Participants who chose a reason that pertained to their visual impairment gave other reasons including being self-employed in disability-related fields such as consulting on disability policy or teaching AT. Others said that they chose to be self-employed after struggling to find or keep employment in the traditional job market. Participants generally preferred self-employment because they were free to control the work environment, their schedule, and the technology they used.

In an open-ended question, participants who were self-employed were asked how they made decisions about what accommodations they needed. They explained that they often made a cost-benefit calculation based on the price of the accommodation compared with the anticipated benefit to their business activities and profit. The participants also described needing to maintain current knowledge of assistive technology by reading blogs or talking to other AT users.

Self-employed participants explained that to get help with their IT needs or troubleshoot technology problems, they often used sighted assistance (such as from a spouse), a visual interpreting service, or they researched the problem themselves by using online resources or talking with other AT users. Some participants also used help desk resources offered by technology manufacturers such as Microsoft's Accessibility Help Desk.

Self-employed participants were asked about the ways in which they learn to use new mainstream technology or features in mainstream technology they have not used in the past. Fifty-nine participants selected at least one option. These included:

- Searching online for information (n=46)
- Talking with others who are visually impaired (n=41)
- Obtaining sighted assistance (n=36)
- Watching videos (n=30)
- Talking with others in the same field who may or may not use assistive technology (n=28)
- Using a visual interpreting service (n=20)
- Contacting VR staff or staff at an agency where the participant received training in the past (n=9)

Ten (17.8%) of 58 participants reported they had been passed up for a contract or had their contract terminated because they were unable to use inaccessible software. When asked to elaborate, self-employed participants detailed a variety of challenges accessing specific technology-based tasks that clients required them to access, such as screen-sharing, inaccessible PDF documents, or proprietary databases.

RECOMMENDATIONS

"My company is massive, and they have onboarded blind people before. Most important though was the culture of enthusiastic continued learning. Everyone just wanted to know more about what they could do, if something didn't work, and how we could fix things together. This allows me to have an open channel of communication with the IT folks, where I document software issues with narrated screen recordings for them, and with HR, for the rare situations when my blindness affects my employment in human-related ways."—*White female in her 20s who is congenitally visually impaired*

The recommendations in this report are limited to the areas investigated in this study and researchers' understanding of survey responses and interviews. Therefore, the recommendations may not present a comprehensive list of actions required to achieve full inclusion in the use of technology in the workplace. Most of the recommendations reflect well-established and widely accepted practices that, nonetheless, have not been fully and broadly implemented, as demonstrated in this report. The recommendations are organized by job function, but readers may find benefit from the recommendations offered to all groups.

"If employers hired more people with disabilities, they would automatically have the tools we need. We should not be the 'odd' one. We should be the norm!"—*White male in his 50s who is congenitally visually impaired*

Human Resources

HR staff are often the first point of contact for a potential employee and play a role in employee onboarding, training, and support as well as in which processes and tools an organization uses. Having knowledge of the rights of people with disabilities and reasonable accommodations is imperative. It is important that HR staff support all potential and current employees through each step of the employment process by having policies in place that address the needs of all individuals who seek or obtain employment.

- Make all HR materials – including websites, applications, automated screening systems, forms, manuals, electronic documents, training materials, and paper materials – fully accessible to and usable by those who use assistive technology, such as screen reader software. Implement accessible forms with e-signatures to reduce the reliance on paper forms. Refer to the Web Content Accessibility Guidelines for recommendations on how to prepare digital materials in accessible format.

"HR people are poorly prepared to understand disability in general. So, we need to train our HR people differently. It would be so simple. They have to take labor law, so throw in a unit on disability."—*White male*

"[Employers need to] verify that [training products] work on multiple combinations of screen readers and computing platforms/browsers. This should be a basic requirement for the training platform companies. Employers should refuse to contract these services from these training platform manufacturers if they aren't fully accessible."—*Asian/Asian American male who is congenitally visually impaired*

- Ensure employee training programs are fully accessible to employees with disabilities and assistive technology users. Procure accessible products and platforms, provide appropriate accommodations before and during trainings, and require presenters to use accessible meeting and presentation practices.
- Implement an accommodations policy that is visible on the employer's website and referenced in relevant documents used throughout the application process, hiring, onboarding, and employment. The accommodations policy should standardize requesting and fulfilling accommodations, only require pertinent disability documentation, ensure employees benefit from an interactive process, result in timely action, offer appeal procedures, and allow for changes when the disability or technology changes. The procedures should be communicated to and employed by managers, HR professionals, and all other staff who play a role in providing accommodations and an accessible workforce.
- Create a centralized accommodations process, including a centralized budget that will cover any costs of needed accommodations (e.g., screen reader software, adjustable monitor arm, accessible VoIP phone). Centralizing the accommodation process reduces department-level disincentives to provide accommodations.
- Grant accommodations during the application and hiring process. For example, when asked to demonstrate their skills (e.g., a typing test), some potential employees may request accommodations, such as to use their own equipment or to make modifications to the employer's equipment or workspace (e.g., moving a monitor closer to them). When accommodations are granted, potential employees can accurately showcase their skills.

- Implement an accessibility policy that requires all documents, tools, procedures, and procurement to be accessible, usable, and compatible with assistive technology. Seek feedback from employees with disabilities on the accessibility of new procedures and tools and ensure that procuring and implementing new technologies accounts for the accessibility, technical support, and training needs of employees with disabilities.

- Establish a policy that maximizes how visual interpreting services, such as Be My Eyes or Aira, can be used in the workplace without compromising sensitive information. For example, an employee may be allowed to use a visual interpreting service to access a copy machine that has a touchscreen input. Yet, the employee may not be allowed to use a visual interpreting service to review patient health records due to patient privacy concerns. In the latter case, the accessibility of patient records should be assessed and improved to work with other assistive technology.

- Create a disability-focused Employee Resource Group, an Assistive Technology Users Group, or other discussion groups as appropriate. These communications channels allow HR staff and other employees to hear firsthand from employees who have accommodation needs. All employees should know about the group, its purpose, and how to share ideas with the group. The group should be supported by senior management and empowered to engage a wide audience, share information, and inform decision making.

- Create employee engagement opportunities and actively support diversity, equity, and inclusion efforts for people with disabilities.

- Create opportunities for employees to meet regularly with HR staff and supervisors to build mutual respect and understanding, ultimately leading to increased employee productivity.

- Establish relationships with vocational rehabilitation agencies (VR). Depending on the state, VR may assist employers with recruitment of people with disabilities, accommodation requests by applicants, finding assistive technology contractors/consultants, disability awareness training, assessment of workplace and job barriers, and resources for training opportunities. Although some services require fees, the training and support translates to a more inclusive, productive workplace.

- Respect employee decisions to disclose their disability. Individuals who have a disability must only disclose their disability when seeking accommodations. Employers and other employees alike should respect the decision whether to disclose. However, employers can encourage voluntary disclosure after an offer has been made and subsequent requests for needed accommodations by creating a more accessible, diverse, and inclusive workplace; demonstrating a commitment to meeting employee needs; and by clarifying and publicizing how to make a request.

IT Staff

IT staff vary in their understanding of the impact of a disability on one's technology use, in addition to their knowledge of assistive technology. When IT staff are willing to listen to employees, to take the extra time to educate themselves, and to work with manufacturers or consultants to solve IT-related issues for AT users, both the employee who needs accommodations and the IT staff will have a more positive experience.

- Actively collaborate with and understand the needs of employees with disabilities, their assistive technology, and their accommodations requests.
- Attend trainings and develop internal expertise on assistive technology to support employees with accommodation needs. Maintain up-to-date industry knowledge about technology that is accessible to and usable by people with disabilities and compatible with assistive technology.
- Consider hiring external consultants to support procurement, to troubleshoot, and to offer training on assistive technology accommodations to ensure employees are fully supported and are maximizing their productivity.

"[E]very computer science, IT studies student etc., should have their screen and mouse taken away for a week and have to use screen reading or other adaptive software so that accessibility is taken seriously. Resources need to be made available to both end users and software developers so that accessibility is hopefully built in from the beginning, maintained as an absolute priority instead of an afterthought or convenience and end users have immediate support to troubleshoot problems when they arise instead of hearing that nobody else has that problem except you or maybe we'll fix that in the next update."—*White male in his 30s who is congenitally visually impaired*

- Participate in and support an Employee Resource Group or Assistive Technology User Group that identifies accessibility barriers and areas for improving IT policies, procedures, and tools.

- Procure and implement only technology tools and platforms that are accessible to and usable by employees with disabilities. Develop a policy governing accessibility in procurement. Ask vendors about the products' accessibility and the process for resolving issues. Incorporate a commitment to remediate accessibility issues into contracts.

- Solicit feedback from assistive technology users prior to purchasing new tools. If the users do not find that the technology is accessible, IT professionals can work with the employee and vendor to address concerns or select alternative products.

- Incorporate the needs of employees with disabilities, including those who are blind or have low vision, from the beginning when implementing any new technology. IT staff may need to include employees with disabilities in procurement decisions, develop accessible training with assistive technology, troubleshoot issues, provide accessible documentation, and ensure help desk staff are knowledgeable about the interface between assistive technology and the new product.

- Offer dedicated assistive technology training for employees when implementing new technology solutions. Provide opportunities for one-on-one or small group support.

- Document accessibility issues and contact vendors to report issues and initiate help desk requests.

- Allow exceptions for employees using assistive technology to run updates on a timeline that accounts for the frequent incompatibility between assistive technology and mainstream technology updates. Many assistive technology users prefer to delay updates, rather than to receive them automatically. Consider requests made by employees who want to have the ability to control when and if updates are completed and who may need administrative rights to do so.

- Ensure the employer has a standardized policy for implementing technology accommodations. A centralized accommodations process may clarify how employees request an accommodation and how to pay for new purchases. Work collaboratively with employees to meet accommodation requests effectively and efficiently.

- Work with the employee, HR staff, and others to find a solution to provide the employee access to necessary visual information, such as by providing a visual interpreting service like Aira or Be My Eyes.

Supervisors and Managers

Supervisors often play an important role in receiving and responding to requests for accommodations. While employers should create an organizational policy for handling accommodations, employees are most likely to succeed when their supervisors are open to and supportive of employees' requests for accommodations and concerns about workplace accessibility.

- Become familiar with all employer policies regarding procurement, accessibility, and accommodations for people with disabilities as well as diversity, equity, and inclusion practices and policies. If your employer does not have policies, advocate for the creation of policies, so that there are clear guidelines and practices for all to follow.
- Meet with employees who are blind, have low vision, or deafblind to learn about the accommodations, if any, they need in order to complete their assigned work tasks. Advocate with them, as necessary, to get these accommodations in place in a timely manner.
- Recognize that an individual's need for accommodations may change as a result of changes to their visual impairment, other disabilities, or the work tasks they are assigned. Work together to examine their needs and ensure they can complete work tasks. For example, over time an employee may need different accommodations, training to use specific assistive technology, or to be released from some job tasks and assigned different ones in place.

> "[Requesting accommodations is a] very uncomfortable conversation for me to have with my boss. The money and the fact that I need this help…I know I have to deal with it, but it seems that employers are not even aware that this type of technology exists… Seems that it's the supervisor's 'decision' [to approve the purchase of AT] and it just seems that there should be some training [provided] to employers/supervisors of this possible need."
> *—Hispanic/Latinx female in her 50s who became visually impaired in childhood*

- Explore team job-sharing arrangements to maximize the productivity of all employees. For example, an employee who is blind may take on extra editing responsibilities in exchange for having other coworkers handle the graphical aspects of a report.
- Identify challenges early and communicate frequently with employees to ensure that the requested accommodations are effective and comprehensive enough to complete essential job functions and meet production standards. If you observe that an employee is not performing to the standards you expect, ask them to show you how they are doing certain aspects of their job and address accessibility barriers, such as a required form that may be inaccessible. Work together to find solutions, coordinating with other teams and departments, as necessary.
- Model inclusive practices, such as requiring meetings and presentations to be fully accessible and incorporating document accessibility into the team's workflow.
- Seek out opportunities for professional development on creating accessible, inclusive workplaces. Encourage other employees to develop similar knowledge and practices, regardless of whether an employee with a disability is currently on the team.

> "My office is full of people who regularly help each other out. I never mind asking for help. It is a very collegial environment. Someone might help me out with an accessibility issue, I might help them out with editing their work. It all averages out in the end."—*White female in her 30s who is congenitally visually impaired*

Product, Website, and App Developers

When products, websites, and apps are developed and maintained with principles of universal design in mind, companies do not later need to retrofit them for accessibility for people who use assistive technologies, including screen reader software, screen magnification software, voice input software, or the built-in accessibility features of their preferred device.

"Universal design — don't treat assistive technology as something 'special' that is only targeted for users with disabilities. Accessibility should be the standard which can benefit everyone."—*White female in her 40s who is congenitally visually impaired*

- Develop a corporate commitment to creating accessible products, offering accessibility support to users, and providing accessible sales and technical documentation.
- Create products that conform to the Web Content Accessibility Guidelines and other technology accessibility standards where appropriate. Ensure product updates maintain and increase accessibility, especially when an update is critical or required.
- Hire individuals who are blind, have low vision, and are deafblind to test products, services, and documentation for accessibility and usability and to provide feedback about the user experience on an ongoing basis. Test products with a variety of screen reader, magnifier, color contrast, braille display, and voice input systems.
- Develop in-house expertise in the use of assistive technologies for product design and development as well as for any customer support functions.
- Document reported accessibility issues with products and create a workflow to address them quickly. Take advantage of opportunities for innovation and invention, including for the barriers documented in this report.

Assistive Technology Developers

AT developers are in a unique position to support increased productivity of employees who use their products. They can do this through training and support, working with mainstream and proprietary companies, and developing innovative products.

- Make documentation and training materials available in multiple formats that are accessible to a wide array of users with a spectrum of skills, preferences, and accessibility needs. Create a variety of ways for users to build skills with new products or updates, such as written manuals, podcasts, webinars, and support groups.

"Like when Mac upgraded their operating system and ZoomText refused, that HUGELY impacted my life because it made my Mac completely inaccessible to me."—*White male in his 30s who is congenitally visually impaired*

- Ensure assistive technology products remain compatible with workplace technologies as they evolve, and new updates are issued. Establish relationships with key technology companies to synchronize updates and releases for seamless compatibility between assistive technology and mainstream technology products.
- Communicate issues and information about product updates and training in a format that is digestible to a typical consumer with a busy schedule.
- Engage in outreach to employer and information technology professional groups to create opportunities for knowledge building and documenting accessibility issues.
- Innovate ways to improve access to particularly difficult-to-access visual content, such as screen sharing during video conferences.

"Being one's own advocate should be one of the first lessons visually impaired people learn right up there with mobility training. I believe this is a skill that needs to be taken more seriously with the vocational rehabilitation organizations."—*White female in her 50s who is congenitally visually impaired*

FINAL THOUGHTS

"In the midst of daily struggles, it's easy to forget how lucky we are to have the technology and opportunity we have today as blind people. I often remind myself to be grateful for that. However, we as blind people have to function in a workplace and compete with sighted peers using tools that are designed specifically for them and not us. This is every tool, every day, all the time, from the coffee maker to the calendar app to the very architecture of the building."—*White male in his 40s who became visually impaired in childhood*

The Technology and Accommodations: Employment Experiences of U.S. Adults Who Are Blind, Have Low Vision, or Are Deafblind study gathered data to answer the question:

How does technology and the need for accommodations shape the employment experiences of U.S. adults who are blind or have low vision?

Across the board, participants expressed significant variability in whether their employer prioritized technology accessibility in the workplace; provided effective, timely accommodations; and facilitated access to new technology tools, trainings, and company procedures for their employees with disabilities. Approximately one in five participants expressed reluctance to request needed accommodations because of the attitudes of others in the workplace and the culture toward disability and accommodations. As a result, some participants were left without tools that would improve their productivity and performance. At the same time, there were employees who rarely experienced barriers related to their disability or other health conditions. If there were barriers, they found their employer, supervisor, and/or coworkers were supportive and collaborated with them to find solutions.

The research findings suggest a need for both employers and employees to better understand their rights and responsibilities under the law. While each person's case differs in some way, the law requires most employers to provide reasonable accommodations upon the request of an employee with a qualifying disability. Yet the law allows employers some flexibility in determining which accommodations will be provided. Moreover, accommodations, whether provided during the application process, for employees performing essential job functions, or during an employer-provided training, should be expeditious and effective. That many study participants were not aware of processes for requesting accommodations is troubling. Equally troubling is that some employers were reported to not incorporate the needs of employees with disabilities within their corporate decision-making and

policy development, suggesting a need for improved policies, communication, and knowledge about the employers' obligations. The findings suggest a need for improving the inclusion of people with disabilities during the hiring process as well as to retain and advance employees throughout their career.

Participants also frequently reported that they faced accessibility barriers in many of the corporate functions that ought to support employee productivity. They experienced numerous accessibility barriers accessing hiring and onboarding documents, could not fully participate in trainings and meetings, and did not believe their employers considered accessibility when procuring new technology tools, requiring new procedures, or adopting new company processes. Leadership, human resources, finance, information technology, and operations staff all play a role in ensuring the workplace is not only accessible but also equitable and inclusive. When they had provided support, these staff had reduced stress and frustration and created a more positive working relationship with impacts on the quality and efficiency of the work completed.

In the recommendations section of this report, the authors strived to offer ways in which staff can incorporate effective communication and accessibility practices and policies to improve employee inclusion, productivity, retention, and well-being. These actions will reduce discrimination, intentional or otherwise, that employees with disabilities face in the workplace. There are also numerous areas for further exploration. With this research and report, we hope to shed light on progress toward inclusive employment, identify areas for additional work, and continue the journey toward equal employment opportunities for people who are blind, have low vision, and are deafblind.

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