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The Assistive Technology Passport: A Resource for Enhancing Capabilities as a Result of Better Access to Assistive Technology

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Abstract: The value of Assistive Technology in enabling active and equal participation in political, social, economic, and cultural life of people with disabilities, people ageing, and people with chronic conditions is broadly accepted. However, most of the global population who need assistive technology (AT) lack access to it, hence the call for international efforts to improve access to AT. Drawing from the capability approach (CA) developed by Amartya Sen and Martha C. Nussbaum, we explore factors that may hinder or facilitate access to AT. We examine the idea of an AT Passport as an innovative user-centered approach for improving access to AT. We used Interpretative Phenomenological Analysis (IPA) to explore service users' lived experiences of access to AT and their understanding of the AT Passport concept. We identified the core values of human diversity, equity, access to opportunity, and individual freedom to choose a life of significance to them. Access to AT is central to expanding these capabilities subject to conducive personal and social-contextual issues. The AT Passport could be developed as a capability-enhancing resource by facilitating access to AT, harnessing the diversity of people's personal, social, and environmental factors to enrich peoples' capability sets. Further research is required to identify core AT Passport functionalities, usability, and acceptability features.

Keywords: assistive technology; capability approach (CA); Interpretative Phenomenological Analysis (IPA); assistive technology passport; disability



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1. Introduction

1.1. Assistive Technology

The enabling value of Assistive Technology (AT) in promoting the equal participation of people with disabilities, people ageing into disabilities, and people with chronic conditions in social, economic, political, and cultural aspects is well recognized [1–4]. AT is broadly defined as a combination of the service provision system, related services, and specific assistive products [1]. AT systems include the processes, procedures, policies, and structures contributing to assessing, providing, maintaining, and using Assistive products. Assistive products may be devices, software, equipment, or instruments designed to maintain or improve a person's functional participation [5]. AT products includes a wide variety of low-tech devices, such as hearing aids, walking frames, wheelchairs, and Augmentative and Alternative Communication, to high-tech computer technologies, including a variety of intelligent computer user interfaces, home automation systems, and innovative technologies [6].

The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) is an internationally binding legal human rights document that ensures the active participation of people with disabilities in political, social, economic, and cultural life [7–9]. The Global Report on Assistive Technology recognizes AT as a precondition to equal enjoyment of life per the CRPD measures [2]. The CRPD states the right to AT generally, specifically, and inclusively in several articles of the convention [10,11]. Furthermore, it calls for increased research and development of all forms of AT, and promotion of accessible, affordable, and available Information, Communication, and Technology (ICT), and training

of users and professionals in all aspects of AT. The link between AT and the realization of the UN's sustainable goals as a pillar of universal health coverage is clear [12–14].

Notwithstanding this established right to AT, globally, many people have unmet AT needs [2]. Most of the existing AT provision systems lack the end user's engagement, which could contribute to ineffective access to AT [15,16]. Maximizing the value of AT to the person requires a systems-thinking approach, which factors in the interaction of 5 key strategic components to effective access to AT: people (or users), Personnel, policy, provision, and products [17]. Any complex service provision system, including access to AT, requires the consideration of multiple confounding factors, including the individual and their social and structural environment needs [4,18,19]. The International Classification of Functioning Disability and Health (ICF) framework, for example, emphasizes the influence of an individual's social and contextual environment in their capacity to realize wellbeing [20]. The philosophical basis of occupational therapy also emphasizes the triple relationship between a person, their environment, and occupation as a powerful influencer of participation [21,22]. Barriers caused by social and environmental factors influence the potential for an individual to fulfill their life goals [23].

1.2. Assistive Technology Passport

If the person is to benefit from access to AT, user engagement is imperative to ensure systems respond to the persons' needs [24]. The idea of developing an AT passport was a recommendation from a joint Enable Ireland and the Disability Federation of Ireland (DFI) report (2016) on the future of Assistive Technology service provision in Ireland [25]. The report highlighted Ireland's fragmented and uncoordinated AT system, advocating for developing an AT Passport as a user-centred resource to help people navigate the AT service provision system. The Passport's purpose is to place the person at the center, articulating their AT requirements and facilitating access to information on, for instance, assessment, funding, training, and maintenance of AT products. The current research seeks to investigate the AT Passport idea, refine its conceptualization, and offer recommendations for its design, development, and implementation. This work builds on other work in health, social care, employment, and education settings where the "passport" concept already exists and is used in different forms [26].

1.3. Capability Approach

In this study, we draw upon the capability approach (CA) framework developed by Nobel Prize winner Amartya Sen [27] and Nussbaum [28,29] to help us in the interpretation of the participant's AT experiences and subsequently to conceptualize the AT Passport. The CA framework helps understand the impact of disability on people's capabilities and functioning through an analysis of a person within social and environmental contexts [30]. Furthermore, Sen's assertions on the significance of human diversity to the promotion of justice and equality of opportunity are essential in our endeavor to evaluate access to AT and its potential enabling of the right to the enjoyment of life [31].

The CA framework provides an explanatory foundation to evaluate how AT as a resource aids people's choices to live a life of their choosing. AT, which is not person-centred or linked to other enabling elements in the broader AT support system, is unlikely to mediate meaningful choices for users effectively. The CA framework helps us to infer the potential of AT in enhancing people's opportunities (capabilities) to exercise their human right to participate in activities of their choice. It may also help us identify the barriers and facilitators of translating AT into an individual's desired functioning. AT has the potential to enhance people's capabilities to function and potentially reduce capability deprivation to engage in valued activities [32]. The CA examines a person's capability to function in relation to their valued life choices instead of focusing on the utility value of a resource simply in terms of income [32]. The CA, therefore, focuses on individual well-being as a substantive opportunity for people to live a life of their choice [32–35]. One could argue that utilitarianism, in principle, also maximizes people's values as defined by an individual;

nevertheless, proponents of CA contend that it lacks its ability to enhance the personal capability to convert resources into welfare. The three core features of the CA framework include functioning, capabilities, and resources.

Functionings are the “beings” and “doings”, while capabilities are the range of doings and beings (functioning) that an individual has the freedom to choose. Resources, for example, a wheelchair, would allow a person to exercise their functional mobility needs; however, for the wheelchair to affect the required functioning, it depends on what Sen calls conversion factors. Conversion factors are the preconditions to the effective use of the resources (wheelchair), such as user skills and functional ability, accessible roads/buildings, and societal stigma, for example. Three types of conversion factors primarily referenced in the literature are personal (physical condition, knowledge and awareness, gender), social (policy, discrimination, social structures), and environmental (built environment, context of use) [36]. Another vital element of CA is the focus on the human diversity captured through an individual agency to pursue valued life goals and the diversity of people’s freedom to choose their desired functionings [23,36]. Moreover, human diversity considers individual characteristics and the environment significant in converting resources into valued functionings [37].

In the context of this study, CA offers a theoretical perspective that we use to conceptualize if and how AT enables the freedom for people to live the lives they value [31,32]. The application of the CA framework allows us to evaluate how AT as the resource enables our study participants to expand their capabilities to achieve their desired functioning. Furthermore, applying the CA will allow us to explore the personal, social, and environmental factors that may hinder or facilitate access to AT. We, therefore, use the CA framework to conceptualize the AT Passport’s role in enhancing AT’s capability to enable wellbeing and agency rather than merely providing access to AT per se [34].

2. Materials and Methods

2.1. Study Design

We used Interpretive Phenomenological Analysis (IPA) to deeply explore the participants’ lived experiences of access to AT and their idea about an AT Passport. We chose IPA because it focuses on understanding and sense-making people’s “involvement in and orientation to the world” [37]. IPA allows a researcher to ground their interpretations of lived experiences from the participant’s perspective and simultaneously go beyond the participant’s conceptualization [38,39]. IPA treats detailed first-person accounts as data and focuses on context and subtle meaning-making from single to multiple perspectives. To ensure we achieve meaning-making from multiple participants on a mutually shared topic, we explored the divergence or convergence of views and opinions [37,40].

2.2. Participants Recruitment

We recruited the study participants through a gatekeeper from a non-profit state-funded organization in Ireland that provides services to children and adults with disabilities and their families. The participants were purposefully selected based on the criteria that they have currently or previously accessed services from the organization or were associates of the AT service. Additionally, the selected participants had knowledge or awareness of the AT Passport concept based on their affiliation with this organization. We opted for purposeful sampling due to its ability to identify and select participants with rich information on the study phenomenon [40]. We provided the potential participants with a detailed information sheet on the study details, including confidentiality issues and voluntary participation. We obtained informed consent from eleven participants; however, two people did not complete the study due to difficulties with digital connectivity. We conducted nine semi-structured interviews; the participants’ demographic information is outlined in Table 1. The nine participants included two parents who participated on behalf of their children. The study was granted ethical approval from the Enable Ireland Research Ethics & Quality Committee and the Maynooth University Research Ethics Committee.

Table 1. Participants' demographic characteristics.

Pseudonym	Person Identifies as	Gender and Age Description	Life Roles
Mary (Parent)	A child with complex Communication and physical disability	Child/Female	Students
John	A person who is blind	Older Adult/Male	Retired Senior Executive Advocates for persons with disabilities
Jess	Wheelchair user	Adult/Female	Mentor for students and adults with disabilities Employee
Fiona	A person who is blind	Adult/Female	Parent Athlete
Scott	Wheelchair user	Adult/Male	Social entrepreneur Employer
Leo	Wheelchair user	Adult/Male	Employee
Garry	A person with a complex physical disability	Young Adult/Male	Advocates for persons with disabilities
Amy	Wheelchair user, Dyslexic	Adult/Female	Student Researcher Educator
Grace (Parent)	Children with Specific learning disabilities Neurodiversity	Children/Male	Students

2.3. Data Collection

Semi-structured in-depth interviews are deemed the most appropriate way of capturing data on people's lived experiences in IPA studies [37]. We collected data through online semi-structured interviews in June 2020 using video conferencing software due to government restrictions in response to the COVID-19 pandemic. Participants consented to online interviews, which was very convenient considering some of the participants selected were in an at-risk population for COVID-19 infection. Additionally, barriers such as access to transport, built environment accessibility, and additional investment in travel time did not exist due to the use of online interviews. [41]. We considered ethical issues regarding participants' wellbeing in case of distress by providing the Gatekeeper's and researcher's contact information and information on emergency services in case required. We undertook other measures, including ensuring the online platform we used was secure and obtaining additional informed consent for audio and video recording. We also offered the participants the opportunity to withdraw participation at any interview stage and to retract their data if they wished to do so [42,43]. Our interview guide encouraged open discussion, with the questions starting broadly and follow-up questions guided by the participants' responses. Participants responded to questions on their AT experiences, perception of AT service provision, understanding of the AT Passport concept, and how it may or may not contribute to access to AT. The interviews lasted approximately one hour, were audio and video recorded (only consenting participants), and the data was transcribed verbatim.

2.4. Analysis

Based on the analytic approach of IPA that strives to make sense of participants' sense-making of their lived experiences, our analysis was iterative and inductive [44]. The analytic approach acknowledges Heidegger's view, which rejects the presuppositionless approach when interpreting participants lived experiences and instead promotes reflexivity on behalf of the researcher to counteract preconceptions. Following Smith, Flowers, and Larkin's recommendations, our analysis process was committed to treating each participant at an idiographic level by progressing from the initial close, line-by-line analysis of experiential data for each person [37]. We later formulated initial experiential statements, merged a collection of personal experiential themes (PETs), and culminated by identifying the group experiential themes (GETs) as outlined in Figure 1. Our analysis engaged with the data through a process of double hermeneutic (researcher making sense of the participants' sense-making). We ensured analytical integrity by providing a narrative presentation of each theme by capturing the diversity of experiences contributing to the theme. Indeed, according to IPA, the same GET may be demonstrated differently across the participants, not just the level of agreement to a theme or the prevalence of similar experiences [37]. To support the rigour of this process, the first author received regular supervision to reflect on the GETs interpretations.

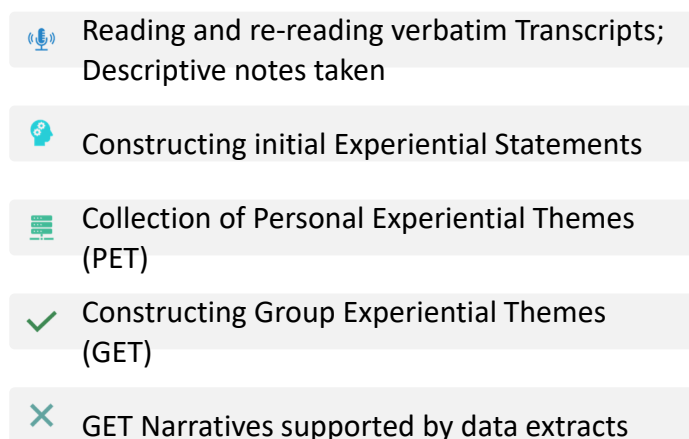


Figure 1. Process of data analysis.

3. Results

The participants shared their experiences of Assistive Technology (AT) access and use, which were richly overlapping and sometimes diverging. We identified this through detailed accounts of their everyday lived experiences of disability and the role of Assistive Technology as a mediator for participation in valued activities. A consistent focus across the participants was the human agency to live a valued life of their choice and the recognition of human diversity as a significant factor for the wellbeing of the person and the wider society. The participants further explored the potential for developing an AT passport as a capability-enhancing resource for access to AT.

We identified two group experiential themes (GET) summarized in Table 2; individual agency and the freedom to make choices; and the conceptualization of the AT passport as a capability-enhancing resource for access to AT.

Table 2. Development of Group Experiential Themes.

Initial Experiential Statements	Personal Experiential Themes (PET)	Group Experiential Themes (GET)
AT opens people’s rights to equal participation AT as a human right and failure to provide AT is a denial of the right to participate AT is essential for promoting functional ability AT enhances functional ability AT has an enabling value of promoting independent living, safety, and autonomy	Value of AT in promoting equal participation and enjoyment of life	
Fragmented AT service provision systems Lack of information on AT Lack of Communication and coordination on users’ AT requirements during transitions The lack of robust AT policy infrastructure Limited awareness of the value of AT Complex AT maintenance and repairs pathways The inexperience and competencies of AT Personnel Lack of user engagement and training in AT provision and decision-making. Abandonment of AT due to poor matching of Technology to the person	Social Contextual barriers to AT access	Individual agency and the freedom to make choices
AT Passport facilitates transitions AT Passport as a source of information on AT service provision pathways. AT Passport as a record of user AT journey including AT needs and requirements for effective Communication AT Passport to function within the broader service provision system	AT passport functionalities	
Accessibility: Conform to the highest level of accessibility standards, must reflect the diversity of user needs and self-identity, incorporate universal design and design for all features. User experience: Ease of use and simplicity at the core of the design, Communicates information clearly User Ownership: The user controls ownership of the AT Passport, user grants or denies access to others Information Security and Privacy: Ensure the Security and privacy of information contained in it. Operability into the broader system: AT Passport must operate seamlessly into the broader system	AT Passport’s Usability feature AT Passport Acceptability features	AT Passport as a capability-enhancing resource for access to AT

3.1. Individual Agency and the Freedom to Make Life Choices

Two personal experiential themes (PET) demonstrate the individual agency and the freedom to make life choices that access to AT enhances. The first PET discusses the value of AT, while the second presents the challenges and barriers to AT access.

- Value of AT in promoting equal participation and enjoyment of life.
- Social Contextual barriers to access to AT

Value of AT in promoting equal participation and enjoyment of life

The benefit of AT in enabling independence, autonomy, and choice to participate equally in society is a core recurring theme among all the participants but how and in what context the value of AT was perceived differed. Jess succinctly described AT as “Opening people’s rights to equal participation into society”. Scott compares its relative significance by asserting that AT is more than luxury but a significant capability to achieve freedom.

Scott: “For most people, technology makes things easier, but for someone with a disability, it makes things possible”.

Mary discussed how the means to communicate was essential for her daughter's basic needs and participation on an equal basis with others and further attributes failure to provide such a device to a denial of a right to communicate.

Mary: *"it's like putting sellotape over somebody's mouth, to someone's right to communication if not provided"*.

John provided a metaphor of a bridge when explaining the value of AT for people with disabilities.

John: *"It's the bridge, and I've always seen technology as a bridge between not being able to do something and actually doing it"*.

The essential value of AT is described almost as an embodiment, especially for people with physical disabilities, as Garry puts it.

Garry: *"AT is one of the top things in my life. Without AT I couldn't be as independent as I can be today. So it has been so much help"*.

Likewise, Scott gives an analogy of the significance of AT to someone with a disability to the significance legs are to others. Jess also views her AT as a lifeline without which she could not function and enjoy life. Thus, by equating access to AT as part of a human embodiment, the participants could be suggesting that denying access to AT limits the right to equal participation and enjoyment of life.

Scott: *"It's like me asking you, if you don't have legs, what difference would that make in your life? You know. That is the role that assistive Technology is played for me"*.

Jess: *"My chair and even my desk here is a lifeline I can't function without them and, I don't think people realize it you know"*.

Fiona summarizes the value of AT in facilitating freedom and the opportunity it provides her to live a life of her choice. She asserts that AT is not merely 'Assistive' but 'Enabling,' because it provides her with the capability sets for a good quality of life by facilitating independent living, safety, and autonomy.

Fiona: *"For me, like I don't call it assistive Technology, it's enabling Technology. It's enabling Technology because it just enables me to have the quality of life that I do, and it enables me to have independence to have safety to have autonomy"*.

Table 3 displays the participants expressed sentiments on the enabling significance of AT in promoting equal participation in different facets of life.

Social Contextual barriers to AT access

The participants explored the barriers to AT access that currently limits their capability to exercise their freedom. Most of the participants experienced barriers to effective AT access however, the barriers were expressed differently; some saw barriers in existing AT service provision pathways, while others provided insight from a societal and structural viewpoint. Mary and Grace allude to the presently fragmented AT service provision systems demonstrated by uncoordinated and often lack of communication pathways between and across different stakeholders.

Mary: *"The process for the client; just myself and my child. that process is made is not streamlined for me; the service should have all those ducks lined up and that is effectively my experience"*.

Grace: *"And again, you know this there is no joined up thinking, everybody is separate. The school is doing one thing. The public health nurse is doing something else, the clinic is doing something, and you know It"*.

Lack of user information on AT is a common theme for the study participants accessing AT through the State's service provision systems. For example, Grace was unaware of assessment pathways and support structures for her children due to a lack of information and guidance from the school.

Table 3. Value of AT in promoting equal participation in different facets of life.

Area of Participation	Interview Quotes
Education	<p>John: "When I was doing my master's, and I was doing it through distance learning, I could manage, I think everything. I did not feel that I needed a lot of special assistance. I felt I was working with the other students, as equals rather than as someone with a disadvantage"</p> <p>Jess: "A lot of students, I am working with would use apps in their phones. They would have dyslexia dyspraxia, ADHD, some of them have physical disability"</p> <p>Scott: "I wouldn't have been able to get an education the way I did"</p> <p>Jess: "We can never put a burden on the employer, yes, they have a legal obligation, but it is up to you to provide them with information (on value of AT) and to go away feeling this person is going to be an asset to my workforce".</p>
Promote social and economic participation	<p>Leo: It wasn't, I am a burden, I am a great cost, it was just we want you to be as productive as possible, so do you need a desk that's higher or lower, do you need a, I wanted a voice recognition software, I wanted the desk at a certain height</p> <p>Scott: "I wouldn't be able to do any of what I've done if it wasn't for that technology. Take that away and I'm reliant on others for everything I wouldn't have started a business, I wouldn't be employing people now, I wouldn't be adding into the economy, I wouldn't be paying taxes, I'd be unemployed or be on welfare. Negative cost to me for being a member of society".</p> <p>Amy: "Well, I couldn't have worked, (because of breakdown of wheelchair) I didn't work for the month, because I do enough a lot of training".</p> <p>Mary: "It's (AT) essential, she can't sit unless she's in one of these proper chairs". Because otherwise she can't feed if she's not sitting up, her head isn't supported, she cannot feed. She would definitely be lying on the bed. The other option, so my point of view, it's very important and improves her life. She can sit up, I've obviously lots of other positioning aids as well".</p>
Promoting functional ability and Independent Living.	<p>Gary: I can drive into town with my wheelchair which is six kilometers. It has been incredible for me, AT is one of the top things in my life, without AT I couldn't as independent as I can be today. So, it has been so much help".</p> <p>Amy: Like AT is part of helping people to live the philosophy of independent living. Independent living is a basic human right under the CRPD and So assistive technology is one of the elements to achieve independent living".</p> <p>John: "I have my front door camera hooked, to tell me who is at the front door, I can change my thermostat on the heating system so that I could tell it went to come on and not, So I'm using that technology"</p> <p>Scott: "I use (home) control system for opening the door controlling stuff in the House and environmental controls".</p>

Grace: "I know there's a lack there of kind of, you know, information and everything".

"I suppose, I didn't know where to go and again, I would consider myself, you know, I am educated, and I am articulate".

Mary appears frustrated by the lack of quality information on the choice of AT products and services, including customer support from the supplying companies. AT access does not end with the delivery of a piece of equipment; maintenance and aftercare are equally important.

Mary: "It's difficult to source a good range of sample products". "Some of the companies are very good to deal with, very reliable, very good at you know, follow up and support that might be needed with a new piece of equipment and others are a disaster".

Transition through education is another area lacking coordination between the health and social care and education sectors. There is a lack of Communication on users' AT requirements to facilitate continued educational participation during this transition period. Jess is frustrated with the duplication of requested information at every stage of education, and constant re-assessment of AT needs without due diligence on behalf of service providers.

Jess: "And this whole thing within education you know, when you're going from, when you are in primary school, you have a certain type of technology or a certain type of seating then you apply and go through the whole process again before you go to secondary

school, and then go through the whole process again when you go further education or higher education"

Equally, Grace is apprehensive that when her sons are ready to transition to secondary school, the system may not have organised to facilitate this transition seamlessly.

Grace: *"There's no centralized database that I can give them access to and say log in here and review my son's history and what he has used and what he needs. And here is what we would like you to help us do for his secondary education, you know"*

The lack of robust AT policy infrastructure and the limited awareness of the value of AT by policymakers is a significant structural barrier to AT access. Nonetheless, in instances where policy exists, it has been described as lacking implementation, broad and tokenistic. Fiona stresses that policymakers lack personal touch and awareness of the benefits of AT to the user and the general wellbeing of society. She continues to suggest that policies may be gathering dust on public records due to the lack of political will and the translation of the policy into practice. A case example, she stresses, is that the State's ratification of the UNCRPD provision lacks a robust actualization plan because the scarcity of financial resources is a scapegoat and any attempts at implementation are often short-sighted.

Fiona: *"I think policy makers are very distant from the reality"*.

"To say the right is enshrined doesn't help so. Policies don't really, I don't think they always benefit the people that they need to benefit".

"Sometimes it is just to tick a box and say we've tried our best, unfortunately then it's put down to lack of funding"

From his experience, Garry exerts a lack of political will and further stresses that public bodies entrusted to provide services are distant and unaccommodating. Equally, Mary alludes to the fact that policy makers are more interested in the financial implications of service delivery instead of its value and benefits to the users exacerbating the barriers to adequate access.

Garry: *"I don't think the Government really understands. I don't think the health body cares"*.

Mary: *"Honest, I know it's about money. It's always, always, always about the money. You know, finance don't care ultimately what chair it is. They want to know how much it costs and how am I going to pay for it"*.

The experience and competencies of AT Personnel in health and social care services and education are also barriers to access to AT. AT Personnel often lack understanding and clear guidelines on the AT provision pathways. Subsequently, user involvement in assessing and providing an appropriate AT is limited, resulting in the provision of AT for substandard products and eventual abandonment. John explains AT provision without user involvement results in abandonment, while Mary attributed the lack of variety and choice of AT due to inexperienced AT Personnel.

John: *"Because we were discovering separately that people couldn't, couldn't visit places to try out a technology and when they got home, they were disappointed with it or it wasn't going to do what they wanted"*.

Mary: *"My feeling on that sometimes is that they are very young and don't have a lot of experience. But they are limited there sometimes because of inexperience, not all the time"*.

Similarly, Garry reports that for people with complex physical presentations and living independently in the community, the primary care personnel, in this case, the Occupational Therapist, lack training and understanding of people's expressions. Likewise, Amy was issued inappropriate AT albeit her attempts to communicate the type of product she was looking for based on her self-expression and functional requirements. Amy was disappointed to discover that the people she assumed to be the experts were indeed not meeting her expectation.

Garry: *"I don't think the Health Service OTs are trained to deal with the level of disability I have. I need a newer shower chair, I contacted the health service looking for an OT, I said to him I needed a shower chair; he wanted to give me a shower chair that he could get from the store"*.

Amy: *"I sort of expected my OT and my physio's to be experts". So, I told them I wanted something that looked like; it didn't look like it came from 'Mars,' that it came apart. They came with a big cumbersome chair that did come apart, but it was far too heavy; it was too heavy"*

The AT Personnel lack communication skills and rely on a medical model to provide AT. Jess felt that her views were not appreciated when she was younger.

Jess: *"I felt that they didn't work with me. They had a very clinical linear idea of what, I should have or what I needed based on my diagnosis. I think it was a lack of Communication and the approach that was being used"*.

Apart from the supply chain difficulties, repairing and maintaining essential AT is often a source of frustration impacting people's quality of life. The repair and maintenance of products are not user-centred, usually take multiple layers to access, and are marred by delays. The processes for repairing equipment are very complex and confusing, and dependent on the service provider. Garry described the process with excellent details to highlight how it is not user-friendly and muddled irrelevant formalities to the person's detriment.

Garry: *"when that wheelchair breaks, I had to call the Health Service, the Health Service has to call the repair company, then the repair company could take one or two weeks to come down to assess my wheelchair; if the parts cost over 200 euros It needs to be signed off by a head OT, which could take up to another two weeks. And then the order has to be placed by the repair company, which could take another six weeks up to eight weeks, and then, by the time the parts come, It could be another two weeks before an engineer is free to come to me, so please, but how long can I wait up to 2 months to get the equipment fixed?"*

Notwithstanding the substandard AT maintenance service, the delay caused by this negatively impacts users' quality of life.

Amy: *"And it broke, and I was out without a chair for three weeks, four weeks", "So, the chair gave me the freedom to do that and connect with people and connect my networks, and I couldn't do that, so I didn't"*.

Jess: *"When technology, no matter what it is when it breaks down, a big thing to complain is that it in can take a very long time and very, very slow for people to get out their software, or their hardware, or their wheelchair, whatever"*.

AT users are experts in their own life; as such, AT provision systems should consider people's opinions and lifestyle choices when making decisions. Still, Amy narrates a situation in which her AT choices and self-concept went unnoticed during the assessment process. She received an AT that, in her view, promoted social stigma and increased additional costs to her as she tried to accommodate the piece of equipment into her life.

Amy: *"I told them I wanted something that looked like,' it didn't look like it came from 'Mars,' that it came apart"*.

Additionally, the lack of user engagement and training in the current AT system leads to inappropriate AT purchases with a negative cost to the user and the State.

Jess: *"So, all this technology was purchased but never used, and the student did not have a very positive experience"*.

John: *"Because we were discovering separately that people couldn't see couldn't visit places to try out a technology and when they got home, they were disappointed with it, or it wasn't going to do what they wanted"*.

Matching AT to the person is a very individualized endeavour; as such, recognising people's self-identity and choice based on their context of use is essential. Individual

differences should be acknowledged as a part of human diversity and incorporated into the decisions on AT.

Fiona: *“And, off course, with all sorts of Technology, it suits some people. It doesn’t suit other people, so the Technology you know it’s not just even if it is based at people with low vision, it doesn’t mean that one fits all”.*

Jess: *“In relation to using the voice-activated software, my voice is not even, you know, when I get tired, I tend to stammer and stutter. It isn’t as effective as it could be for me”.*

3.2. AT Passport as a Capability-Enhancing Resource for Access to AT

The study participants explored the concept of an AT Passport and what it means to them. For most of the people interviewed, the understanding of the AT passport concept is that it’s a person-centred and person-driven support tool with the potential to streamline the process of access to AT. However, to some of the participants the idea appears to lack clarity, primarily on how it would operate within the broader system and especially outside the traditional service provision.

We identified two PET under the conceptualization of AT Passport.

- AT Passport functionalities and,
- AT Passport Usability and Acceptability features

AT Passport functionalities

The participants highlighted the following broad functionalities regarding what the AT Passport could do for people.

- Facilitates transitions
- Source of information on AT service provision pathways.
- Enables effective Communication for easy access to AT

Facilitates Transitions

The current practice regarding duplication of information on a person’s AT needs at every transition level, for example, from primary school to secondary school and from secondary school to university, has been identified as a significant barrier to AT provision. The AT Passport is a solution to streamline this process by ensuring coordination between relevant transition stages. Mary feels at the time of transitions; valuable information could be exchanged amicably through the AT Passport by all the stakeholders to facilitate smooth transitions. Jess also makes similar sentiments arguing that the AT Passport would eliminate the stress for users caused by the completion of numerous duplicate forms at all transition stages. John also feels that the AT Passport from an early age would facilitate smooth access to AT and ensure individuals’ changing needs are reflected and evolves with Technology.

Mary: *“Well, look, you know I. I’d say it’s very important around the time of the transition from services”.*

Jess: *“As we mentioned already, when people you know transition at different points in their lives, it needs to be a seamless transition”.*

John: *“I think if people got to it (AT Passport) as it youngest age at an early stage in their disability, I think they evolve they grow with the technology as it evolves”.*

John feels the AT Passport should be a dynamic user-centered tool that facilitates the process of AT provision and moves with the person in different contexts. Similarly, Jess argues that the AT Passport would streamline the AT provision process by eliminating the duplication of information and should adapt to people’s changing needs

John: *“I think if we have a passport that gives you equipment and allows it to move with you”.*

Jess: *“when you are in primary school, you have a certain type of Technology . . . then you apply and go through the whole process again before you go to secondary school, and then go through the whole process again when you go further education or higher education. An AT*

Passport will eliminate all that, and off course your needs will change you're your needs to be, you know, re-assessed and all that kind of stuff as your needs change".

Scott demonstrated how transitions could be made easy by an AT Passport resulting in the implementation of reasonable accommodations for, for example, a student, which would significantly positively affect participation in education. Leo, too, reflecting on his childhood, thinks that the AT Passport would be beneficial during the school years because providing the proper support at this stage is crucial to a person's success in the community.

Scott: "If I was if I was moving from school to school and, the teacher, the principal came to me and said look, we have your file, and we understand you need a natural point in dragon dictation, that's no problem. We have it all set up for you. You know how much of a difference is going to make to life is massive. To know that that's not an issue and that there's an easy transition there".

Leo: "Because on top of that, especially in formative years, I think back to my own childhood, you know, if you know if you think that their main interactions are going to be between that key 8–18 phase as they are changing schools and it's picking news subjects and all of these and entering University there, the real key touch points that are going to determine how successful that person is in society".

Grace, on her part, feels that in the absence of an AT Passport, she would have to depend on recall to communicate to her child's prospective secondary school, which in her opinion, the AT Passport would have helped.

Grace: "So when we think about him transitioning into secondary school, you know, I know that we will be in there meeting with the teachers and trying to explain what's been happening, you know, and I won't have anything really".

Source of information on AT service provision pathways.

The AT Passport is an information source to help people quickly navigate the AT service provision. The participants discussed how access to information is fragmented and often uncoordinated within and between different sectors, for example, healthcare and education. Mary, for instance, in her experience, the lack of information to the user and the potential that the AT Passport has in filling the information gap is significant. Furthermore, Mary hopes that the AT Passport would be user owned to personalize what information and resources they would like to seek, such as the assessment process and funding opportunities.

Mary: "I See the AT Passport as an information tool to guide the user to access AT. I think, for me, what would be useful about an AT passport is information because in my experience, I think you need one".

Jess goes further and suggests that there is a demand for user centred, transparent, and seamless AT system that would maximise people's capabilities for living a life of their choice. Reflecting on her life, Jess thinks that the AT Passport, in conjunction with a good support structure and the awareness of its value, would have provided her with the correct information to make informed AT decisions.

Jess: "Consistency, transparency, consultation, and people need to be kept up to speed around big development in this sector and probably the opportunities that are available".

"I think if I had an AT passport, it would have been great because I think I would have been aware of what I needed and wanted, and that would have depended on how aware and how well I was supported".

Scott and Grace also believe that the AT Passport is a beneficial informational resource that would accelerate access to AT and be generally positively receptive to the concept. Grace furthermore identified a gap in the current service provision systems where access to AT is delayed due to the lack of centralised information systems; AT Passport would eliminate that.

Scott: "So I think firstly as a as a wheelchair user, the convenience of having that there and having all of that on record is. It makes sense".

Grace: *“I guess that’s where a passport would come in for people like us where we wouldn’t have to fight for all that again”.*

Fiona, John, and Leo contend that the AT Passport could benefit traditional service provision structures such as disability service providers and educational institutions; nonetheless, its implementation outside these structured services could be challenging. Leo felt that the AT Passport presented to an employer during the recruitment process could indirectly spur discrimination.

Fiona: *“It’s absolutely beneficial at the moment within service provision and within, you know, AT funding and stuff like that, but because AT is not understood or not given the benefit that it needs in the wider.”*

John: *“And if you’re in a community of special school or residential centre, you have the support, but if you’re trying to spread the whole thing in regular schooling, you know you’ll find difficulty”.*

Leo: *“The employers will say all the right things, but at the end of the day, No . . . if it’s me versus another person where the exactly the same on everything but I bring a passport with me they’re going to pick the other person like ‘passport what?’”.*

Fiona continued to suggest that the concept as she currently understands it is ambiguous on how it would interact and interface with the broader health system, for example. AT.

Fiona: *“It’s not standalone; it has to integrate into a wider thing”.*

Fiona continues to argue, like Amy, that the value and benefit of the AT Passport to the person must also be apparent and cautions against its adoption as a sole tool for people’s access to AT and recommends personal choice on its use or non-use as part of extending people’s capability sets for access to

Fiona: *“So if somebody doesn’t want to use a chooses not to use, doesn’t understand how to use it, but the system is only going to work with that like the capture, there should be another way around it, whereas if things were just set up to work on this basis of the AT passport, it’s not going to work either; there has to be options”.*

Amy: *“Right from the start, so function of the passport needs to be very clear”.*

“So like if I was, for example, to agree to have an AT passport, for example, I wouldn’t do it unless it met with my belief and the way I want to live my life”.

Enables effective Communication

The AT Passport is an effective way for people to communicate their AT choices, needs, and requirements in different contexts, as per the participants. The AT Passport could share people’s AT choices and preferences, promoting self-advocacy and self-empowerment as Mary and Amy discern in the below extracts.

Mary: *“I think the client should be saying I need XY and Z”.*

Amy: *“AT Passport potential to communicate user needs and your image as well”.*

Similarly, Jess feels that the AT Passport could hasten access to specific AT needs, for example, for a person with visual impairment, by clearly communicating their needs to a prospective school or employer and thus easing the reasonable accommodation implementation process. Leo also thought it would be beneficial, for example, to share info with AT Personnel to facilitate clinical assessment.

Jess: *“For somebody who is visually impaired, the software they need is very specific . . . if the passport follows the person, then we won’t have to be, they might need an upgrade, but at least we’re not going to wait months”.*

Leo: *“If you’ve got a situation where let me say if I interacted with a new occupational therapist, and they want to understand, you know, what they want a new piece of equipment or something I need like without meeting me or somehow assessing me”.*

Amy and Fiona see the potential of the AT Passport in prospectively informing service provision and even policy; however, it requires immense awareness raising on its use and potential benefit for the user and must be acceptable to the broader system.

Amy: *“If the AT passport is around facilitating people to live the way they want, that, needs to inform policy”.*

Fiona: *“Like a very brief example, applying for blind welfare allowance . . . is not accessible, having an AT passport and someone understanding my needs and then changing the system to make it accessible, and you know that’s fine”.*

“Hopefully that, education around the AT passport will have a broader impact that this could be a catalyst for people with disabilities and the AT users, it could jump-start something else”.

AT Passport in enabling Communication could be more effective for people who experience functional communication difficulties and who may not have the ability to advocate for themselves, as highlighted by Leo, Scott, and Amy. Fiona concurs with the benefit of AT Passport for this population in particular; nevertheless, she questions how best they could harness the communication benefit of AT Passport if, for different reasons, their awareness to self-advocate or make decisions to use it is a challenge.

Leo: *“I think when it comes to intellectual disabilities where people or anywhere where people find it harder to communicate, harder to express themselves. Obviously, the Passport is going to be more valuable”.*

Amy: *“But his wheelchair that he has is not comfortable, and he has to be moved like, lifted every hour and he has to have head support, in that he has a floppy head, but that is horrible, I know that, he doesn’t speak, but he uses AAC, but I’m sure I know he doesn’t like it”.*

Scott: *“The core target mark is who’s going to be using it will be those with the highest needs”.*

Fiona: *“I think sometimes it’s the very people that don’t think they need it are the ones that needed the most”.*

AT Passport Usability and Acceptability Features

The participants outlined two significant AT Passport core design factors, namely

- AT Passport usability and
- AT Passport acceptability features

AT Passport usability features

The design of the AT Passport must ensure it reflects the diversity of users in terms of accessibility. The AT Passport’s ability to accommodate each user’s unique personal characteristics while enabling a positive user experience is also important. The need to design it using universal features is essential to ensure it reaches a vast population. Table 4 outlines these usability features that should be incorporated when developing the AT Passport alongside extracts from participants.

AT Passport Acceptability factors

To ensure the usability of AT Passport to achieve its functionalities, the participants deliberated on acceptability features. Data protection issues, privacy and confidentiality of information, ownership, broader systemic concerns, and user interface were also imperative. Table 5 outlines these acceptability features that should be considered when developing the AT Passport alongside extracts from the participants.

Table 4. AT Passport usability features.

Usability Feature	Interview Extract
Accessibility	Grace: "So I guess the accessibility of the user interface would be important too because you know it has to be friendly to somebody who may have some additional needs". Scott: it's fully digital, digitally accessible so that it works across screen readers in browsers and fonts and colours and all of that type of thing; you get up to the highest level of Accessibility standards". Scott: "You need to think in terms of universal design so that the least technical person can use it with the most technical person".
User experience	Amy: "I think identity, how you identify yourself as well. So like I'm quite safe and identify myself as a disabled". Jess: "First of all, it has to be able to be used to the lifestyle of people". Scott: "That's user experience, and simplicity is key". That is so easy that I don't need any sort of training or anything to understand how it works, then that's a given". Leo: "keeping it pretty high level, quite simple, before you get into the details, and then you can layer it up". Amy: "I think identity, how you identify yourself as well. So like I'm quite safe and identify myself as a disabled" Jess: "First of all, it has to be able to be used to the lifestyle of people".

Table 5. AT Passport proposed Acceptability features.

Acceptability Features	Interview Extract
User Ownership	Mary: "I think an AT passport would be useful to give, I suppose, a manager role to the person. Leo: "You make the user in charge of their own data, and then they can constantly update it as the situation changes". Grace: "You would own the Passport, you as the parent would own the file if you like". Grace: "You would be able to grant access to a viewer to go in and read the file, and then you could withdraw that access if you needed to at any point". Amy: Data is information, and like privacy is important, but it depends on who has, who has you know who has access to that information, as opposed to data. Data protection is huge". Scott: "In this day and age, security obviously is a rule, but the way technology is built that is part and parcel of it, and so that should be built in from the start". "That would have all the security and everything built into it".
Information Security and privacy	Amy: "But if you secure it in a way that it can't be viewed by everybody or it can't, it couldn't be used to damage a person Grace: "I guess you know data security is huge, so even where the data is stored, you know if you're using a digital provider, you know, you need to have that done through European Union, you know, a data warehouse for example". "I suppose particularly in light of, you know, the likes of GDPR and the sharing of sensitive medical data". Leo: "You, that person then is, bound by GDPR and everything else". "You will be put it in the cloud, put it in the cloud just you know it's going to be secure and everything else". Leo: "let's say I'm interacting with a government agency, they can send me a key, and then I can put that key, and I give that person access to a level of disclosure, be it light, medium, or full". Grace: "If there was information in the Passport that there would be, I guess a requirement that it would have had to have been verified or approved at some stage to get there. So that we can be sure that it's correct, and I guess the integrity of the Passport is not doubted".
Operability into the broader system.	Fiona: "It's not standalone; it has to integrate into a wider thing. But to try and reach the widest audience, it's not only to create the Passport, but it's also to empower people and educate people to the benefits that this will have for them". Leo: "The user would require a new interaction to understand about them". John: "I think you also need something as a backup to you to actually support it".

4. Discussions

Our aim in this study was to understand people's lived experiences of access to AT, including the meanings and values people ascribe to AT in their lives. We explored the personal, social, and environmental factors that may have facilitated or hindered their

endeavor to access AT. Furthermore, we explored the participants' insight into the concept of an AT passport, a proposed person-centred resource for facilitating access to AT.

The value of AT in enhancing people's opportunities to live a life of their choice was seen as promoting people's freedom to exercise their agency. Access to AT was understood as expanding people's capabilities (what people can be or do) and promoting quality of life. Freedom for an individual to choose the lives they value and have a reason to value is an essential tenet of Sen's capability approach [45]. The inherent significance of freedom is the choice people have to use the opportunities presented to them to achieve the functioning of value to them [46]. The findings from our study show the intrinsic aim of access to AT is to expand people's capabilities for equal participation and enjoyment of life. The freedom to decide on what capabilities are relevant depends on the person's values and the functioning they want to achieve [31]. Some of the powers that access to AT our participants felt were relevant in their lives include opportunities for independent living and equal participation in society's social, political, and economic facets. Access to AT in enhancing people's capabilities, options, and motivation to live a quality life has been widely highlighted [16,36,47,48]. Indeed, the Global Report on Assistive Technology asserts that the lack of access to AT significantly impacts people's opportunity to access education, livelihood consequently, has a negative value to the individual and societal wellbeing [2].

According to CA, people benefit from resources such as AT to realize their freedoms and enhance their well-being. However, translating the resources (AT) into functionings or capabilities depends on personal, social, and environmental factors, which Sen collectively calls the conversion factors [19,49,50]. These factors could hinder or facilitate people's ability to translate resource availability into functioning [51]. This view suggests that the availability of AT, for example, is by no means directly related to the real opportunity to achieve one's life goals and that all the personal and social environmental factors may either act as barriers or facilitators to the valued functionings [50,52].

Our study identified that people seek to enhance their functional abilities and are motivated to live a life they value. The benefit of AT in enabling people to achieve their desired functionings is clear from our study; however, social contextual barriers to AT exist, limiting people's opportunity to benefit from it. Lack of awareness and knowledge on AT, including the process of accessing a product or service, is a significant barrier [53–55]. The lack of user engagement in the AT selection process, including the disregard for user self-identity and preferences at the AT decision-making stage, is also a significant barrier [47,56,57]. Indeed, lack of user engagement and poor matching of the end user needs, and the required technology often leads to the non-use of products and an increased rate of AT abandonment, consequently, promotes social exclusion, with additional increased cost to the person and public resources [15,58–61].

The social and environmental factors that may facilitate or hinder access to and use of AT include societal awareness of the value of AT, availability and competencies of AT Personnel, local and international policy infrastructure, and AT service provision systems [15]. We found in our study that the lack of strategic implementation of the provisions of UNCRPD, the lack of political will, and inadequate local policy infrastructure are significant social contextual barriers to access to AT. Furthermore, AT service provision, where available, is fragmented, uncoordinated, and highly medicalized. Indeed, suggestions on poorly organized AT service delivery systems on poor outcomes and recommendations to establish cohesive AT systems have been made before [19,25,62]. Developing an AT service provision system and policy environment that harnesses the diversity of people's needs and valued functionings would enhance people's well-being. [16]. Furthermore, to optimize the benefit that AT offers, thorough recognition of social contextual factors that may hinder or encourage a person functioning as conceptualized in the ICF requires attention [20]. In this regard, access to AT should consider a person's needs in their dynamic relationship with their environment to maximize its potential.

Our deliberation has explored the freedom people with a disability seek to optimize their opportunities to engage in their desired functionings and the central role AT plays

in supporting these capabilities. Nevertheless, we found that the possibility to convert AT into real and new opportunities is hampered by personal and social environmental barriers. The application of the CA framework therefore allows us to examine how we can translate the conversion factors positively to ensure access to AT is converted into opportunities and functionings [63]. To help address these barriers, the participants in this study discussed what an AT Passport means to them and the potential it may have. The bottlenecks in AT service provision due to uncoordinated service delivery systems operating under poor policy infrastructure hugely impact the ease of access to AT; as such, the AT Passport is understood as a resource with the potential to support coordinated access to AT information and associated supports, including funding, selection of products, maintenance, and training. The AT Passport was also thought of as an information resource to help communicate user needs during transitions by ensuring the seamless transfer of required technology. Additionally, the AT Passport, designed and developed with a focus on the user at the core of service delivery decisions, could increase the acceptability and use of AT and subsequently inform policy and practice.

For the AT Passport to achieve its proposed functionalities, design and development must incorporate features that make it work. The AT Passport should consider the diversity of user needs and their contextual realities through its usability and acceptability features. The participants in our study are drawn from a diverse group; parents, varying age, different genders, functional ability and educational background. This diversity offers an opportunity to reflect on what each person values AT for, and what specific barriers to AT that each person would want their AT Passport to moderate. Furthermore, we found in our study, the differences in our participants use of AT ranging from supporting functional ability to full participation in social and economic life. Adopting a universal design or design for all principles in the development of AT Passport may help provide an opportunity for broader usability and acceptability [64–66]. AT Passport can potentially position the AT users as central to AT provision systems, recognizing them as experts in their lived experiences. It could also offer an opportunity to steer away from the traditional clinician-led medical model to a collaborative systems approach to service delivery [67,68]. The WHO's GATE initiative promotes a people-centered AT system model based upon five strategic factors, often referred to as the 5 P's (People, Product, Personnel, Procurement, and policy) to affordable access to AT [1,2,19,69]. The inadequate AT service provision systems and information barriers to access AT are essential elements that the AT Passport aims to narrow and enhance people's capabilities. Understanding and knowledge of the benefit of and access pathways to AT impacts users' acceptability and use and aids in societal AT awareness, consequently reducing stigma [15]. The 10P approach—incorporating the additional Ps of partnership, place, pace, promotion, and procurement highlights those additional issues that relate strongly to the conversion factors within the CA. These factors determine in more local contexts if access to AT is likely to be supported through effective system integration for the user to realize the potential benefits of AT.

Designed and developed adequately, the AT Passport has immense potential to lower the access gap by improving people's personal and social contextual capabilities to ensure access and benefit from AT. Although our literature search did not identify similar innovations to AT Passport that purport to increase access to AT, the AT Capability Building Framework claims to be a person-centered innovation to improve AT users' capabilities [70]. This framework could help build the personal capabilities of AT users; however, it does not seem to highlight other macro-level social contextual factors and their impact on improving AT access. Another promising innovation is the My Assistive Technology Outcomes Framework which seeks to provide an information resource for users, consumers, and AT stakeholders regarding their AT outcomes [71]. This tool also has the potential to inform policy and practice by utilizing data emerging from it through systemic advocacy. AT passport development could therefore gather inspiration from similar concepts. We thus argue that the person-centered approach to the AT Passport concept has the potential to improve

people's capacity to access and use AT to accomplish their valued goals, subsequently improving individual wellbeing.

5. Conclusions

In this study, we attempted to understand our participants' journey to access AT and what it means in their endeavours to live a life they value. We used a participatory approach supplemented by an IPA to help us make sense of our participants' sense-making of their individual lived experiences and the convergence and divergence of their views in the context of their social environments. The CA framework helped our analytic process to situate the AT's significance in expanding people's capabilities or potential to achieve their valued life goals.

Our findings re-affirm that access to AT is a precondition to the enjoyment of human rights and equality of participation. We further identified that the availability of the resource AT does not necessarily equate to the achievement or opportunity to achieve the required functioning if the substantial personal, social, and environmental factors that may hinder or facilitate it are absent. We argue that AT Passport is an innovative person-centred capability-enhancing resource with the potential to moderate the personal and social contextual barriers to AT. Informed by the CA framework, we propose that the design and development of the AT Passport acknowledges the diversity of user requirements to ensure quality access to AT and subsequently augments people's capability set to live a life they value.

6. Implications for Future Research and Practical Applications

Considering value user engagement and ownership is a precondition to acceptance of any innovations or service delivery systems, it is imperative that the further design and development of AT Passport and other similar initiatives in general build on the findings of this study. Specific to the AT Passport, we seek to operationalise the concept by conducting a follow-up study. This study further identifies the AT Passport functionalities and Acceptability features for implementation. We will strive to identify and model the design of an AT Passport through engagement with users. This stage ensures the AT Passport is designed and developed inclusively and functionally. We'll seek to draw inspiration from studies and approaches that promote inclusive design and design for all systems to ensure broader acceptability [66–68].

7. Limitation of the Study

This study is part of the first author's ongoing PhD research project, and the confidentiality of the data is extended to the supervisor only; hence, the bulk of the analysis was completed by the first author and, as such, a potential source of bias. To ease this issue, however, regular supervision supported the credibility and integrity of the data and interpretations. We recognize that our study reviews participants' experiences of and ideas about AT and an AT passport from the perspective of only one service-providing organization. Other service providers and service users may have different practices and views.

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