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

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## ABSTRACT

To support effective alternative access assessment and service delivery for people with motor impairments, we are developing an app called Access Navigator. This paper describes the first stage of the project: the interviews we conducted as part of a discovery process to improve our understanding of user needs. We individually interviewed 8 assistive technology practitioners and 3 clients who use alternative access methods, to learn what practitioners were currently doing in their access assessments, identify opportunities for improving current practice, and understand what the assessment process was like for clients. We extracted 236 relevant quotes from interview transcripts, and clustered the quotes using the affinity wall method, yielding 42 themes. Here we present the 21 highest priority themes, along with the app requirements that support those themes. Results confirmed the need for a tool to support more effective assessments, with emphasis on taking the worry out of access assessments and supporting early success. Results also revealed specific needs such as flexible workflow, personalized test-drive tasks, and a choice of metrics (including client preference). With a richer understanding of user needs, we are in a much better position to design software that can address those needs.

## ARTICLE HISTORY

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## KEYWORDS

Augmentative and alternative communication; computer access; self-help devices; user-centered design; user-computer interface

## Introduction

Individuals with motor impairments often require alternative access to computers, speech generating devices, tablets and smart-phones. A wide range of alternative access options exist, including alternative keyboards, eye and head tracking technologies, speech recognition, switch-scanning options, and more. (Beukelman & Light, 2020; Fager, Beukelman, et al., 2012; Hurtig & Downey, 2009). Practitioners have the critically important task of helping individuals with motor impairments choose the most effective access method, or combination of methods, that best fits their needs. As alternative access options have grown, so has the challenge of supporting practitioners in providing evaluations and making appropriate recommendations for alternative access. Lack of opportunities for training experiences specific to assistive technology and access, whether preservice or ongoing, have been identified as barriers to being able to effectively provide these services (Arthanat et al., 2017; Jans & Scherer, 2006; Judge & Simms, 2009; Smith et al., 2018). While many practitioners do gain skills and knowledge in alternative access through on the job experiences, they still express a lack in confidence in this area (Long & Perry, 2008). The wide range of ages (pediatric to geriatric), diagnoses (acquired or congenital disabilities), and settings (hospital, school, community-based) of the individuals needing alternative access assessments can be another barrier for practitioners providing these services. Additionally, for some practitioners, alternative access may be an infrequent part of their work,

further decreasing confidence in their ability to successfully complete these assessments.

A myriad of resources exist to help teams identify an access solution that meets an individual's needs, including textbooks and journal articles (Cook & Polgar, 2013; Fager, Bardach, et al., 2012; Fager, Beukelman, et al., 2012; S. K. Fager et al., 2019; Hoppestad, 2006; Simpson, 2013) clinical frameworks such as HAAT (Cook & Polgar, 2013) and SETT (Zabala, 2005), informational resources such as the WATI guides (Wisconsin Assistive Technology Initiative [WATI], 2018), online forums and questionnaires such as Quality Indicators for Assistive Technology [QIAT], (2022) and Student Inventory for Technology Supports [SIFTS], (2022), and software tools for gathering performance data (Koester Performance Research [KPR], 2022; Dumont et al., 2002; Koester & Simpson, 2019; Koester et al., 2006, 2007, 2013). These resources all relate to a common process for alternative access assessment, including these steps: initial assessment (gather information and identify goals), identify candidate solutions, conduct trials of candidate solutions, then select and implement specific solutions.

These existing resources are helpful, but there is room for improvement. For example, informational guides may be too general to address an individual's unique needs, or may require significant time and effort to adapt for use in a particular setting. Software tools for collecting performance data, such

as Compass (KPR, 2022), are not sufficiently comprehensive; they can provide important evidence, but only midway through the process, once candidate access solutions have been identified. With an integrated toolkit to guide the access assessment from start to finish, alternative access services could be improved substantially.

The long-term goal of this project is to build a tool to help provide structure and guidance to practitioners (including novice to expert, and occasional to frequent use) to ensure that more people receive effective access methods that fully meet their needs. The tool will be a software app (the *Access Navigator*) that guides assistive technology (AT) teams through the process outlined above. This project is part of the RERC on AAC (McNaughton, 2020) and builds on existing software tools developed by Koester Performance Research (KPR) (Koester & Simpson, 2019; Koester et al., 2013; KPR, 2022).

Although we began the project with a specific concept in mind, based on the previous work noted above, we also recognized that we needed to learn more about the problem in order to improve our chances of building a successful solution. We knew the app needed to support the basic assessment process described above, but we hoped to gain insights beyond these basic functional requirements. Best practices in product design strongly recommend beginning with a discovery process (Burchill & Brodie, 2005; Newman, 2020; Toyama, 2020). This early phase of design focuses on understanding the specific needs of the target users, the problems that need to be solved, and the potential opportunities for the app to provide solutions. 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 clients who use access technology. This paper illustrates our early process of learning from users to inform a starting point for the app. Subsequent feedback, design revisions, and formal evaluation of the app will occur iteratively at later stages in the development process. (Note that this paper uses the term "client" throughout, to refer to individuals/patients/students with motor impairments who use alternative access methods.)

## Methods

Our goal was to gather a preliminary understanding of the gaps and opportunities that an access evaluation tool could address through the initial analysis of the lived experiences of practitioners and clients. An affinity wall process was used to

analyze content collected from participants via a semi-structured interview. Affinity walls are a common method used in user-centered design research to sort and organize data and ideas (Toyama, 2020). 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 clients (see Table 1). Practitioner participants included 3 occupational therapists, 4 speech-language pathologists, and 1 special educator. Three worked in school or community settings and five in healthcare settings (acute care hospital, rehabilitation, skilled nursing facility, and home health). Adult clients included an individual with cervical spinal cord injury, an individual with Guillain Barre Syndrome (GBS), and an individual with cerebral palsy who was non-speaking. Their current access methods included Dragon speech recognition (for two of the three) and a variety of head-controlled pointing devices (HeadMouse Extreme, GlassOuse, Open Sesame, and NuPoint).

## Procedures

### Semi-structured interviews

The interviews were designed by the research team to gather a preliminary understanding of 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 clients (Toyama, 2020). Due to Covid-19, all interviews occurred remotely via Zoom to ensure the health and safety of all participants. (The one non-speaking participant also provided some written responses to the questions prior to his Zoom session.) 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 full interview protocol is available for download (Koester et al., 2021).

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 it accordingly in preparation for analysis.

**Table 1.** Basic characteristics of participants.

Code	Gender	Profession	Setting	Client Ages	AT Experience (yrs)
P1	F	OT	Healthcare	All ages	10+
P2	F	SLP	Community	All ages	10+
P3	F	SLP	Healthcare	Adults	10+
P4	M	SET	School	Children & youth	10+
P5	F	SLP	Healthcare	Adults	2–5
P6	F	OT	Healthcare	Adults	2–5
P7	F	OT	Healthcare	All ages	10+
P8	F	SLP	School	Children & youth	2–5
		Age (yrs)	Medical Condition	Access Method	Length of Use (yrs)
C1	M	40–50	Guillain-Barre	Dragon + GlassOuse	1
C2	M	60–70	C4–5 SCI	Dragon + Headmouse	25
C3	M	50–60	CP, non-speaking	NuPoint on AAC system	17

P=Practitioner, C=Client.

### 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. This process of data extraction and agreement through consensus is consistent with qualitative research methods analyzing interview data (Baylor et al., 2011; Creswell, 2007; Yorkston et al., 2017). 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 (Burchill & Brodie, 2005; Toyama, 2020). Because the research team involved members 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 discussed each cluster as a group until consensus was reached (Creswell, 2007; Graneheim & Lundman, 2004). 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 Navigator app could positively support the theme.

42 themes emerged from this process. In order to prioritize this fairly large number of themes, at least roughly, each member of the research team rated each theme for its relevance to our research questions and significance in understanding how an app could enhance the access assessment

process (as low, medium, or high). Half of the themes were highly rated; to keep the scope of this paper manageable, we present those 21 themes below. (Note that we retained all 42 themes and associated requirements within our product definition.) Within those 21 themes, we grouped related themes into categories, which constitute overarching themes.

## Results

Table 2 lists the 21 themes within the eight overarching themes. Below, we provide brief descriptions of the themes, as well as examples of the supporting data (participant quotes) and the requirements that define how to reflect the theme in the design of the Access Navigator app.

### Theme 1: need for a systematic assessment tool

A need for a systematic assessment tool was noted by every practitioner participant throughout the interviews. Effective access was described by participants as a high priority and a foundational goal that affords the achievement of many other goals, such as communication, education, employment, and community participation. Practitioners appeared to welcome a tool that would help them conduct more effective assessments.

#### Theme 1.1

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. It's just really powerful. So I'll do whatever I can to figure that out.

**Table 2.** Themes that were most relevant to designing an app to support the alternative access process, from interviews with 8 practitioners and 3 clients.

Theme Group	Theme	Support	
		Pract.	Client
(1) Need for systematic assessment tool	1.1. A good access solution can be truly life-changing 1.2. Practitioners really want a more systematic way to do this work 1.3. Guide us through the process	ALL	0
(2) Fun & early success	2.1. Having fun makes a difference to both the practitioner and the client 2.2. Focus on getting some kind of early success, then expand from that foundation	5	1
(3) Practitioner worries	3.1. Practitioners may have fears that they are forgetting something or that they don't know enough to feel confident 3.2. Practitioners worry that they'll miss a solution because it's so hard to know everything that's available 3.3. Practitioners feel pressure to find answers quickly 3.4. Practitioners worry that the recommended tech will be abandoned, or that they won't be able to find a solution despite their efforts	7	n/a
(4) Test-drive tasks and metrics	4.1. The metrics that matter can vary from person to person, depending on goals, and may not be highly quantitative 4.2. Changes with data collection and interpretation	ALL	2
(5) Flexible tool	5.1. Allow me to skip around 5.2. Adapt to a range of client types 5.3. Clients may change significantly requiring flexibility	ALL	n/a
(6) Mentoring and multidisciplinary needs	6.1. Help coach new practitioners 6.2. Support identifying needs when collaboration is needed	7	n/a
(7) Practitioner consideration of client-specific needs	7.1. Client readiness 7.2. Tasks that are meaningful to the client 7.3. Consider the full context	4	ALL
(8) Client needs	8.1. Clients value hands-on experience with candidate access methods, although it may not be feasible or appropriate to do this all at once 8.2. An assessment isn't done until you find something that the client really wants to use	5	ALL

"Support" shows number of participants who explicitly supported the overall Theme Group.

When you find something that works, it really relieves a lot of a patient's anxiety and stress and gives them a little bit of hope that things can get better.

### Theme 1.2

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.

### Theme 1.3

Guide us through the process.

And we're working through a hierarchy or, you know, just having that yeah just knowing where to go and knowing what you're looking for, like a recipe a little bit.

### App requirements

These themes provided confirmation of our original motivation to develop the app. The need for a systematic process could be addressed in a variety of ways with the app and could include use of decision-making points, flow-charts, and decision-making trees. Access Navigator could include conditional branching to help navigate the process.

### Theme 2: fun & early success

The theme of making the access assessment process fun and establishing early success was described by many participants. The concept of having fun with the process was noted by both practitioners and clients, which could alleviate some of the stress practitioners express regarding completing access assessment. Having a process that supports early success was also important and may feed into that feeling of the process being "fun" or rewarding.

#### Theme 2.1

Having fun makes a real difference to both the practitioner and the client.

Let's have fun with it. And that is the piece that I think was missing from this [rough] 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.

#### Theme 2.2

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 could 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.

I always teach my students that when you're first trying something with a patient to make sure that the person is going to be successful.

### App requirements

Designing the app to be fun and welcoming to the user can be accomplished in a variety of ways including friendly and conversational language, ease of use, and readily available help. An overall tone of emphasizing exploration and learning may provide a more satisfying and effective experience. Giving practitioners and clients opportunities to trial options that they have been able to narrow down as "most promising" as well as providing ways to customize those test drives may support early client success.

### Theme 3: practitioner worries

All but one practitioner spontaneously expressed significant worries and stress regarding completing access assessments, particularly when faced with a challenging situation. The worries clustered around four main types, described below.

#### Theme 3.1

Practitioners may have fears 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.

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.

#### Theme 3.2

Practitioners worry that they'll miss a solution because it's so hard to know everything that's available.

Trying to know all the technology really, really well is hard.

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.

#### Theme 3.3

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.

#### Theme 3.4

Practitioners feel 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.

You don't want to recommend things that are going to be abandoned in a closet.

### App requirements

To alleviate some of the worries and stress expressed by practitioner participants, several features could be included in

Access Navigator. First, the app could provide guidance, a place to start, and suggest options so that nothing is forgotten. By helping people know what's out there and how to learn more about those options, it could aid practitioners in finding a basic initial access solution quickly, which could reduce anxiety. Additionally, Access Navigator could provide guidance and support for teams to explore multiple possible solutions (rather than one best option), with the understanding that options may need to change across time. This may help reduce pressure on the practitioner to come up with a single "best" solution right away. 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.*

#### **Theme 4: test-drive tasks and metrics**

All practitioners indicated that quantifying performance did not necessarily drive all assessments and that linking back to personal goals and objectives was at least as important. Participants noted that collecting data was challenging when intentionality was unclear and that finding metrics that match real-life needs was a challenge and may differ for each client.

##### **Theme 4.1**

The metrics that matter can vary from person to person, depending on goals, and may not be highly quantitative.

I'm not one to just to literally take tallies, and I don't think that would work in my day-to-day function. So it is more of an estimate, for showing progress. Like, if half the time they're able to get the target, then I'll call it 50%. And if it's more so the next time then I'll probably call it 75%

I am not objective with it at all, in terms of having like a set, you know, typing accuracy, or speed, or whatever it is. If that was something that our funding sources really cared about, you bet I would. But since they don't, I just use my clinical judgment.

##### **Theme 4.2**

Challenges with data collection and interpretation.

The data collection part is the hardest thing, I think, because of the variables involved, and the variability of the person, like, they're too tired today to activate the switch this way.

#### **App requirements**

Access Navigator should allow the team to choose whatever task they want to use during test-drives and what metrics and indicators of success are appropriate for the team's goals. Test-drive data can include qualitative information such as comments and preferences (both from client and practitioner) as well as quantitative measurements such as speed and accuracy.

#### **Theme 5: flexible tool**

Practitioners wanted the tool to provide structure, and six of them spontaneously suggested that a recipe or a decision-tree would really help the process, as noted in Theme 1.3. But they also voiced the need to allow jumping between steps in the

structure. Not all assessments are able to follow a standard form, so practitioners with experience should have room to use their experience within the tool. Flexibility is also inherent in that Access Navigator needs to be able to meet the needs of a wide range of clients, across varied ages, diagnoses, severity, prognoses, and contexts.

##### **Theme 5.1**

Allow me to skip around

So I think like if the tool would have the ability to skip sections and come back to it. I'm thinking of how we do our MDS's here and it has all of our little tabs. And it shows: this one's been completed, this one's still not complete. So you'd have areas that visually have a cue to go back and address, or just skip and close out. And I think it would be nice if you didn't have to go through every single thing.

##### **Theme 5.2**

Adapt to a range of client types

Our routine patients, I think I tend to do this [assessment process] super fast. With some of the more challenging folks, this is much more of a process to follow.

With the degenerative conditions, that can be really challenging, because a lot of times they have the cognition to do whatever you want them to, but we just don't have any access points anymore.

##### **Theme 5.3**

Clients may change significantly requiring flexibility

I've evaluated a patient before on a Friday, and then I come back on Monday, and they look totally different. And so it's just kind of that dynamic assessment piece.

#### **App requirements**

While participants described a need for a systematic tool that could guide them through the access assessment process, they also indicated the need for a tool that was flexible and could be used with a wide range of client types and in a wide range of settings. Access Navigator should acknowledge that some practitioners may require the use of some features (e.g., test drives) and not others (e.g., planning ahead for evaluation) and should not lock the practitioner into following all steps of the process.

#### **Theme 6: mentoring/coaching and multidisciplinary needs**

Practitioners expressed a desire for mentorship, but didn't always get it. Practitioners noted that they often conduct access assessments on their own, although they sometimes were able to work with a colleague. They indicated knowing when to bring in additional expertise as a key skill.

##### **Theme 6.1**

Help coach newer practitioners

I think something that would actually help me is if I had somebody kind of like coaching me through it. Being able to learn from other professionals and being able to work with the professionals that have that area of expertise.

I want to be able to guide my teams to get better information and guide them and teach them how to work with the kids more.

**Theme 6.2****Support identifying when collaboration is needed**

Getting OT involved, they're a great wealth of knowledge. And so getting them involved early to help with some of that access piece, too, is something that is always really helpful.

I do a lot of co-treatments when it comes to access because let's take a child with cerebral palsy. The speech therapists know the speech generating devices but they might not know the limitations the child has with vision and they might not know all of the access points for switch controls.

**App requirements**

By providing a structured, step-by-step process, Access Navigator may provide at least some of the mentoring and coaching that newer practitioners may need and want. Additionally, Access Navigator should provide guidance as to when additional expertise and referrals need to be made (e.g., expert in vision assessment, seating and positioning specialist).

**Theme 7: practitioner consideration of client-specific needs**

This overarching theme relates to ways in which the practitioner can and should consider specific needs for each client, then adapt the assessment process accordingly. Participants described a need to gauge the extent to which the client is ready and willing to fully engage in the assessment process. Helping the client identify an important goal was also mentioned as a key motivator and factor in success, as was the need to consider issues in the context beyond the access method itself, such as environments of use, the types of devices that the client needs to access, and the available support from others.

**Theme 7.1****Client readiness**

A person's acceptance of where they're at with their recovery and needing to use that device can be a challenge. I might be excited to show them this cool new tool. And their reaction might be, I hate that I need that.

With those people that don't have a goal, sometimes I can show them a couple things, and sometimes they come around.

**Theme 7.2****Tasks that are meaningful to the client**

What can we give him access to. What's meaningful for the kid, what's really meaningful for the kid.

What can you not do now that you need to be able to do? What's the priority?

**Theme 7.3****Consider the full context**

I needed to connect Bluetooth devices to multiple inputs, which didn't work right at first.

My head tracking device doesn't work in bright sun.

I have to use 2 devices, a computer and a phone, and independently switch from controlling one to controlling the other.

**App requirements**

Access Navigator could help practitioners meet these client-specific needs by providing a way for teams to gather information and prepare prior to the assessment process. Designing an application that is flexible would allow practitioners to complete different test drives to trial different solutions as the client progresses. Additionally, features such as identifying client-specific goals to ground the assessment process and being able to select test drive tasks that are personally relevant could support a successful outcome.

**Theme 8: client needs**

Participants who use alternative access methods expressed the need for more time and opportunities to trial multiple solutions. They indicated that final selections should be made when the client really wants to use that solution, with feedback and buy-in from the client as an essential component.

**Theme 8.1**

Clients 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 [access] methods available.

Let people have the opportunity to try options for longer.

**Theme 8.2**

An assessment isn't done until you find something that the client 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.

So they weren't gonna use the device, because they didn't want to do that. And so, kind of working in the middle to try to figure out, okay, what's going to be the best fit and make you the most successful? But also, what's something that you're going to actually use?

**App requirements**

Access Navigator could encourage practitioners 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. Client feedback and preferences need to be at the heart of decision-making in Access Navigator.

**Discussion****Implications for designing access navigator**

This discovery process provided a method for systematically identifying foundational concepts to incorporate into the

initial app design and development. This process confirmed some of our initial understanding that effective access is a high priority and that practitioners want a more systematic and satisfying way to do this work. The interviews also uncovered new and important user needs that we were not fully aware of. 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 current KPR software relies exclusively on such measures (KPR, 2022). We recommend the use of this sort of discovery process for any design project, to enhance the chance of building something that actually meets user needs.

Note that these are not the only themes and requirements that are relevant to the Access Navigator app. The app will be based on established frameworks for assessment (Cook & Polgar, 2013; Zabala, 2005; WATI, 2018), so, as a given, it has requirements related to conducting a valid alternative access assessment and being accessible to all users. The benefit of this study is that it allowed us to discover needs that go beyond these basics, and gave us an opportunity to address those needs with our app.

### **Implications for clinical practice**

While practitioners are highly motivated to do this valuable work, it is unfortunate that it involves a high level of worry and stress, even for experienced practitioners. Some of that is inherent in any important but demanding work, but some of that is a product of issues that emerged from our interviews: lack of a systematic assessment process and limited opportunities to develop the needed expertise. The worries, pressure, and uneven support combine to make a challenging process more difficult and less satisfying, which does not bode well for retention or recruitment within AT teams or for provision of quality services to people who need them. We hope that Access Navigator can reduce at least some of this pressure and bring some much-needed reassurance and fun into the alternative access process.

### **Methodological considerations and limitations**

This study employed methods commonly used in formative research within user-centered software design, to broaden our existing understanding of the needs of practitioners and clients with respect to alternative access assessments, and help us identify new possibilities and unanticipated issues that our proposed app could address. While we chose methods specifically for their ability to provide useful and applicable results within an efficient timeframe, it is worth considering some of these methodological choices and the impact they may have had.

With respect to sample size, it can be challenging to know exactly how many participants is sufficient in an interview discovery study. Two types of criteria are often used. First, rough guidelines have evolved, such as 5 participants initially for an interview study (Nielsen, 1993), or 3 or 4 interviews per user type (Burchill & Brodie, 2005). Taking our two user types

to be practitioner ( $N = 8$ ) and client ( $N = 3$ ), this sample meets or exceeds both of these rules of thumb. In later work, Nielsen's group notes, however, that the main criterion for adequate sample size is at least some degree of data saturation (Marshall et al., 2013; Rosala, 2021). We did observe a saturation effect in our study, with participants bringing up similar insights and patterns beginning to repeat. So our sample satisfied both the rule-of-thumb and saturation criteria. We feel that we learned valid and relevant insights from users, at a reasonable cost of time and effort, while not expecting those insights to be exhaustive. While we had fewer novice practitioners and school-based practitioners than we might have liked, we did have some, and we continue to involve those groups in our ongoing user feedback activities.

With respect to credibility, including participants with varied perspectives provides some triangulation of sources, while having a review-and-consensus process within the research team for data extraction and analysis provides triangulation across analysts. Additionally, the use of a semi-structured interview allows for an openness of responses and an emergence of new ideas and themes. When several people independently voice a similar issue, especially when responding to very open-ended questions, that forms the basis of a valid theme. For these reasons, we feel comfortable with the validity of responses provided by this participant group, but it is certainly possible that a different group of participants may have yielded some different themes.

Finally, a limitation of the study is that we asked participants about their experiences, rather than directly observing those experiences. Interview data, while a common and fully acceptable means of conducting the discovery process, may not include valuable insights that could be gained through direct observation. That was not possible for this study, but we will be able to employ direct observations later in the project.

### **Ongoing and 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 Navigator app, and we continue to engage target users to help us meet that challenge. Since the completion of this study, we've designed a wireframe prototype and revised it iteratively based on feedback from 12 practitioners (Koester et al., 2022). We've also implemented an early version of the software, and run 5 practitioners through a think-aloud evaluation protocol. After revising the software in response to that feedback, we'll conduct a clinical evaluation of the app to determine its usability and effectiveness in real-world use. We'll continue to gather systematic feedback from both the practitioner and client throughout the project to refine the functional requirements and inform any necessary design changes.

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## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding and Data sharing

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## Data availability statement

Data from this study are freely available at Open ICPSR: <https://doi.org/10.3886/E189382>

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