# Building a Fluent Assistive Technology Testing Pool to Improve Campus Digital Accessibility (Practice Brief)

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**Abstract**

Usability testing that includes people who are fluent in assistive technology is an important way to ensure that digital products meet the needs of all users. In settings such as universities, with highly distributed content creator networks and vast differences in project sizes and scopes, it can be challenging for non-experts to find and use the best methods to assess accessibility. This article describes creation of a pilot pool of fluent assistive technology users from the surrounding geographic area made widely available internally to university content creators. The availability of the pool ($n$ = 40) provided increased capacity to test internally developed products and vended solutions, increasing overall accessibility assessments at the university. Authors review the benefits and challenges in creating the participant pool, along with implementation details. Further discussion includes efficiencies for the university, learning by content creators, and potential directions for future research.

*Keywords: web accessibility, usability testing, digital accessibility, postsecondary*

Over the past two decades, digitization efforts have increased at universities and many experiences that were once analog are now online. Digital interactions are now required for everything from attending a campus sporting event and accessing course materials to using campus dining facilities and applying for financial aid. Even everyday activities like doing the laundry can require interacting with fully digitized control and payment interfaces.

With such a large number of transactions requiring digital access, it is hard to argue that the full college experience is equitable unless the entire scope of activities is available to all students. A further complexity for higher education is the sheer quantity of content creators that distribute content to wide audiences compared to traditional corporate structures. For example, it is common for each department to control its own section of the university website. In addition to the communications office, there are also department administrators, IT departments, faculty, teaching assistants, and students who are authorized to modify platforms or post content.

While it's well documented that the benefits of improving digital accessibility have an impact beyond people with disabilities, (Lazar, Goldstein, & Taylor, 2015), it is most critical for constituents where inaccessible content prevents equal participation. One perceived hurdle facing staff is the low incidence rate of some disabilities necessitating accessibility, such as blindness. But data show the rates of students with disabilities are rising on campuses (U.S. Department of Education, National Center Education Statistics, 2016), making it increasingly probable that departments or their employees serve students needing accessible digital materials, even if they do so unknowingly.

## Summary of Relevant Literature

Usability is defined as a function of an interface's learnability, efficiency, memorability, satisfaction, and error handling (Nielsen, 2012). A common way to evaluate an interface's usability is to conduct usability testing using the think-aloud protocol. The think-aloud protocol "may be the single most valuable usability engineering method" (Nielsen, 1993, p. 195), allowing test moderators to quickly triangulate perception with behavior. In a think-aloud usability

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test, a participant uses the interface to complete a series of tasks while narrating the actions that they are taking, providing information that is closer to behavioral data, rather than simply asking a user's opinion.

While usability testing has become a common step in the software and website development process, it often does not include users with disabilities. In recent years however, more usability professionals have advocated for including people who use assistive technology in traditional usability testing. Some experienced usability test moderators have provided practical tips on conducting such tests and conclude that they often gain new insights on usability by including individuals with disabilities in their testing (McNally, Graham, & Bellas, 2016). In addition to learning about the interface features or components that are barriers for assistive technology users, staff gain a deeper understanding of how these users navigate the digital world.

Automated testing tools are a common early step in determining if a digital product adheres to web content accessibility guideline (WCAG) criteria, but testing with real users provides benefits that go beyond WCAG conformance. For example, if a website was designed using HTML tables to create a layout, it might technically conform to WCAG standards. But it would be confusing and frustrating for a person using a screen reader, because it would read the content as if it were all within an actual table (Henry, 2010). By conducting usability tests on individuals with disabilities, test moderators gain insights related to both accessibility and usability (Henry, 2010; Utt, 2010). And by making the interface more accessible, it often becomes more usable as well.

One underlying assumption of using test participants with disabilities is that they are fluent assistive technology users because that is their primary means of engaging with electronic content. In some cases, developers become adept at using the basic functions of screen readers to quickly assess their own code with screen readers—an excellent practice, but this should not supplant the need for fluent assistive technology user testing, just as one would expect a fluent speaker to review a secondary language edition of a publication.

In order to successfully improve the case institution's broader efforts toward digital accessibility, a greater number of staff members needed to be engaged in testing and improving digital products. Given that some disabilities are low incidence, user testing was a challenge if the department did not have easy access to a staff or student with a disability. The need for lower-cost accessibility testing spanned a variety of academic offices and a variety of scenarios, including student-facing and employee-facing interfaces.

## Background

In the case institution, a decentralized approach to governance and content control led to a wide variety of means by which digital content could be assessed or monitored for accessibility. While larger projects or departments may have been able to hire consultants to assist with assessment or remediation, smaller departments or application owners that wanted to make accessibility improvements did not always have sufficient resources available to outsource efforts. Some departments had asked employees with disabilities to check sites as collegial favors, and in some cases hired students with disabilities as student workers to do testing on their web properties. While those efforts had proven beneficial, not every department had personal connections with fluent assistive technology users that could assist. Relying on the time donation of faculty, staff, and students with disabilities to work on accessibility outside of their primary job duties perpetuated the time donation requests often experienced by underrepresented communities on campus (Guarino & Borden, 2017).

## Depiction of the Practice

To address the need for increased accessibility testing, a cross-departmental team created a process for recruiting people who use assistive technology to serve as potential testers for university interfaces. The team included staff from the university library, academic technology, online education, and disability services offices. The team's work was initially funded by an internal staff innovation grant, but now continues via ongoing funding through department budgets.

In order to increase availability of accessibility testing by fluent assistive technology users for university staff, the team created a participant pool comprised of people with disabilities from the local community who self-identified as fluent assistive technology users. The on-call pool, comprised of people who have expressed interest and been screened, is similar to one that may exist for simple experiments in a university's psychology department. The usability testing pool is made available internally to departments that express interest in performing moderated accessibility testing on the university's digital products. It includes people who use JAWS, VoiceOver, NVDA, ZoomText, Dragon NaturallySpeaking, as well as those who use captions and transcripts regularly. Rather than capturing potentially sensitive, unnecessary medical information about a pool member's disability in the sign-up process, the form asks about which assistive technologies members use reg-

ularly. This tactic has met all product testing needs so far. Thus, the participant pool has provided staff with a systematic, sustainable way to test digital products with fluent assistive technology users, in the style similar to a usability test.

Original recruitment efforts faced some difficulties attracting enough students and employees for the pool, so recruiting efforts were shifted toward local community members which proved much more fruitful. Participants were recruited through local affinity groups for persons with disabilities and meetups and solicitations through state and local agencies serving the target populations. The team created handouts in a variety of formats including large print and braille, along with a webpage explaining the opportunity. Appendix A provides the marketing language used for advertising the opportunity.

A variety of recruitment strategies were used, including: sending messages to email lists, adding articles in email newsletters, speaking at local events, and tabling at a job fair for people with disabilities. The startup phase of the project included much higher recruitment effort, working toward a critical mass to ensure the same participants would not be used too heavily. Continuous recruitment efforts will grow the pool and maintain the size and diversity of participants in the future.

The assistive technology testing pool is now comprised of about 40 people who make use of a variety of assistive technologies. Participants are paid an hourly rate of $25 for their contributions and typically come in for three hours of testing at a time. This means a tester usually makes $75 per testing session. It was important to the team to provide monetary compensation, rather than a token thank-you gift like a gift card. The group that manages pool membership and scheduling also tracks payments. It is important to note that rate of pay, number of tests and frequency conducted, along with university policies and local tax regulations, should be considered to ensure all arrangements fall within local legal and policy guidelines.

During the first year with the participant pool a variety of usability tests were run on university systems, apps, and websites. The following types of applications were tested: online courseware, human resources software, a library video player, and the online library catalog. Table 1 shows the number of assistive technologies that were tested across the varied platforms.

**Pre-Moderated Review Requirements**

One important goal of the pool is to assess the experience of assistive technology users, rather than simply find basic accessibility problems with a digital product. For testing to be successful it was critical that the interfaces be tested for basic accessibility prior to engaging the usability pool. It would have been wasteful to both the participants and moderators if major product flaws--such as unlabeled buttons or images without alternative text--prevented testers from performing basic tasks. Because the pool was created as part of a university-wide internal grant program and promoted across campus, it created an opportunity to advertise other digital accessibility resources available to the university community. The team that created the pool required departments go through some other means of accessibility assessment before gaining access to the assistive technology usability pool. These pre-assessments typically involved some combination of university licensed automated accessibility tools and reviews including reading order, color contrast checking, and keyboard navigation. Additionally, as part of the onboarding process to gain access to the pool, university departments were encouraged to check the “10 Essentials” of accessibility as defined by the university-wide IT department’s online accessibility website. These 10 Essentials include WCAG basics such as alternative text for images, appropriate labels for forms and buttons, and a meaningful heading structure. Ensuring these essentials were addressed amid onboarding allowed the usability tests to provide more meaningful feedback to product owners.

**Testing Sessions**

A short training on moderating user testing was required for moderators to ensure they were well-prepared for testing with AT users from the pool. Basic etiquette training was offered to staff, who often may not have worked with persons with disabilities before, to ensure a comfortable experience for test participants and moderators alike. The pool coordinator handled scheduling of participants and worked to find a range of technology types useful to the moderators. For example, the moderator aimed to recruit a variety of JAWS users (Windows-based screen reader), a VoiceOver user (macOS- based screen reader), a ZoomText user (Windows screen magnification software), and occasionally electronic braille display users. In addition to the usability testing consultation and “etiquette training,” consultants would review testing scripts and provide examples where needed to ensure the scope and time estimates were appropriate for the testing sessions.

During a single testing session, a participant would review two different university projects in a single three-hour time period, maximizing time efficiency for the pool members and university schedul-

ing resources alike. Appendix B shows the schedule for a typical testing session. The schedule allows up to fifteen minutes for the introduction to the lab, meeting moderators, adjusting the lab equipment settings as desired, and reviewing and signing the participation authorization and confidentiality notices. Ninety minutes was allotted for the first university platform test session, followed by a 15-minute break, and then a second session of up to 90 minutes for an additional university platform.

The usability testing portions of the sessions were conducted by team members from the business unit that was responsible for the respective platform, often consisting of user experience professionals, software engineers, accessibility professionals, or web designers. Participants were encouraged to think aloud and share experiences interacting with the platforms. In some cases involving developers, testers made some quick adjustments for testing rapid prototypes. Other times, detailed notes were taken. In all cases, screencasts and audio recordings were made for internal review of the testing session. Within a few days of the test sessions, the platform teams were able to download the videos for further analysis by other stakeholders involved in the platform that was tested.

## Evaluation of Observed Outcomes

After the first year of using the participant pool, the team has made some adjustments to improve the practice. One of the most time-consuming logistical challenges of the testing was that it could be difficult to meet the participant who came in for a testing session. The building where testing occurred has multiple entrances and is located within a university campus without a street-level address. The staff running tests learned to make sure that they had the participant's cell phone number and that participants had the phone number of the pool coordinator. Highly-detailed directions on where to meet were created and provided to avoid confusion.

Originally, participants had the option to either bring their own laptop to use during testing or use the lab's computers and configure the assistive technology to their preferred settings. Using personal laptops created challenges with setting up screen recording or configuring wi-fi connectivity, which was too time consuming. Thereafter, testing was conducted on lab equipment, but participants were permitted to use their personal input peripherals and allotted adequate setup time to configure the lab equipment to their preferred settings. This made the setup process much more efficient and did not impact the participant's workflow or ability to provide feedback during testing.

The team also established parameters based on what was learned during the first few months of testing. For instance, with advertisements offering "accessibility feedback," there were several requests to use the pool to help review physical facilities, however, the pool is intended specifically for digital products. Promotional materials to staff now clearly state that pool participants are available to provide feedback on digital products only.

Finally, the team promoted the service through a series of campus-wide talks, workshops, and a survey about digital accessibility across the institution. The survey invited staff members to indicate their level of interest in the pool and provide the team with estimates of demand in the coming year.

## Implications and Portability

The benefits experienced so far by the case institution are promising, replicable, and offer further opportunities for researchers. First, the participant pool offered a low-cost way for distributed platform developers, interface designers, and content creator networks to conduct fluent assistive technology user testing on their digital content. The pool provided a convenient way for decentralized university units to access a proven way of enhancing accessibility. At the same time, conducting moderated testing increased staff awareness on the real impacts of their own accessibility improvements. After the grant-funded pilot concluded, the usability lab took over ongoing management of the participant pool. The lab offers the testing service to any University affiliate using a fee-for-service model. University affiliates wishing to use the pool are considered "clients" and fund the participant compensation as well as some administrative overhead fees for recruitment and test coordination.

Second, the pool offers a mutually beneficial partnership between the university and local communities of persons with disabilities. The university benefits by pooling shared needs to create reliable opportunities for user testing, whereas a single department would not have easy access to fluent AT users without time-consuming logistics and coordination. It also demonstrated a commitment to improving accessibility on campus. The benefit to community members with disabilities is two-fold: it provides them with a paid user testing opportunity at a competitive market rate, and an opportunity to build skills in identifying and articulating common accessibility barriers.

Finally, the participant pool provides ample opportunities for further research studies. The pool was originally created to solve a practical problem; however, interesting research questions abound in at

least two distinct areas.

- *Impact on university staff*: for those conducting or viewing the moderated accessibility user testing, how did the experience change their perception of digital accessibility work? If staff conduct moderated AT usability tests for one project, do they continue to incorporate accessibility work into other projects?
- *Impact on content*: what were the most frequent accessibility enhancements made after moderated usability testing? Was moderated testing more effective than the automated testing for enhancing accessibility? In a university context, what kinds of technical content was the moderated testing most successful in finding and fixing?

All these questions and similar could be appropriately structured in moderated testing pools at many universities implementing similar strategies. The resulting studies could inform practitioners to most effectively target content and usability testing to improve their overall digital accessibility efforts.

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Table 1

*Products and Assistive Technologies Tested via AT Usability Pool*

| type | product | assistive technology tested | |
|---|---|---|---|
| | | screen reader | magnification |
| academic applications | library catalog | X | |
| | library guides | X | X |
| | video delivery service | X | X |
| | library learning portal | X | X |
| | learning tool for online course | X | X |
| administrative applications | HR management system | X | X |
| | student information system | X | X |
| websites | department website | X | X |

## Appendix A: Recruitment Marketing Details

**Accessibility Testing Participant Pool**

Opportunity for proficient users of assistive technology to help test university

**Digital products**

Thank you for your interest in the Accessibility Testing Participant Pool! By joining the pool, you become part of a group that periodically receives invitations to test the university's digital products for accessibility. You will receive notices by email when tests are available for your participation. Tests are scheduled and participants are recruited based on the needs of projects.

Participants will be paid $25 per hour. A typical test session lasts one to three hours. Tests are conducted on campus during standard business hours between 9:00 AM and 5:00 PM.

**Test session details**

During tests, participants are asked to perform basic tasks using assistive technology with a digital product such as a website or mobile app. The goal of the testing is to understand how proficient users of assistive technologies navigate the university's digital products. A staff member will guide and observe the participant's activities. University computers are used for test sessions, although participants are invited to bring their own keyboard, refreshable Braille display, or other input device to use during test sessions. All participant information will be kept confidential.

**Who can participate?**

We are seeking proficient users of assistive technology such as screen readers (JAWS, NVDA, VoiceOver), screen magnifiers (ZoomText, Fusion), dictation/speech input (Dragon NaturallySpeaking), and other assistive technologies. You must be at least 18 years old to join the pool. We welcome students, university affiliates, and members of the community to sign up.

**How to sign up**

The survey will help us understand your background and the kinds of technology you use. We will periodically send announcements about testing opportunities to members of the pool. Participants who are available on the day of the test can indicate their interest by replying to the email announcement.

We usually receive many applications from qualified participants. Our staff will match the background of the interested participants with the needs of the tester. Participants who are selected will receive an email confirmation with details about the test. You may apply to participate in as many or as few test sessions as you like.

To join the testing pool, please fill out the form on our website [website linked].

**Contact information**

Questions? Email us at [email address]

## Appendix B: Example Moderated Test Schedule

[schedule tests two products with four testers over two days]

**Friday, August 4**

Slot 1: 9:30-12:30

| | |
|---|---|
| 9:30-9:45 | Meet participant & setup test 1 |
| 9:45-10:45 | Test 1 – Online Learning Platform |
| 10:45-11:00 | Stop recording & setup test 2 |
| 11:00-12:00 | Test 2- Education Tutorial |
| 12:00-12:30 | Stop recording/payment/exit |

Slot 2: 1:30-4:30

| | |
|---|---|
| 1:30-1:45 | Meet participant/setup |
| 1:45-2:45 | Test 1 – Online Learning Platform |
| 2:45-3:00 | Stop recording & setup test 2 |
| 3:00-4:00 | Test 2 – Education Tutorial |
| 4:00-4:30 | Stop recording, payment, exit |

**Monday, August 7**

Slot 1: 9:30-12:30

| | |
|---|---|
| 9:30-9:45 | Meet participant & setup test 1 |
| 9:45-10:45 | Test 1 – Online Learning Platform |
| 10:45-11:00 | Stop recording & setup test 2 |
| 11:00-12:00 | Test 2- Education Tutorial |
| 12:00-12:30 | Stop recording, payment, exit |

Slot 2: 1:30-4:30

| | |
|---|---|
| 1:30-1:45 | Meet participant & setup |
| 1:45-2:45 | Test 1 – Online Learning Platform |
| 2:45-3:00 | Stop recording & setup test 2 |
| 3:00-4:00 | Test 2 – Education Tutorial |
| 4:00-4:30 | Stop recording, payment, exit |