Designing an app for computer access assessments: using interviews to uncover and define user needs

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INTRODUCTION

There are many alternative access methods, such as alternative keyboards or hands-free mice, that can enable people with motor impairments to access a computer, tablet, or smartphone. The broad goal of this project is to ensure that more people receive effective access methods that fully meet their needs.

As part of the RERC on AAC [1], this project builds on existing software tools developed by Koester [2] as well as a thorough literature review conducted during the proposal writing process. This background work convinced us that a major barrier to improving alternative access services is the lack of an integrated toolkit to guide the access assessment. We hope to solve this problem by developing a software app (the *Access Assistant*) that guides assistive technology (AT) teams through the process, including initial assessment, identifying candidate solutions, conducting trials of candidate solutions, and selecting and implementing specific solutions.

While this concept forms the starting point for the project, we also recognized that we needed to learn more about the problem in order to improve our chances of building a successful solution. We are challenging ourselves to start with a beginner's mind and be open to a richer understanding of the needs of our target user groups, including practitioners in alternative access and end users of access technology. This is a key pillar of the design process [3].

This paper describes the discovery process we conducted in order to inform our product definition before beginning to design prototypes.

METHODS

Overview

Our goal was to understand gaps and opportunities that an access evaluation tool could address through analysis of the lived experiences of practitioners and end users. Qualitative methods were employed using a semi-structured interview. The project was approved by an Institutional Review Board and informed written consent was obtained from all participants.

Participants

Participants included 8 AT practitioners and 3 end users (individuals with disabilities who use alternative access). Practitioner participants included 3 occupational therapists, 4 speech-language pathologists, and 1 special educator. Two worked in school settings and six in medical settings (acute care hospital, rehabilitation, skilled nursing facility, and home health). End users included an individual with cervical spinal cord injury, an individual with Guillain Barre syndrome, and an individual with cerebral palsy who was non-speaking. Their access methods included Dragon Naturally Speaking and a variety of head-controlled pointing devices.

Procedures

<u>Semi-structured interviews</u>

The interviews were designed to help the research team understand what practitioners were currently doing in their access assessments (what did and didn't work well), identify opportunities for improving current practice, and understand what the assessment process was like for end users (full interview protocol available in [4]). Due to Covid-19, all interviews occurred remotely via Zoom to ensure the health and safety of all participants. Two researchers were present for the sessions; one researcher led the interview and the other took notes. We did not describe our specific project goals, to try to minimize bias, but told participants that we wanted to learn more about their experiences with access assessments.

The interview sessions lasted approximately one hour. Sessions were encrypted and recorded using Zoom's recording features, then transcribed using Otter.ai which converted audio to text. A researcher checked the auto-converted text for accuracy and edited accordingly in preparation for analysis.

Data extraction

To extract meaningful data segments, transcripts were divided among three researchers, who then highlighted quotes that appeared particularly relevant to the participants' lived experiences performing or receiving access assessments. A second researcher reviewed the highlighted quotes, and the full team met to reconcile any differences between researchers. The resulting highlighted quotes (236 of them) were entered as cards into a Trello board for thematic analysis.

Thematic analysis

We used the affinity wall method to cluster the raw quotes into themes [5]. Because the research team involved members that lived in geographically different locations, a shared Trello board was used simultaneously by researchers during video-conferencing sessions to sort and organize the raw quote cards. For each card, we asked: does this card go with an existing affinity cluster? If yes, we moved it to that list on the Trello board. If no, we created a new cluster for it. We then wrote a sentence summarizing each cluster, as the cluster theme. Finally, we wrote at least one software requirement for each theme, to define specific ways in which the Access Assistant app could positively support the theme.

RESULTS

The resulting affinity wall contains 46 themes and corresponding requirements that will drive our design and development for Access Assistant. Within the scope of this paper, we highlight 12 of the more foundational and interesting themes that emerged.

Need for the proposed Access Assistant tool

The interviews strongly supported the need for a systematic tool to support access assessments, highlighted by the two themes in Table 1.

Table 1. Themes and sample data supporting need for a systematic assessment tool.

Theme	Example Data
1. A good access solution can be truly life-changing. Practitioners are highly motivated to do this important work.	"A lot of times the people who benefit from access, they've never been given a shot at being independent. The biggest piece for me is just seeing someone be able to have control over something again, is just really powerful. So I'll do whatever I can to figure that out."
2. Practitioners really want a more systematic way to do this work.	"Having a system, being able to have more of an idea of like, almost decision making tree of sorts. Just being able to figure Okay, so if they're able to do this, this is a great option. If they're able to do that, here are some really great options."

Overall approach

The next two themes capture key aspects about the overall approach for success in access assessments: fun and early success (see Table 2).

Table 2. Themes and sample data regarding importance of fun and early success.

Theme	Example Data
3. Having fun makes a real difference to both the practitioner and the end user.	"Let's have fun with it. And that is the piece that I think was missing from this difficult assessment that I just did was the fun part." "Being able to get hands on was [my favorite part]. You know, just having somebody tell you about it, wasn't near as much fun as being able to do it."
4. Focus on getting some kind of early success, then expand from that foundation.	"Get them started with something, have a little success, and then you can come back and show more. It spreads out from that first success and first high priority thing to then start the patient thinking about other things. They're much more open to it when you come back and say, Hey, have you thought about this... "

While we don't yet know exactly how the Access Assistant app will do it, the requirements here are to find ways to support fun and early success within the assessment process.

Practitioner worries

The interviews revealed that practitioners experience a lot of anxiety when doing access work, particularly when faced with a challenging situation. Almost all of them expressed some sort of worry like the following: "Not knowing. Just feeling like I'm going in blind and just like imposter syndrome a little bit, feeling like okay, I should know this, but I don't." The worries clustered around four main types, as shown in Table 3.

Table 3. Themes and sample data related to practitioner worries.

Theme	Example Data
5. Practitioners worry that they are forgetting something or that they don't know enough to feel confident.	"I just hope I'm not leaving anything out, because there's just a lot of detail work... which would probably be helped if I had something written down and more of a system."
6. Practitioners worry that they'll miss a solution because it's so hard to know everything that's available.	"Since I also work on our driving program and have a traditional caseload, I often feel that I lack the time to research/keep up to date on the latest tech."
7. Practitioners feel pressure to find answers quickly, and in some cases that is really difficult to achieve.	"The assessments take a long time and families want answers. People want answers right away, and sometimes it's really hard to give them those answers because it takes a while to practice everything."
8. Practitioners fear that the recommended tech will be abandoned, or that they won't be able to find a solution despite their efforts.	"I worry that I'm just not going to be able to find something that's going to allow him to have a voice and have control."

We've identified some initial requirements for Access Assistant that might reduce practitioner anxiety. For example, Access Assistant could:

- Provide guidance, a place to start, and suggest options so that nothing is forgotten.
- Help people know what's out there and how to learn more about those options.
- Help practitioners find at least a basic initial access solution quickly, then help you refine that using that initial success as a foundation.
- Guide teams to multiple possible solutions (rather than one best option) - understanding that options may need to change across time (so the practitioner doesn't have to feel it has to be a one and done deal).

We also established the following overall requirement to address the practitioner-worry theme: The spirit of the app is welcoming, reassuring, fun, curious, and supportive. It takes the worry out of access assessments.

Flexible test-drives

Everyone spoke to the need for test-driving candidate access methods before making a recommendation. Beyond that, there was strong support for making sure that test-drives could be flexible, particularly for the tasks performed during the test-drive and the metrics or indicators of how the test-drive went (see Table 4).

Table 4. Themes and sample data regarding test-drive tasks and metrics.

Theme	Example Data
9. When doing test-drives in an assessment, always choose a task that's meaningful, motivating, and well-suited for the user.	"It's definitely, definitely whatever's motivating to that patient." "What can we give him access to. What's meaningful for the kid, what's really meaningful for the kid?"
10. The metrics that matter can vary from person to person, depending on goals, and may not be highly quantitative.	"The patient rating of how easy or how hard it was to use. And then my perception of that." "I'm not objective with it, in terms of having like a set, you know, typing accuracy, or speed, or whatever."

The corresponding requirements for Access Assistant are: (1) the team can choose whatever task they want to use during test-drives; and (2) the metrics and indicators of success can be customized and may or may not include specific speed and accuracy measurements.

End user needs

The interview data support the principles of putting the end user at the center of the assessment and valuing their preference as a key criterion when choosing an access method, as illustrated by the two themes in Table 5.

Table 5. Themes and sample data regarding key end user needs.

Theme	Example Data
11. End users value hands-on experience with candidate access methods, although it may not be feasible or appropriate to do this all at once.	"The more hands on, the better" "Take time to try all of the methods available" “Let people have opportunity to try options for longer"
12. An assessment isn't done until you find something that the end user really wants to use.	"When the individual is happy and is like, oh, yeah, I can do this, and has proven that that piece of technology is actually going to help them in their daily life. When they demonstrate proficiency with whatever piece of equipment and they say, Yes, I want this, then I think the assessment is done."

To support Theme 11, Access Assistant could encourage therapists to reach out to vendors for more equipment, and could provide "virtual tours" of some devices to help users at least get some feel for them. As a requirement to support Theme 12, user feedback and preferences need to be at the heart of decision-making.

DISCUSSION

This discovery process proved invaluable in helping us confirm some of our initial understanding and uncover new and important user needs that we were not fully aware of.

Confirmation of what we thought we knew

The interviews confirmed that effective access is a high priority foundational goal that affords the achievement of many other goals, such as communication, education, employment, community participation, and more. Practitioners appear to welcome a tool that would help them conduct more effective assessments.

New things we learned

The intensity and prevalence of the practitioner-worries theme surprised us, although all of us on the research team understood those feelings from direct experience. The relatively low importance of quantitative performance measures in current practice was a good wake-up call, given that previous KPR software relies exclusively on such measures [2].

Future work

These themes are now embodied as requirements in our product definition, to ensure that they will be carried into our process for designing prototype software. It will be challenging to honor all of these needs within our Access Assistant app, and we look forward to continuing to engage target users to help us meet that challenge.

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REFERENCES

[1] McNaughton D. New RERC on AAC funded by NIDILRR (2020-2025) [Internet]. [posted Aug 12, 2020]. Available from: https://rerc-aac.psu.edu/new-rerc-on-aac-funded-by-nidilrr/.

[2] Koester Performance Research. Compass, Keyboard Wizard, Pointing Wizard, and Scanning Wizard software [Internet]. Available from: https://kpronline.com/software.

[3] Newman M. Introduction to user experience principles and processes [Internet]. [retrieved Aug 2020]. Available from: https://www.coursera.org/learn/introtoux-principles-and-processes.

[4] Full interview protocol available to view at: https://docs.google.com/document/d/1TkUs4X972xR2aahjHk0_fAvz6yBCVDpCaBu0URooEL8/edit?usp=sharing.

[5] Toyama K. Understanding user needs [Internet]. [retrieved Aug 2020]. Available from: https://www.coursera.org/learn/understanding-user-needs.