Investigating the Potential of Assistive Technology Passports for Enhanced Access to Assistive Technology and the Development of an Implementation and Adoption Framework

Mohamed I. Maalim

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Research Supervisor: Prof. Malcolm MacLachlan

Head of Department: Dr. Michael Cooke

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List of Acronyms

AT	Assistive Technology
ATP	Assistive Technology Passport
CA	Capability Approach
CCA	Constant Comparative Analysis
DAT	Digital Assistive Technology
GATE	Global Cooperation on Assistive Technology
HAAT	Human, Activity, Assistive, Technology
ICF-DH	International Classification of Functioning, Disability and Health
IPA	Interpretative Phenomenological Analysis
MDT	Multidisciplinary Team
MAP	Maynooth University Access Programme
PHR	Patient held record
PhD	Doctor of Philosophy
RCT	Randomised Control Trial
SDG	Sustainable Development goals
UN	United Nations
UHC	Universal Healthcare
WHO	World Health Organisation
UNCRPD	United Nations Convention on the Rights of Persons with Disabilities

Declaration

The work presented in this thesis has not been submitted for any other degree or professional qualification and is the result of my independent work.

Mohamed I, Maalim

31st October 2023

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Abstract

This research addresses the critical need for improved access to Assistive Technology (AT) for people with disabilities, guided by human rights frameworks and a growing global emphasis on inclusive technology. This research investigates the potential of an AT Passport as a solution for improving access to Assistive Technology. This proposed passport would be a centralised, personalised document outlining an individual's AT needs, preferences, and recommendations. The research aims to understand existing barriers to AT access, define the potential role of the AT Passport in overcoming these barriers, and develop a framework for its implementation and adoption. To achieve these aims, the research unfolds in four distinct phases, employing a pragmatic, exploratory sequential mixed-methods design to explore the feasibility and impact of an AT Passport.

The research commenced with exploring the lived experiences of individuals with disabilities and their access to AT, utilising Interpretative Phenomenological Analysis to uncover existing barriers and understand the potential value of an AT Passport. Informed by these qualitative insights, a quantitative survey was conducted to gather statistically grounded data on AT use patterns and challenges. Concurrently, a Delphi study engaged expert AT user participants to achieve consensus on a core set of functionalities and design features for the AT Passport, ensuring the framework is deeply rooted in lived experiences and user needs.

The research culminates in developing a comprehensive and user-centred AT Passport framework by synthesising the qualitative and quantitative findings and incorporating the Delphi consensus on essential functionalities and design features. This framework provides concrete recommendations for designing, developing, and implementing the AT Passport, ensuring its integration within existing support systems and promoting long-term sustainability.

An AT Passport is needed to create a more inclusive future for people with disabilities by improving access to assistive technology. While promising, the current AT Passport framework has limitations. Further research is needed to refine the framework and maximise its impact.

Publications associated with this research.

1. Maalim, M. I., & MacLachlan, M. (2022). The Assistive Technology Passport: A Resource for Enhancing Capabilities as a Result of Better Access to Assistive Technology. *Societies*, *12*(6), 182.

2. Maalim, M., MacLachlan, M., Long, S., O'Donnell, J., Ahern, S., & Gilligan, J. Access to Assistive Technology: A descriptive review and application of the systems-thinking approach in the conceptualisation of the Assistive Technology passport. Global Perspectives on Assistive Technology, 489.

Acknowledgements

Chapter 1: Introduction

1.1 Introduction and Research Scope

"While technology makes things easier for most people, it makes things possible for persons with disabilities." This powerful statement, originally made by Mary Pat Radabaugh, the former director of the IBM National Support Centre for Persons with Disabilities, and echoed by Scott, a participant in our qualitative study, underscores the transformative potential of Assistive Technology.

Assistive Technology is pivotal in empowering disabled individuals to live independent and fulfilling lives, fostering their full participation and inclusion in society. Recognising AT as a human right, the Convention on the Rights of Persons with Disabilities underscores its importance in upholding the principles of accessibility, reasonable accommodation, and equal opportunities for all(1). However, despite global initiatives and frameworks, a stark reality persists: millions of individuals worldwide need access to AT(2). This thesis explores the capacity of the Assistive Technology Passport (ATP) to reshape the Assistive Technology landscape for people with disabilities and individuals across their lifespan. Recognising that technology can significantly enhance everyone's lives, this research emphasises the unique role of AT in bridging gaps in physical or cognitive abilities, ultimately promoting independence, inclusion, and improved quality of life for people with disabilities(3-7).

AT is widely acknowledged for its instrumental role in facilitating the involvement of people with disabilities, those ageing with disabilities, and individuals with chronic conditions in various social, economic, political, and cultural spheres(3-5). Assistive Technology is an umbrella term for assistive products and their related systems and services; it is critical for enabling and promoting the inclusion, participation, and engagement of persons with disabilities in various areas of society.

Assistive Technology is generally defined as a cohesive blend of the service delivery system, associated services, and specific assistive products(4). AT systems incorporate the processes, procedures, policies, and infrastructures that aid in evaluating, supplying, maintaining, and utilising Assistive products. The products

include devices, software, or tools designed to sustain or enhance a person's functional involvement(8). Assistive products can significantly improve cognition, communication, hearing, mobility, self-care, and vision. These products range from physical aids like wheelchairs, glasses, hearing aids, and cognitive supports to digital solutions like software and apps that aid communication, time management, and monitoring.

The Global Report on Assistive Technology emphasises a people-centred service delivery model(4). The philosophy of the people-centred Assistive Technology model is that the users are not passive recipients of Assistive Technology but are active partners in the pathway to Assistive Technology access(9, 10).

Guided by human rights frameworks and informed by an understanding of the evolving global landscape, this thesis unfolds through multiple research phases to develop and refine the ATP concept. This research adopts a pragmatic mixed method explorative sequential design, integrating qualitative and quantitative insights to understand the research problem. The research design will involve the following phases:

- **Qualitative Phase:** Employing Interpretative Phenomenological Analysis, this phase examines individual experiences with Assistive Technology, laying the groundwork for the ATP's development.

- **Quantitative Phase:** Survey work provides a statistical understanding of AT utilisation across diverse environments, including educational settings where AT plays a pivotal role in shaping capabilities.

    Concurrent Delphi Study: Running parallel to the quantitative phase, this study engages a panel of expert AT users, drawing upon their lived experiences to iteratively shape and refine the ATP.

- **Integration Phase:** This final phase synthesises findings from the qualitative and quantitative phases, incorporating expert perspectives from the Delphi study to design a comprehensive and user-centred ATP framework.

This thesis aims to significantly contribute to the field by investigating these facets of the AT landscape and employing a multi-phased research approach. The goal is to design and advocate for a sustainable and impactful ATP that empowers individuals with disabilities, promotes inclusivity, and ensures equitable access to the transformative power of technology.

1.2 Right to Assistive Technology

The international legally binding human rights document, the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), assures the dynamic participation of disabled individuals in political, social, economic, and cultural life(11-13). The Global Report on Assistive Technology acknowledges AT as a stipulation for equal enjoyment of life per the CRPD measures(4). Various articles in the CRPD affirm the right to AT, indicating more expansive research and development for all types of AT, promoting affordable and accessible Information, Communication, and Technology, and emphasising the training of users and professionals in all AT aspects(14). The relationship between AT and achieving the UN's sustainable goals, a fundamental pillar of universal health coverage, is unquestionable(15-17).

Despite the global right to AT, many individuals still have unmet AT needs(4, 18). Most current AT systems do not effectively engage the end-users, leading to difficulties accessing AT(7, 19). AT can benefit individuals with disabilities, but significant obstacles prevent widespread access and use. These obstacles include high costs, limited awareness, inadequate infrastructure, lack of training, issues with personalisation, policy challenges, and sustainability concerns(20-22). Additionally, if available, the provision of AT services tends to be disjointed, lacking coordination, and overly influenced by medical factors. It has been previously established that unstructured AT service delivery systems can negatively impact results, and proposals have been recommended to create more unified AT systems(23-25).

Ensuring access to AT is not just the responsibility of individuals with disabilities. Societal structures, organisations, and governments also have a role to play in

facilitating access and breaking down barriers(26). Equally crucial is the necessity of reshaping societal attitudes and systems, including education, healthcare, and infrastructure, to support the deployment of AT solutions at scale(27).

Efforts to improve access to Assistive Technology and address these barriers require a multidisciplinary approach, including policy, infrastructure, education, and economic considerations(4). Additionally, a collaboration between stakeholders such as governments, healthcare professionals, Assistive Technology developers, and disability rights organisations is essential to ensure that Assistive Technology is accessible, affordable, and effectively meets the needs of individuals with disabilities(10).

1.3   The Importance of Assistive Technology

The Convention on the Rights of Persons with Disabilities recognises the right to access and use Assistive Technology as a crucial aspect of upholding the rights and inclusion of persons with disabilities(12). As the CRPD outlines, Assistive Technology is a powerful tool that empowers people with disabilities to lead independent and fulfilling lives. By providing access to appropriate equipment and devices, AT supports daily activities and enables the full exercise of rights and freedoms. This underscores the significant role of AT in fostering social inclusivity and promoting independence.

Although not directly stated as a human right within the CRPD, AT's pivotal role in promoting equal participation is underscored throughout the Convention(14, 28). The CRPD recognises Assistive Technology as essential for realising the full and equal enjoyment of human rights by persons with disabilities. Accessibility, encompassing AT, is a core principle of the CRPD and is a fundamental requirement for realising other rights included in the Convention(29).

1.3.1   AT and Global Initiatives

The provision of AT is key to Universal Health Coverage (UHC) as it promotes independence and quality of life for people with disabilities(14, 16, 28). AT availability not only enhances access to essential services and supports daily tasks

but also enables broader societal participation(30-33). Assistive Technology is a precondition for realising all human rights because it facilitates the inclusion and full participation of individuals with disabilities in all aspects of life. AT enhances individuals' functional capabilities, allowing them to engage in educational, employment, and social activities, thereby achieving equality of opportunity. This directly ties to several human rights, such as the right to education, employment, health and participation in social and cultural activities(1, 14, 34). By providing devices, software, or equipment, AT serves as a foundational tool for enabling these rights, making it a precondition for their realisation(4).

Furthermore, AT's cost-effectiveness in managing health conditions reassures us that it aligns with UHC's objectives of improving health, preventing financial strain, and ensuring access to quality care(15, 16). AT's availability enhances access to essential services, supports daily tasks, and enables wider societal participation. Moreover, AT helps manage health conditions cost-effectively, adhering to UHC's objectives of improving health, averting financial strain, and ensuring access to quality care.

AT significantly contributes to achieving several Sustainable Development Goals set by the United Nations (16).

For example:

- **SDG 3:** AT improves health outcomes for people with disabilities or chronic diseases, increases life expectancy, and reduces the need for healthcare services.
- **SDG 4:** AT allows individuals with disabilities to access educational materials and engage in learning environments, promoting inclusive and equitable education.
- **SDG 8:** AT enables people with disabilities to participate in the workforce, contributing to economic development.
- **SDG 10:** AT promotes the social, economic, and political inclusion of persons with disabilities, reducing societal disparities.

These examples demonstrate AT's crucial role in meeting multiple SDGs, reflecting its broad benefits and impact on individuals and societies(14-16). Similarly, the World Health Assembly Resolution calls upon member countries to improve access to AT within universal health and social coverage by developing, implementing, and strengthening relevant programs and policies(17). The resolution encourages member states to research and develop to improve global access to AT.

The World Health Organization's Global Cooperation on Assistive Health Technology initiative, launched in 2014, aims to bridge the accessibility gap in AT(3). GATE strives to reinforce global strategies like the UNCRPD and the SDGs by suggesting measures to help member states enhance AT access for all in need (35-37).

1.3.2   GATE's Five Ps Framework

The GATE initiative aims to guide research to improve access to high-quality and affordable Assistive Technology. It accomplishes this through five priority categories:

1. **Developing effective policies promoting AT access:** This aligns with the "Policy" aspect of the Five Ps, emphasising the need for supportive legislation and regulations.
2. **Creating sustainable systems for AT provision** aligns with the "Provision" aspect, focusing on establishing reliable and accessible supply chains and service delivery models.
3. **Identifying and promoting best practices in AT service provision:** This theme emphasises the importance of sharing knowledge and successful approaches to ensure high-quality services, aligning with the "Personnel" aspect by promoting training and capacity building.
4. **Enhancing understanding of AT provision and use:** This theme focuses on research and data collection to inform policy and practice, contributing to a better understanding of user needs ("Person") and contextual factors ("Place").

5. **Capacity building amongst those delivering AT services:** This directly addresses the "Personnel" aspect, highlighting the need for skilled professionals to provide appropriate AT services.

These categories are designed to work in conjunction with GATE's core five strategic "Ps":

- **Person:** Recognizing the individual at the centre of AT use and their unique needs and preferences.
- **Policy:** Ensuring effective and inclusive policies that promote access to AT.
- **Products:** Promoting the development and availability of appropriate, affordable, and high-quality AT products.
- **Personnel:** Ensuring adequate training and capacity building for personnel involved in AT service provision.
- **Provision:** Establishing sustainable and equitable systems for providing and delivering AT services.

The "Person" is central to the interplay among AT products and services, requisite personnel offering services, and across-the-board policy and provisioning systems. Recognising that different contexts (community, region, or country) require tailored approaches, GATE has identified five additional "Ps":

- **Promotion:** Raising awareness and advocating for the importance and benefits of AT.
- **Place:** Ensuring AT access in various settings and environments, considering geographical and contextual factors.
- **Pace:** Adapting to the evolving needs and technological advancements in AT.
- **Procurement:** Establishing efficient and transparent procurement processes for AT.
- **Partnership:** Fostering collaboration and partnerships among AT research, development, and provision stakeholders.

These ten "Ps" provide a comprehensive framework for guiding research and interventions aimed at improving access to quality and affordable AT globally(2, 3, 23).

1.4 Global Unmet Assistive Technology Needs

Only around one in ten individuals who require AT have access to it, which equates to approximately 1 billion people globally. This figure is projected to double by 2050 due to ageing populations and increasing chronic diseases(4, 17). The extent of these unmet needs is particularly notable in low-income and middle-income countries, where high costs, lack of availability, limited awareness, and inadequate policies or service systems often hinder access to AT. Additionally, issues such as the need for more user involvement in AT design and selection and a shortage of trained personnel exacerbate these problems, leading to low adoption rates and frequent abandonment of AT devices(18, 38-40). To address these concerns, global initiatives, such as the WHO's GATE initiative, aim to enhance access to high-quality, affordable AT for everyone who needs it(10, 41, 42).

Despite the acknowledged importance of Assistive Technology, there are substantial worldwide unmet needs(18, 20, 38). Various factors contribute to this shortage, including inadequate awareness about Assistive Technology, a lack of suitable products or services, financial restrictions, and a shortage of skilled personnel(7, 40, 43). Moreover, policies, regulations, and standards for Assistive Technology often need to catch up to what is required(6, 9, 36). The report emphasises the need for proactive and collective action to bridge this gap. This includes policy support for developing and using assistive technologies, increased awareness and service delivery, and research and development(44). It also underlines the importance of placing users at the centre of efforts to address unmet Assistive Technology needs(23, 45-47).

The active involvement of users drastically affects the successful adoption and use of Assistive Technology devices(48-50). User participation in the design and selection phase ensures that the AT aligns with their specific needs and preferences, which results in higher adoption rates and efficient use(19). User engagement also encourages a deeper understanding of their unique skills and the

environmental constraints that might impact the device's use. This understanding facilitates the customisation of AT devices to match each user's needs, promoting user-friendliness, satisfaction, and sustained use(6, 51). Indeed, a lack of user participation can lead to poor alignment between the product and the user's needs, often resulting in device abandonment or under-utilization(19, 39, 50, 52). This emphasises the key role of user-oriented design and selection processes in promoting successful AT adoption(10, 19, 25).

The involvement of users in the adoption process of Assistive Technology devices provides various benefits, creating a more user-oriented approach(50). User engagement enables tailored solutions, allowing AT devices to be customised based on individual needs and personal preferences, enhancing the technology's effectiveness and use(10, 53). This involvement typically leads to higher user satisfaction, as they participate actively in the process, leading to devices that are truly useful and suited to their situation, actively contributing to improved adoption rates. Moreover, user involvement bolsters understanding of their unique abilities, guiding the development or selection of devices that accurately meet individual needs. It also decreases the likelihood of device abandonment, as the selected or designed devices are more relevant and suitable, fitting their needs closely(19, 50, 54). Furthermore, user involvement in the selection or design process facilitates learning, enabling users to use the technology effectively. Therefore, user involvement becomes critical in ensuring the successful and sustained use of Assistive Technology devices.

1.5 Systems Approach to Assistive Technology

While previous sections have highlighted the importance and global efforts surrounding Assistive Technology, moving beyond the individual importance of Assistive Technology requires a transition from linear thinking to a more holistic, systems-based approach. This approach views a "system" as a complex whole of numerous components that interact, interconnect, interrelate, and depend on each other. The idea is to understand the individual parts and their interactions and how these create the system's overall behaviour(55, 56).

1.5.1 What is Systems Thinking?

Instead of viewing elements in isolation, systems thinking considers the entire AT landscape as a complex web of interconnected components, recognising that individual parts and their interactions shape the system's overall behaviour. Various elements persistently interact within a system as they adapt and modify over time. Changes in one part of a system may cause a domino effect, directly or indirectly impacting other parts(57). Recognising these interrelationships and potential influences is critical when executing changes, given that they can extend their effects broadly, affecting the system's overall functioning and results.

1.5.2 Why is Systems Thinking Important for Assistive Technology?

Systems thinking is essential for improving access to and the effectiveness of Assistive Technology because it considers every component of the AT ecosystem. This includes the users, products, personnel, policies, and provision systems, acknowledging their interconnectedness(23, 47, 58, 59). By adopting this comprehensive perspective, systems thinking offers several key benefits:

- **Holistic Understanding:** Provides a comprehensive view of the AT landscape, moving beyond isolated components to understand the complex interplay within the system.

- **Effective Problem Solving:** By understanding the system's interconnectedness, more practical and sustainable solutions can be developed to address AT access and implementation challenges.

- **User-Centred Focus:** Shifts the focus from individual components to the user experience within the system, leading to more user-centric design, policy, and service delivery.

1.5.3 Applying Systems Thinking to Assistive Technology

Systems thinking can be applied to various aspects of Assistive Technology:

- **Policy Making:** Developing policies that consider users' needs, promote innovation, and ensure equitable access to AT requires a systems-level perspective(5, 51, 60).

- **Product Design:** Designing AT products that are user-friendly, functional, and meet diverse needs requires understanding user needs within the broader context of their lives and the AT ecosystem.

- **Service Delivery:** Effective service delivery models consider the entire user journey, from assessment and device selection to training, support, and follow-up, recognising the interconnectedness of these stages.

1.5.4 Interdisciplinary Collaboration

Systems thinking encourages collaboration between stakeholders from different disciplines, such as engineers, therapists, policymakers, and users, to develop comprehensive and user-centred AT solutions(6, 35). This aligns with the holistic perspective of the International Classification of Functioning, Disability, and Health, which emphasises how an individual's social and situational environment can affect their well-being(61).

This thesis draws from a user-centred, interdisciplinary approach to Assistive Technology provision grounded in the principles of systems thinking. Recognising that an individual's well-being is deeply intertwined with their social and situational context, this research identifies socioeconomic, cultural, and policy-related barriers to AT access. To overcome these interconnected barriers, the thesis proposes a multifaceted strategy that integrates expertise from various disciplines with the lived experiences of AT users. This participatory approach is crucial for developing functional, user-centred solutions that seamlessly integrate into individuals' lives, ultimately promoting greater participation, independence, and quality of life(6, 9).

1.6 Bridging the Gap in Assistive Technology Access: Investigating the Potential of the AT Passport

Research highlights a significant disparity in access to Assistive Technology globally, particularly impacting lower-income regions(4). This disparity arises from various factors, including high costs, limited awareness, inadequate policies, and subpar service systems(10). Additionally, limited user involvement in AT development and a shortage of trained professionals contribute to low adoption rates and frequent abandonment of AT devices(18). This research investigates the

potential of the AT Passport, a proposed concept, to bridge this gap and promote a more equitable and user-centred approach to AT provision.

1.6.1 Meeting User Needs: The AT Passport Concept

Ensuring that an individual genuinely benefits from access to AT necessitates significant user involvement so that the system can aptly cater to their needs(9). In response to this need, an AT Passport was proposed in a joint report by Enable Ireland and the Disability Federation of Ireland in 2016 to improve Assistive Technology service provision in Ireland(24). The report called attention to Ireland's disorganised and poorly coordinated AT system and championed the development of an AT Passport. This user-focused tool aims to guide individuals through the AT service system, positioning the user at the heart of the process. It assists in clearly defining individual AT needs and provides easy access to critical information about the assessment, financing, training, and maintenance of AT products.

This PhD thesis will explore the AT Passport idea, refine its conceptualisation, and offer recommendations for its design, development, and implementation. The AT Passport is envisioned as a unified system designed to enhance the user-centricity of the AT experience. It aims to achieve this by documenting:

- **User Profile & Needs:** A detailed profile capturing the individual's unique requirements, preferences, abilities, and goals related to AT use. This includes documenting any diagnosed conditions or functional limitations relevant to AT needs.
- **AT Journey & History:** A chronological record of the individual's experiences with AT, including past and present devices, modifications, repairs, and evaluations. This also encompasses funding sources, acquisition methods, and any challenges encountered.
- **Support Network & Training:** This document documents the individual's support network, including healthcare providers, AT professionals, and personal contacts involved in their AT journey. It also includes information about completed training programs, accessed resources, and ongoing support needs.

By centralising this information and fostering communication among stakeholders, the AT Passport is envisioned to empower users to actively manage their AT needs, facilitate continuity of care, and promote more effective and personalised service delivery.

1.6.2   Person-Centred Approach at the Core

The AT Passport concept is fundamentally rooted in a person-centred approach. It prioritises individual needs in terms of:

- Functional Capabilities
- Participation requirements
- Necessary system supports

By recognising and respecting users' unique circumstances and preferences, the AT Passport, if successfully implemented, could promote a tailored approach to AT provision(23). This personalised approach is anticipated to lead to:

- Better alignment with appropriate AT products and services
- Increased user satisfaction
- Greater consistency in AT use(19, 52).

1.6.3   Addressing Disparity in AT Access: The Potential of the AT Passport

This research investigates the potential of the AT Passport to reduce the significant disparity in global AT access. The AT Passport could improve affordability, promote awareness, facilitate training, and encourage user involvement by centralising and streamlining information about an individual's AT needs and history; the AT Passport could:

- **Improve affordability and funding allocation:** A centralised record of AT needs and funding history can help individuals and service providers navigate complex funding landscapes and advocate for appropriate financial support.

- **Promote awareness and knowledge sharing:** The AT Passport could serve as a platform to raise awareness about available AT options and resources. This can empower individuals to make informed decisions about

their AT needs and connect them with relevant services and support networks.

- **Facilitate training and capacity building:** By documenting necessary training requirements, the AT Passport can highlight the need for increased training opportunities for both users and professionals. This can contribute to a more skilled workforce capable of providing appropriate AT services and support.

- **Encourage user involvement and feedback:** The AT Passport can empower users by giving them a central role in managing their AT journey. This can lead to more user-centric design and development of AT products and services, ultimately increasing adoption rates and reducing abandonment.

By addressing these key areas, the AT Passport, as investigated in this research, holds the potential to bridge the gap in AT access and promote a more equitable and inclusive society for individuals with disabilities. However, further research and development are necessary to understand its implications and feasibility fully.

1.7 The Irish Context: Challenges and Opportunities for the AT Passport

This PhD research is grounded in Ireland, where the implementation and availability of Assistive Technology present challenges and opportunities. While Ireland has made strides in recognising the rights and needs of individuals with disabilities, the current AT landscape reveals a pressing need for a more unified and user-centric approach. This is where the AT Passport concept demonstrates significant potential.

1.7.1 The Current Landscape of AT in Ireland

Ireland faces a significant need for effective AT provision. According to the 2022 Census, 22% of the population, or approximately 1,109,557 people, reported having a disability(62). This number underscores the large population that could benefit from improved access to AT. It is evident that while Ireland has made progress in recognising the rights and needs of individuals with disabilities, there

remains a need for a comprehensive and cohesive policy specifically addressing the provision and implementation of Assistive Technology(24, 63).

Several challenges hinder the optimal provision of AT services in Ireland(24, 63, 64):

- **Fragmented Service Delivery:** Funding and protocols for AT are currently managed by separate government departments, leading to a fragmented and uncoordinated system. This fragmentation makes it difficult for individuals to navigate the system and access the AT they need.

- **Geographical Disparities:** Access to AT services varies significantly across different regions of Ireland, creating inequities in service provision.

- **Inconsistent Delivery:** The quality and consistency of AT service delivery often depend on individual staff knowledge and can vary greatly.

- **Lack of Transparency in Funding:** The amount of funding allocated specifically to AT is often unclear, as it is frequently grouped with other aids and equipment in budgets(24).

- **Non-Person-Centred Approach:** Current services often lack a person-centred approach, hindering individuals from directly applying for funding and receiving AT solutions tailored to their specific.

- **Lack of User Ownership:** Ownership of AT often resides with the providing institution rather than the individual user, limiting user autonomy and control.

- **Limited Evaluation and Awareness:** There is no established mechanism for comprehensively evaluating the effectiveness of state-funded AT solutions in Ireland. Additionally, many individuals who could benefit from AT are unaware of the available options.

These challenges highlight Ireland's need for a more integrated, user-centric, and transparent AT-provision system. Despite these challenges, recent developments signal a positive shift towards a more cohesive and person-centred approach to AT in Ireland. The Disability clinical programme under the Health Service Executive has initiated discussions on a systems approach to AT provision, with dedicated

funding allocated to support Digital and Assistive Technology initiatives(65). This commitment to a more integrated and user-focused approach provides a promising foundation for future developments.

1.7.2 The Potential of the AT Passport in Ireland

The AT Passport concept holds significant promise for addressing the existing gaps and challenges in AT provision in Ireland. By providing a centralised and personalised system for documenting an individual's AT needs, funding history, and training requirements, the AT Passport can help to:

- **Enhance Service Coordination:** The AT Passport can act as a bridge between different service providers and government departments, fostering greater collaboration and a more streamlined user experience.

- **Promote User-Centricity:** By placing the individual at the centre of the AT process, the AT Passport empowers users to participate in decision-making and advocate for their needs actively.

- **Improve Transparency and Accountability:** A centralised system can enhance transparency in funding allocation and service provision, enabling better monitoring and evaluation of AT programs.

- **Increase Awareness and Accessibility:** The AT Passport can serve as a valuable tool for raising awareness about available AT solutions and facilitating access for individuals who may not be aware of their options

1.8 Research Aim and Objectives

This PhD research project investigates an Assistive Technology Passport's feasibility and potential impact, using Ireland as a case study.

The overarching aim is to explore the AT Passport concept, determine its role in enhancing access to Assistive Technology, and provide a framework for its development and widespread adoption. While this research is grounded in the Irish context, the findings and recommendations will have broader global implications for improving Assistive Technology access.

This research will address the following objectives:

1. **Conduct a comprehensive literature review:** Analyse existing "passport" concepts within health, welfare, education, and employment sectors to understand their applications, benefits, and challenges.

2. **Evaluate the potential value of the AT Passport:** Assess how an AT Passport can enhance access to AT for people with disabilities.

3. **Develop a conceptual framework for the AT Passport:** Define the core functionalities, design elements, and features of an AT Passport. This framework will be refined and validated through stakeholder consultations and research findings.

4. **Provide practical guidance for implementation:** Offer concrete recommendations for designing, developing, and implementing the AT Passport. This includes identifying potential barriers, proposing integration strategies within existing support systems, and ensuring long-term sustainability.

By achieving these objectives, this research aims to provide a roadmap for developing and implementing a successful and impactful AT Passport, ultimately improving the lives of individuals who rely on Assistive Technology worldwide.

1.9   Research Methods

This research employs a pragmatic, exploratory sequential mixed methods design structured in four distinct phases:

Phase 1: Qualitative Understanding Lived Experiences

- Method: Interpretative Phenomenological Analysis
- Focus: Exploring the lived experiences of individuals with disabilities and their access to AT.
- Outcome: Establishing the need for and potential value of an AT Passport.

Phase 2 & 3: Quantitative Insights and Expert Input

- Methods:
  - Phase 2: Survey research investigating individuals' journeys with AT utilisation within educational settings.

- o Phase 3: Delphi study gathering expert insights to shape and refine the AT Passport concept iteratively.
- Focus:
  - o Phase 2: A broader, statistically grounded understanding of AT use patterns and challenges.
  - o Phase 3: Incorporating diverse perspectives and expertise into the AT Passport framework.
- Implementation: Quantitative data collection and the Delphi study will be conducted concurrently but sequentially following the qualitative data collection and analysis of Phase 1.

Phase 4: Integration and Framework Development

- Focus: Synthesizing findings from the qualitative, quantitative, and Delphi study phases.
- Outcome: Designing a comprehensive and user-centred AT Passport framework.

This multi-phased approach allows for a rich understanding of the AT landscape, user needs, and expert perspectives, ultimately informing the development of a robust and impactful AT Passport framework.

1.10 Thesis Structure

This thesis posits the Assistive Technology Passport as a mechanism for enhancing the user experience of individuals who use Assistive Technology. It focuses specifically on the Irish context while drawing upon global perspectives. The research unfolds through structured chapters, each addressing a critical facet of the overarching argument.

The thesis establishes the global significance of Assistive Technology and underscores the imperative for a user-centred approach, particularly within the Irish context. This introductory chapter lays the groundwork for the central proposition of the research – the AT Passport – presenting it as a potential solution to the challenges inherent in current AT provision models.

Chapter 2 constructs a theoretical framework encompassing disability, assistive technology, systems thinking, and user-centred design. This framework provides the conceptual scaffolding for the entire research, ensuring a nuanced and theoretically grounded exploration of the subject matter.

Chapter 3 delves into a comprehensive literature review, examining the 'passport' concept across diverse fields. By analysing successful implementations of the passport model in other domains, the research extracts valuable insights and best practices, informing the development of a practical and accessible AT Passport tailored to the specific needs of AT users.

Chapter 4 details a pragmatic mixed-methods approach incorporating the Delphi method to investigate the research problem rigorously. This methodological chapter outlines the rationale for employing a mixed-methods approach. It highlights how the triangulation of qualitative and quantitative data will contribute to a holistic understanding of the research phenomenon.

Chapters 5 and 6 delve into the qualitative phase of the research. *Chapter 5* outlines the qualitative exploration, focusing on user perspectives on Assistive Technology and the AT Passport concept. Subsequently, *Chapter 6* presents the findings gleaned from this qualitative study, analysing user experiences and their implications for the design and implementation of the AT Passport.

Chapters 7 and 8 explore the quantitative dimension of the research, complementing the qualitative insights. *Chapter 7* elucidates the quantitative methods employed, emphasising their role in complementing and expanding upon the qualitative findings. *Chapter 8* presents the quantitative data analysis, offering valuable insights into Assistive Technology usage patterns and trends.

Chapter 9 integrates the qualitative and quantitative findings, providing a holistic analysis of the AT Passport's potential. This chapter identifies key features and functionalities of the AT Passport that emerge from synthesising both research strands.

Chapter 10 endeavours to achieve consensus on the AT Passport's essential features and functionalities through a Delphi study involving expert Assistive

Technology users. This participatory approach ensures that the proposed AT Passport model is robust, relevant, and reflective of expert opinion.

Building upon the research findings and expert consensus, *Chapter 11* proposes a comprehensive framework for the design, development, and implementation of the AT Passport. This framework addresses critical aspects such as data privacy, user control, interoperability, and sustainability, ensuring the feasibility and ethical soundness of the proposed solution.

Finally, *Chapter 12* concludes the thesis by summarising the key findings, reflecting on the research process, and outlining potential future directions for research and development in AT and the AT Passport. This concluding chapter underscores the thesis's contribution to knowledge and its potential to effect positive change in the lives of individuals who rely on Assistive Technology.

1.11 Chapter Summary

This chapter underscores the vital role of Assistive Technology in promoting the rights, inclusion, and full participation of individuals with disabilities. It establishes the importance of a people-centred approach to AT provision and highlights the stark reality of unmet global AT needs, emphasising the barriers hindering equitable access.

Focusing on the Irish context, the chapter analyses the sociopolitical factors and challenges influencing AT access and utilisation within the Irish system. The Assistive Technology Passport is introduced as a potential solution to bridge this gap. By examining the potential of the AT Passport within the Irish context, this chapter sets the stage for a detailed exploration of its feasibility and potential impact in subsequent chapters.

The chapter deliberates on the challenges faced by individuals with disabilities in accessing AT in Ireland and the potential of the AT Passport to address these challenges. These challenges hold significant implications for Ireland and other countries grappling with similar issues. The research aims to contribute valuable insights into developing and implementing effective AT solutions that can empower individuals with disabilities globally.

In the next chapter, we will discuss the theoretical frameworks that will help shape our understanding of the research topic and formulate recommendations.

Chapter 2: Theoretical Frameworks

2.1 Introduction

This chapter constructs the theoretical framework underpinning this PhD research on the Assistive Technology Passport. It examines prominent models and concepts that shape our understanding of disability, access to Assistive Technology, and user-centred design. Specifically, the chapter delves into the perspectives offered by:

- **The Rights-Based Approach to Disability:** This approach, grounded in the Convention on the Rights of Persons with Disabilities, frames access to AT as a fundamental human right, essential for full participation and inclusion.

- **The International Classification of Functioning, Disability, and Health:** This framework provides a comprehensive lens for understanding disability as a dynamic interplay between individual capabilities and environmental factors. The research utilises the ICF to analyse how the AT Passport can effectively address individual needs within specific contexts.

- **The Capability Approach:** This approach emphasises the importance of individual agency and the ability to achieve valued life outcomes. The research investigates how the AT Passport can empower individuals with disabilities by identifying and addressing factors that facilitate and hinder access to AT.

- Beyond these core models, the chapter explores **Systems Thinking**, recognising the interconnectedness of various elements within the Assistive Technology ecosystem. This perspective guides the analysis of how the AT Passport can function effectively within this complex system.

- Additionally, the research leverages the principles of **Inclusive Design** to ensure the AT Passport is accessible, user-friendly, and adaptable to diverse abilities and needs.

This integrated theoretical foundation, encompassing rights-based perspectives, the ICF, the Capability Approach, Systems Thinking, and Inclusive Design,

underscores the research's commitment to developing a holistic and user-centred approach to the design and implementation of the AT Passport.

2.2 The Rights-based Model of Disability

The rights-based model of disability asserts that access to Assistive Technology is a fundamental human right, ensuring equal opportunities and enjoyment of life for people with disabilities, as enshrined in the Convention on the Rights of Persons with Disabilities(66).

This model emphasises:

- Inherent dignity and non-discrimination for individuals with disabilities.
- Equal opportunities in education, employment, and other life aspects.
- Accessibility of environments, services, and facilities for all.
- Full and effective participation in society on an equal basis.
- Respect for difference, recognising disability as part of human diversity.
- Legal capacity, acknowledging the rights of individuals with disabilities as equal members of society.

The CRPD addresses AT in several articles, highlighting its importance for independence, participation, and inclusion. These articles promote AT's availability, affordability, and accessibility, emphasising its role in various aspects of life, including mobility, communication, education, and political participation.

By advocating for AT access as a human right, the CRPD aims to foster a more inclusive society that empowers individuals with disabilities to participate fully in all aspects of life.

2.3 International Classification of Functioning, Disability, and Health

The ICF provides a comprehensive framework for understanding the multifaceted aspects of disability, recognising the interplay between health conditions, personal factors, and environmental influences(67-70). This research will utilise the ICF as a lens to explore and develop solutions for the complex challenges faced by individuals with disabilities in real-life situations.

2.4 Capability Approach

This study utilises the Capability Approach (CA) framework, developed by Nobel laureate Amartya Sen and Martha Nussbaum, to analyse participants' experiences with Assistive Technology and conceptualise the AT Passport(71, 72). The CA framework emphasises evaluating well-being based on individuals' capabilities to achieve the things they value rather than solely focusing on the resources available to them(9, 73-75).

Central to the CA framework are three core concepts:

- **Functionings:** These represent individuals' valuable activities and the states of being they achieve.
- **Capabilities:** These encompass the range of potential functionings an individual can freely choose from, representing their freedom and opportunity to live a life they value.
- **Conversion Factors:** These are personal, social, and environmental factors that influence an individual's ability to convert resources, such as AT, into desired functionings. This recognises that individuals differ in their ability to transform resources into valuable outcomes due to individual characteristics, social support, and environmental accessibility.

This research employs the CA framework to investigate how AT, as a resource, can empower individuals to expand their capabilities and achieve their desired functionings. The study aims to identify barriers and facilitators to AT access and utilisation by analysing the conversion factors that influence this process. Ultimately, this research seeks to understand how the AT Passport can enhance AT's capability to promote well-being and agency beyond simply providing access to technology.

2.5 Systems Thinking

As established in the previous chapter, systems thinking provides a valuable lens for understanding complex situations by considering the interconnectedness of various elements rather than viewing them in isolation. This approach, which acknowledges that challenges and solutions are often intertwined within intricate systems across disciplines, forms a key theoretical perspective for this research. By

recognising these relationships and interdependencies, systems thinking encourages a holistic understanding of complex issues, which can lead to more effective and sustainable solutions(55, 57). Subsequent chapters, particularly within the literature review, will draw upon this perspective to provide a comprehensive analysis of AT provision and the potential impact of the AT Passport. In the next chapter, we will revisit this concept in a little more depth, including its implications in the context of the development of the AT passport.

2.6   Inclusive Design

Inclusive design is a methodological framework that embraces human diversity to create products, services, and environments accessible to a broader range of people(76-78). This approach, guided by the "design for all" principle, emphasises user involvement from the outset to enhance usability and accessibility(76, 79, 80). Rather than a one-size-fits-all solution, inclusive design promotes flexibility and choice to accommodate diverse abilities and age groups(81, 82). This involves minimising complexity and prioritising user-friendliness to ensure accessibility for all(81-84).

This research will leverage inclusive design principles to inform the development of recommendations for the AT Passport design framework. By incorporating these principles, the study aims to ensure that the AT Passport is accessible and user-friendly for individuals with varying abilities and ages. This approach will contribute to more relevant and broadly applicable research findings, promoting equitable outcomes and solutions that uphold the principle of equal opportunity for all.

2.7   Integrating Models to Investigate the AT Passport

This research utilises a cohesive framework of interconnected models and principles to investigate the Assistive Technology Passport and frame its conceptualisation. The Convention on the Rights of Persons with Disabilities, embodying the rights-based model of disability, establishes access to AT as a fundamental human right, underpinning the entire research endeavour. The International Classification of Functioning, Disability, and Health provides a comprehensive lens for understanding the multifaceted nature of disability,

acknowledging the interplay of individual and environmental factors in shaping AT experiences. This research utilises the ICF to analyse how the AT Passport can address individual needs within specific contexts. Furthermore, the Capability Approach guides the investigation into how the AT Passport can empower individuals with disabilities, promoting their agency and ability to achieve valued life outcomes. By identifying factors that facilitate and hinder AT access, the research seeks to enhance the AT Passport's potential to expand its users' capabilities. Recognising the interconnectedness of elements within the AT ecosystem, the study analyses how the AT Passport can function effectively within this complex system using the principles of Systems Thinking. Simultaneously, the research leverages Inclusive Design principles to ensure the AT Passport is accessible, user-friendly, and adaptable to diverse abilities and needs.

2.8   Chapter Summary

This chapter lays the theoretical groundwork for examining the Assistive Technology Passport. This integrated theoretical framework provides a robust foundation for how the research analyses the AT Passport to promote inclusivity and empower individuals with disabilities. Chapter 3 delves into a literature review on "passport" in various sectors and analyses its implications for AT Passport research and concept development.

Chapter 3: Literature Relating to the Passport Concept

3.1 Introduction

This chapter delves into a literature review focusing on the 'passport' concept, examining its application in health, social care, education, and employment settings. The outcomes of this review are crucial in shaping the AT Passport's conceptualisation and research development. An AT Passport is proposed as an innovative approach to enhance AT accessibility, considering an individual's functional capabilities and requirements for participation. This review targets literature highlighting the 'passport' concept's deployment in these settings to derive applicable knowledge and insights for AT Passport research. The findings are expected to contribute significantly to understanding and formulating the AT Passport concept. This chapter is divided into three sections. Section one reviews passports in health and social care settings, section two reviews passports in education and employment settings, and section three amalgamates the findings of both sections to provide a conclusive recommendation based on these reviews.

3.2 Background to AT Passport Concept

This exploration of "passport" concepts, building upon the AT Passport concept put forward by Enable Ireland and the Disability Federation of Ireland, utilises a systems thinking approach to refine further and develop a user-centred tool(24). Their 2016 report advocated for a central agency supervising comprehensive AT service delivery and spurring innovation. This idea of the AT Passport, visually exemplified in Figures 1 and 2 (reproduced from the discussion paper by Enable Ireland and Disability Federation of Ireland), is presented as an integral component of a comprehensive AT support environment and as a facilitator for service provision. As highlighted in Chapter 1, the AT Passport is envisioned as a user-focused tool designed to address Ireland's fragmented AT service system. The passport aims to guide individuals through the AT service system, positioning the user at the heart of the process. The AT Passport seeks to empower users by:

- Clearly defining individual AT needs.

- Providing access to critical information about AT product assessment, financing, training, and maintenance.

- Documenting an individual's AT equipment, funding history, and required training.

The AT Passport concept prioritises a person-centred approach, recognising and respecting users' unique circumstances and preferences to promote a tailored AT provision experience(23).
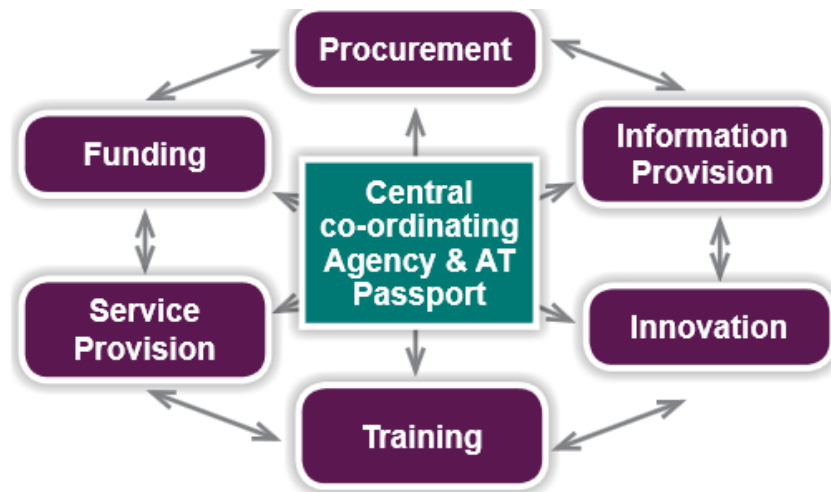
Figure 1: Proposed AT supports ecosystem
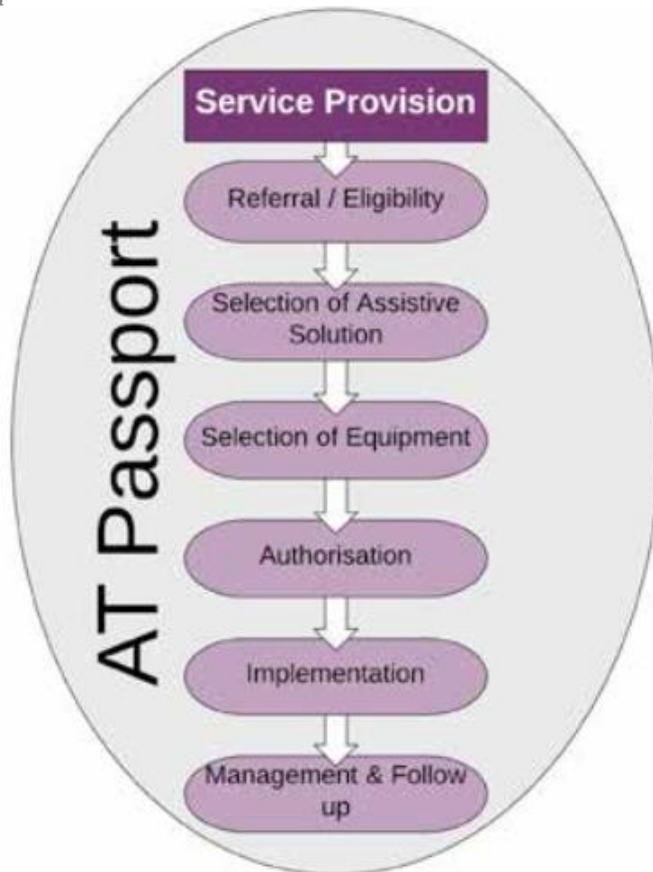
Figure 2: AT Passport role in AT service provision

3.3   Review Rationale

Chapter 1 underscored the vital role of Assistive Technology in promoting independence and enhancing the lives of individuals with disabilities. However, as highlighted in previous sections, navigating the AT service landscape can be complex and fragmented. This complexity necessitates a streamlined, user-centred approach to ensure individuals receive appropriate and timely AT support.

This review examines the potential of the "passport" concept, a novel approach to AT service delivery, to address this challenge. By analysing existing "passport" models across various sectors, this review aims to:

1. **Amalgamate Passport Concepts:** Identify and synthesise key features and principles from successful "passport" initiatives in health, social care, education, and employment.

2. **Translate Concepts into the AT Passport:** Explore how these identified features and principles can be adapted and integrated into developing a comprehensive and user-friendly AT Passport.

3. **Leverage Systems Thinking:** Demonstrate how a systems thinking approach can inform the conceptualisation of the AT Passport, ensuring it effectively addresses the interconnected challenges within the AT service ecosystem.

This literature review focused on understanding the application and usage of the passport concept rather than assessing its effectiveness. Hence, it is descriptive rather than evaluative.

3.4 Integrating Systems Thinking and the 10Ps Framework: A Foundation for AT Passport Conceptualization

The following literature review aims to explore "passport" concepts across various sectors utilising a systems thinking approach to inform the development of an innovative Assistive Technology Passport. Recognising the interconnected nature of AT access, this review critically examines emergent categories from the literature through the lens of the 10Ps: People, Product, Personnel, Provision, Policy, Partnership, Place, Pace, Promotion, and Procurement (see Section 1.3.2). This analysis, guided by MacLachlan and Scherer's recommendations for effective AT access, aims to uncover key insights and potential pitfalls related to how each "P" is addressed within existing passport initiatives(23). This approach seeks to conceptualise an AT Passport that moves beyond a simple document or tool. Instead, the AT Passport will be approached as a dynamic element within a larger ecosystem designed to optimise interactions between individuals with disabilities, assistive technologies, service providers, and broader policy landscapes. This approach aims to lay the groundwork for an AT Passport that is user-centred and deeply integrated within a responsive and equitable AT system.

3.5 The Literature Review of the Concept 'Passport.'

This literature review provides an overview of the concept of 'passport' as it is employed across various contexts. The review process was informed by the principles of constant comparative analysis(85, 86). The goal was to conduct a thematic analysis of 'passport' to identify and analyse emerging categories related to passport design and implementation, which would inform the development of the AT Passport.

This review is distinct from a scoping review or systematic review. Given the significant volume of grey and unpublished literature in this area, coupled with the fact that this is a relatively under-researched field, the primary aim of this review was to descriptively identify existing types of "passports" and leverage these insights to inform the development of the AT Passport.

The analysis process differed between health/social care settings and educational/employment settings due to the sequential nature of the review. The health and social care passports were reviewed first, and the learnings from this analysis were used to refine and restructure the analysis process for the subsequent review of educational/employment passports.

While systematic reviews adhere to specific reporting guidelines, such as PRISMA, these were not deemed appropriate for this literature review. It is essential to acknowledge that this approach, while offering valuable descriptive insights into the existing applications of "passports," may not capture the full breadth of available evidence compared to a systematic review.

3.6 Review of Health and Social Care Passports

Health and social care passports, focusing on optimising healthcare service delivery and empowering users, provide a valuable model for developing an Assistive Technology Passport. The shared goal of improving access to essential resources further underscores the relevance of these existing "passport" models.

The review will focus on the following objectives:

1) **Current Applications:** Identifying diverse uses across healthcare domains to demonstrate the passport concept's breadth and adaptability for AT.

2) **Systems Thinking Alignment:** Analyse how these passports embody a systems thinking approach to connecting stakeholders and addressing user needs within complex care settings.

3) **Informing AT Passport Development:** Extracting successful features, implementation strategies, and potential challenges to guide the development of a user-centred and practical AT Passport.

3.6.1 The Approach

To identify relevant literature on health and social care passports, a comprehensive search was conducted using a combination of systematic and snowballing methodologies. This approach ensured both breadth and depth in capturing relevant documents.

Search Strategy:

- **Keywords:** The search employed significant terms such as "Health passport," "Patient passport," "Personal hand-held record," and "Hospital hand-held records" to identify relevant literature across various sources.

- **Inclusion Criteria:** Literature of all types, ranging from grey literature to randomised control trials, was considered if it addressed the "passport" concept within health and social care settings.

- **Exclusion Criteria:** Documents published before 2009 were excluded to focus on passports developed within the context of recent technological advancements in healthcare. This timeframe ensures that the review captures the most current practices and reflects the evolving landscape of digital health solutions.

- **Databases and Resources:** A specialised search strategy, developed in collaboration with a librarian from Maynooth University, was executed across multiple databases relevant to health, disability, rehabilitation, and nursing. These databases included PubMed, WHOLIS, Embase, PsycINFO, SCIE, CINAHL, ERIC, and Scopus.

Article Selection

The selected articles underwent a rigorous three-stage review process to ensure relevance and quality:

1. **Title Review:** Initial screening to identify potentially relevant articles.

2. **Abstract Review:** Further evaluation of relevance based on abstracts.

3. **Full-Text Review:** Thorough assessment of full-text articles to determine their suitability for inclusion in the review.

The researcher conducted all three stages of the review process. To ensure a comprehensive and robust approach, the researcher regularly discussed the selection process with the PhD supervisor and co-supervisor, incorporating their feedback and expertise. This collaborative approach aimed to minimise bias and enhance the rigour of the article selection process.

3.6.2   Data Extraction and Synthesis

The articles chosen for the review were analysed systematically using a structured data extraction template. This template captured key information from each document, including the source, title, target population, passport type, key concept/purpose, format and characteristics, reported/expected outcomes, and impact on AT Passport conceptualisation.

A systematic content analysis of the extant health and social care passport models was conducted after data extraction. This involved identifying and categorising key content elements related to user information, support needs, and service provision based on the information gathered through the data extraction template. The goal was to determine their potential relevance and applicability to the AT Passport

3.6.3   The Results

The search strategy yielded 29 relevant articles and documents.

- Table 1 presents the descriptive data extracted from these sources. This table provides a detailed overview of the diverse population groups utilising health passports, offering insights into each document's purpose, type, content/format, and reported or expected outcomes.

- Table 2 provides an aggregated view of the population groups represented in the reviewed literature, specifying the number and nature of articles associated with each group.

Through systematic content analysis, eight dominant patterns emerged, highlighting key aspects of successful passport models. These patterns are presented below:

1. **Enhancement of Communication:** Facilitating effective communication among users, families, and healthcare professionals.

2. **Participatory Processes:** Engaging users in designing and developing passport systems.

3. **Transition Management:** Supporting seamless transitions between healthcare and social care providers.

4. **Promotion of Continuity in Care:** Promoting coordinated and uninterrupted care delivery.

5. **Self-Advocacy and Personal Empowerment:** Equipping users with tools and information to participate in their care actively.

6. **Person-Centred: Contextual and Personal Social Needs:** Addressing each individual's unique social needs and circumstances.

7. **User-Led Systems Operating Within an Existing Wider System:** Integrating user-controlled elements within existing healthcare systems.

8. **Effective and Timely Access to Services:** Facilitating timely and streamlined access to necessary services.

The discussion section of this study will explore these categories in detail, highlighting their implications for the development and implementation of the AT Passport.

Table 1: Review Populations - Article Numbers and Types per Group

Population	No. of Articles/Documents	Types of Articles
Diabetes	2	RCT
		Project Development
Epilepsy	2	Qualitative Study
		News article
Asthma	2	RCT
		Project Development
Chronic Patients (General)	2	Systematic review
		Qualitative
Cancer Care (Adults)	2	Project Development
		Mixed Methods Longitudinal study
Childhood Cancer	2	Descriptive Report
		Qualitative study
Intellectual Disability	6	Qualitative study
		Qualitative content analysis study
		Pilot Study: Qualitative
		Mixed Methods systematic review
		Participative action research
		Systematic review
Older people Care	3	Protocol Paper
		Qualitative study
		Pilot study; survey-based
Nursing	1	Descriptive report
Paediatric	4	Service development
		Qualitative study
		Book Chapter
Mental Health	2	Descriptive report
Acute in-Patient	1	Qualitative study

Table 2: Descriptive Data Summary from Reviewed Literature

	Source	Document title	Area/type of Document	Concept/ Main idea	Passport format	Reported/ anticipated findings	Implication for 'AT' passport
1	(87)	Determining the impact of an intervention to increase problem-solving skills in diabetes self-management: the diabetes problem-solving passport pilot study	Diabetes RCT.	Clinic-based designed to improve diabetes self-management behaviours, efficacy, and blood glucose levels.	A list of questions to promote service user's self-management	Low retention, however, passport use can potentially enhance diabetes self-management behaviours.	This passport is clinic-based and does not fully align with the user-led system.

2	(88)	Diabetes passport	Diabetes management Multi-stakeholder Passport Development project	User-held Diabetes Passport aimed to enhance communication to empower and inform the user on self-management	A booklet compiling personal details, assessment results, medication information, and more.	Despite positive patient feedback on self-management aspects, the passport shows low utilisation, especially in secondary care.	Enhancing communication and user empowerment
3	(89)	A Qualitative study to explore the use of the RCPCH epilepsy passport	Epilepsy: Qualitative study	To improve communication and reduce morbidity and mortality associated with epilepsy		Anticipated: Improve communication and reduce morbidity and mortality associated with epilepsy	Communication
4	(90)	Children's epilepsy passport set to improve emergency care	Epilepsy: News Report:	Aimed to improve the sharing of information in the event of an emergency	Booklet contents: Medications, seizure type clinician's contact details for the clinicians, a user profile	bridges the communication gap	Enhancing communication and reducing duplication of work

5	(91)	A patient-centred checklist, the Asthma Passport, for improving asthma self-assessment (Asthma Control Test, ACT) and self-management (Asthma Action Plan, AAP) utilisation in the clinic	Asthma: A randomised, interventional quality-improvement project	Aimed at improving asthma self-assessment (Asthma Control Test, ACT) and self-management (Asthma Action Plan, AAP) utilisation in the clinic	A patient-centred checklist: Questionnaire	Reported improvement in Asthma self-management	Not user-owned; an intervention-based passport.
6	(92)	Patient-held medical records for patients with chronic disease: a systematic review	Chronic Patients: Systematic Review	Investigating whether patient-held medical records (PHR) improve clinical care, patient outcomes, or patient satisfaction compared to usual care.	Paper-based patient-held records	There is no clear benefit to implementing a PHR. More high-quality studies are needed	AT Passport information and specific relevant information should be targeted and not duplicate records held in institutions.

7	(93)	Severe asthma: emergency care patient-driven solutions	Asthma Emergency care: Systems thinking approach	To improve confidence in communication during the emergency department visit	Paper based on the user's medical and personal profile.	Envisioned to decreases (from 12 to 5 steps) the number of steps patients had to do to achieve care.	AT Passport to provide ready information to reduce repetitions and promote effective access.
8	(94)	Radiation passport: an iPhone and iPod touch application to track radiation dose and estimate associated cancer risks	Childhood cancer: Intervention description	An APP aimed to track radiation dose and estimate associated cancer risks	The application contains clinical history, together with personalised follow-up and screening recommendations	Offers potential for follow-up and empowerment to reduce risk	Potential for a Mobile phone application as part of diverse platforms for the AT passport.
9	(95)	Development of an MDT Brain Tumour Patient Passport	Brain Tumour: project development	Enhances the management of tumours and promotes inter-disciplinary communication.	Book format;	User feedback: valuable and would enhance self-management	The critical role of involving diverse stakeholders in developing the AT Passport. Person-system interaction.

10	(96)	A School Passport as Part of a Protocol to Assist Educational Reintegration After Medulloblastoma Treatment in Childhood	Childhood cancer: Qualitative study;	To enhance school reintegration for children and communication (health and education) post-Medulloblastoma.	The standardised protocol of information in the booklet	Enables timely and useful sharing of information.	Potential for the AT passport to be incorporated into a multi-agency communication and transition management system.
11	(97)	Implementation and evaluation of health passport communication tools in emergency departments	Intellectual Disability: Mixed methods study questionnaire and interview	Communication tools used by people with IDD in psychiatric and general emergency departments	It contains medical history, medication, and required support.	Enhances communication between health and education.	Emphasise the need to customise the contents and use of the AT passport in terms of personal and local settings.
12	(98)	Patient healthcare passports in Community Specialist palliative care: a mixed methods study	Cancer; Palliative Care: Mixed Methods Prospective Longitudinal Cohort Study	Patient held record	Patient held record	Patient-held records are unlikely to be used by palliative care patients.	Consider the user's medical and social needs and motivation when designing the AT passport.

13	(99)	The evaluation of a healthcare passport to improve quality of care and communication for people living with dementia (EQuIP): a protocol paper for a qualitative, longitudinal study	Dementia care: Protocol paper	Communication tools for sharing information on the healthcare needs of people with dementia.	An expandable document containing personal, clinical and social care information is recorded	promotes communication and user dignity	The AT passport should be envisioned to enhance communication while simultaneously maintaining the user's dignity.
14	(100)	Geriatric My-Health Passport: A Pilot Study of a Portable Health Summary in an Elderly Population	Geriatrics: Pilot study survey-based	A portable, online health summary tailored for older adults.	A printable, wallet-sized card containing essential medical information for service users.	users report ease of receiving care	Individualised format for AT passport
15	(101)	One-page patient passport for people with learning disabilities	Learning Disability: Pilot study	A reference by health personnel and administrative staff	A one-page passport containing a service user profile	supports communication locational context	Consideration for user's dynamic needs, such as learning, sensory and physical disability needs

16	(102)	Hand-held health records (HHHR) for individuals with intellectual disability: A systematic review	Intellectual Disability: Systematic review:	Empower individuals with communication tools to enhance healthcare access, continuity, and quality.	A structured record of the information held by the service user	Widely acceptable no clear short-term benefits found indicating further long-term research	The AT project considers the heterogeneous population of AT users and considers the best measure of benefit when evaluating it.
17	(103)	Hospital passports, patient safety and person-centred care: A review of documents currently used for people with intellectual disabilities in the UK	Intellectual Disability: Qualitative content analysis	A tool that bridges communication gaps for individuals with intellectual disabilities navigating healthcare settings.	Paper booklets contain key user information and other support networks	Documents reviewed contained several varied information, formats and terms of references	AT passport design, terminology, and format should consider some uniformity while considering the user's contextual diversities.
18	(104)	Evaluation of My Medication Passport: a patient-completed aide-memoire designed by patients, for patients, to help	Older people: Qualitative study: Telephone interviews	Designed by patients to record their own	A passport-sized booklet, An App for smartphones is under development	My Medication Passport aids in increasing information sharing and discussions regarding medicines with family, carers	AT Passport should enhance information sharing between the user and other significant entities

		towards medicines optimisation					
19	(105)	Preventing chronic disease in people with mental health problems: The HEALTH Passport approach	Chronic conditions: A semi-qualitative questionnaire with the results subsequently compared with those of 100 controls.	A tool to help patients make lifestyle changes to reduce the future burden of chronic disease.	Pocket-sized, the patient held the record.	The Health Passport could almost halve the proportion of psychiatric patients at high risk of chronic disease.	Design to own behaviour change
20	(106)	Physical health passports for patients with severe and enduring mental illness	Severe and enduring mental illness: Description of the passport	The Passport centralises medical history and easy-to-understand physical health management information, including lifestyle advice and	passport-style document.	The passport provided access to physical health assessments, and almost half of the patients showed a risk for cardiovascular disease.	Access to information may influence the early identification of risk factors and timely interventions where necessary.

				assessments, for patients with severe mental illness.			
21	(107)	Development and Introduction of "Communication Passport" in an Adult Inpatient Psychiatric Unit for Persons with Intellectual Disabilities: A Brief Report from Singapore	Inpatient Psychiatry-Intellectual disability: Qualitative study	A person-centred accessible document presenting important and complex patient information	Consisted of a 12-page document encompassing multiple aspects, including communication and behavioural profile	Provides a framework for developing communication passports	AT Passport should be an accessible communication tool for all.
22	(108)	A qualitative study exploring the value of a catheter passport	Acute in-patient: Qualitative study	Aimed at providing accessible information to improve self-care	A patient-held document with information and a record of catheter care.	The catheter passport has the potential to promote self-care in conjunction with specialist support	AT Passport alone may only offer some of the solutions if completed by specialist support wherever relevant.
23	(109)	The use and usefulness of My-Health Passport: An online tool for the	Paediatrics Book chapter	Provides educational information and enhances communication	Printable, online created	Key anticipated elements: enjoyment, education, communication/naviga	There is an opportunity to create and customise the AT passport online with a printable option

		creation of a portable health summary				tion, ease of use	and on any other user-centric accessible platforms.
24	(110)	Use of a My Medication Passport (MMP) in a disabled child seen across many care settings	Paediatrics Case presentation	Aimed to help children and young people, parents and carers to manage medicines more effectively	pocket-sized booklet and as a smartphone app.	It has the potential to monitor medication, promote a sense of ownership and user empowerment	Service user empowerment, communication enhancement and promotion of ownership and independence
25	(102)	The Patient Passport Program: An Intervention to Improve Patient-Provider Communication for Hospitalized Minority Children and Their Families	Paediatrics: Qualitative study	A patient-provider communication program, the 'Patient Passport'.	Passport-type document	Enhances the quality of communication among minority families of hospitalised children	varied communication methods and platforms to facilitate diverse populations.

26	(111)	Improving paediatric pain management: introducing the 'Pain Passport'	Paediatrics: Qualitative	Promotes prompt analgesia provision in children, empowers and encourages a re-evaluation of pain	leaflet carried by the patient, which records serial pain scores.	Passport use was associated. with an improvement in standards of pain management	user/parent/guardian/caregiver empowerment
27	(112)	Hospital Passport for Patients with a Communication Difficulty	Acute care, Learning disability, Care of Older Person: Practice development document	The purpose of this passport is to support persons during secondary health services visits.	The passport is in a traffic light format.	Provides clear and concise communication, promotes safety, and travels with the user always	Communication and access simple, precise, and clear language.
28	(113)	My Personal Health Passport for Paediatric Patients	Paediatrics: Service development project	Summarizes a child's key information for various healthcare and support services.	A4-sized folder with colour-coded signposts	Empowers person-centred care, amplifies the child's voice, and streamlines information sharing, especially during transitions.	Promote person-centred care, transition management, and user empowerment.

29	(55)	A Participatory Action Research Project into the Implementation and Evaluation of My Healthcare Passport	M.Sc. Dissertation: Participatory action research report:	My Healthcare Passport - owned by the service user to facilitate a Person-centred, safe and effective care by the HCP.	Available in two forms: - 1) An A5 booklet 2) An online generated printable document	Facilitates communication, informed choice-making, and coordinated support for individuals with learning disabilities.	All stakeholders participatory approach effective in the research and development of the AT Passport

3.6.4 Analysis of findings for the review of Health and Social Care Passports.

This descriptive literature review aimed to inform the concept of an "AT passport" by examining the use of "passports" within health and social care contexts. This section discusses the eight emergent categories and their implications for the ten strategic and contextual factors (10P) for improving access to AT, as outlined by MacLachlan and Scherer(23).

A Systems Thinking perspective will be employed to analyse how these categories intersect with the complexities of the AT system, including user attributes, preferences, privacy, and interactions within the broader system.

3.6.4.1 *Analysis of Emerging Categories from the Review*

1. **Enhanced Communication:** The review highlighted improved communication between service users, families, and healthcare professionals as a key theme(90, 95, 97, 102-104). However, challenges to adoption include user non-involvement, consent issues, and healthcare professionals' perceptions and trust in the information's quality(101, 114).

2. **A participatory process for tool development:** User participation and ownership are crucial for the AT passport's research, design, and development to align with improved AT access. Lack of user involvement in these stages can lead to less user-centred tools and potential abandonment(50).

3. **Transition management:** Passports can facilitate smoother care transitions within and across organisations, such as between primary and secondary care(115, 116), and between health and education institutions(116).

4. **Promotion of continuity of Care:** Passports can ensure continuous care access, primarily through improved communication, especially in emergencies(90, 97, 117). Enhanced user knowledge, self-management promotion, and a person-centred design approach further supports this goal(87, 118).

5. **Self-advocacy and personal empowerment:** Passports can empower users and strengthen patient/user-caregiver relationships(91, 104, 110). Self-management features, particularly for chronic care, promote patient

empowerment(88, 105, 119). In emergencies, passports can enhance self-advocacy by facilitating crucial information sharing with reduced reliance on caregivers(90, 93, 97, 120).

6. **Person-centred: contextual and personal social needs:** A person-centred approach to passport design should incorporate user needs, preferences, and aversions in an accessible format(97, 103, 107). Tailoring the format and features to the user's communication level, using colour-coding, pictures, symbols, and traffic light systems, can enhance usability(103, 111, 121).

7. **User-led systems operating within an existing wider system:** Passport initiatives function within existing institutional or local systems, often supported by legislation regarding reasonable accommodations(103, 122). Integration into existing care pathways, particularly within healthcare settings, is crucial for adoption and utilisation(88, 92, 104, 106). Stakeholder consultation during development and integration into care pathways have been linked to higher usage rates by healthcare personnel(90, 93, 94, 96, 103).

8. **Effective and timely access to services:** Passports were seen as a tool to improve efficient and prompt access to services through enhanced communication, reduction of duplication, and user empowerment, has been linked to faster access to care and support(90, 93, 94, 96, 103).

3.6.4.2 Translation of key findings through systems thinking lens

Our findings shed light on some intriguing implications when interpreted through the lens of a systems thinking approach (as illustrated by MacLachlan and Scherer's 10 Ps recommendations for effective access to AT). Table 3 provides examples indicative of these implications.

Table 3: AT Passport Contributions to a Systems Thinking Approach

People: The Assistive Technology passport should be user-centric, prioritising the type of communication that needs to be improved according to the user. The prime objective is to facilitate the user's effective access to services. The process of developing the AT passport concept should engage all relevant parties but should mainly address the AT user's needs.

Product: The design and purpose of the Assistive Technology passport should emphasise the ease of transition of assistive products, such as moving from primary to secondary care, thus ensuring a continuous support system. Because the AT passport will be employed across various contexts and user groups, its design and development must align with the existing system to ensure adoption and fulfil its goal of providing accessible AT support and services.

Personnel: Users should be able to communicate specific information to healthcare personnel based on their preferences and needs at any given moment. With the user's consent, the Assistive Technology passport could provide a platform for relevant personnel to selectively access necessary data, aiding their evaluation and provision of services.

Provision: The Assistive Technology passport should be the main link between the user's product requirements and experiences and the service provider's ability to fulfil these needs. It should also be the central database for tracking, following up, and evaluating technologies and services and potential user experiences with individual staff members.

Policy: Methods must be established for obtaining consent, securing data, and protecting information, along with providing a framework for verifying the information in the passport. If such a policy is not yet established, it must conform to international standards for the right to Assistive Technology.

Partnership: The Assistive Technology passport should provide a mechanism for augmenting communication between the user and local services, providing support, and creating a shared communication network among all pertinent stakeholders in the broader system.

Place: While designing the characteristics of the AT passport and determining how it can be used to encourage suitable and effective communication, the influence of physical surroundings, societal structures, psychosocial dynamics, cultural background, and socio-political infrastructure should be considered.

Pace: With swift technological advancements, the Assistive Technology passport should be a flexible, malleable, and durable instrument able to adapt to systemic changes. Nonetheless, it must also consider the system's capacity to absorb changes to accommodate the introduction of the AT passport.

Promotion: The Assistive Technology passport should inherently convey its significance in promoting access to Assistive Technology. For instance, it can provide data on user experience and satisfaction to all levels of government bodies, civil institutions, and private entities.

Procurement: The Assistive Technology passport should inform national purchasers about the types of Assistive Technology currently in use, their functional lifespan, frequency of replacement, and distribution points, among other things. Thus, it would make a significant contribution to shaping the market.

3.6.5 Summary of Findings

The literature review on 'Health and Social Care Passports' revealed that passport-like tools can enhance access to assistive technologies in health and social care settings. The review identifies eight key categories: the facilitation of communication among users, their families, and health professionals; involving users in tool design to ensure user-centeredness; enabling smooth transitions between different health and education institutions; promoting continuous care access; empowering users; prioritising individual needs; facilitating user-led systems reflecting user preferences; and enhancing the efficiency and pace of accessing services. The review also discusses how MacLachlan and Scherer's 10Ps recommendations for a systemic approach to Assistive Technology can be applied to the AT passport, underscoring how it encourages systems thinking(23). In this context, the model accounts for People (user-centric focus), Product (care transition), Personnel (communication with health professionals), Provision (linking users and service providers), Policy (information protection), Partnership (stakeholder communication), Place (cultural/societal context), Pace (technological progress), Promotion, and Procurement (information about different ATs and their use).

3.6.6 Conclusion: Health and Social Care Passport Review

This section of the review of the concept of 'passport' in health and social care settings sought to propose suggestions for an advanced conceptualisation of the Assistive Technology passport as a user-guided system tool. This tool introduces opportunities for interaction between individual AT users and their necessary supporting system. A review of the concept of a user-system passport in various contexts, such as health and social care services, was conducted to discern emergent categories. AT goes beyond mere technology or its users, extending to a larger ecosystem that both rely on. The systems thinking approach prompts the identification of relevant components within this ecosystem. It encourages flexibility and creativity in addressing these components and their interactions rather than expecting uniform functionality across varying contexts. The concept of an AT passport shows potential in realising this goal and empowers the user, keeping them at the forefront of the system. By adopting a Systems thinking

approach, this review acknowledges the complexities inherent within AT systems, understanding that these systems necessitate an in-depth comprehension of the intertwined links and connections characteristically present within complex systems. This further has implications for empowering the meaningful positioning of AT users at the heart of supports, innovations, and services, a critical aspect especially in the rapidly evolving technological environment.

3.7 Review of Education and Employment Passports

3.7.1 Assistive Technology for Education and Employment

In education, Assistive Technology is employed to enhance the involvement of learners with disabilities in various activities, including writing, literacy, numeracy, organisation, mobility, and communication needs. Integration of AT into the classroom provides students with a means to participate on an equal basis in education and fosters participation and independence(47, 123). Additionally, access to AT has been suggested to have an impact not only on the facilitation of, for instance, maths or literacy issues but also promotes active participation, planning, and organisation skills as well as improves motivation for learning(124).

AT use within work and employment takes different forms depending on the type of disability, the requirements of the work duties, and environmental demands. AT solutions to support people with, for example, vision, hearing, mobility, communication, cognitive, and learning disabilities may be low-tech or high-tech and would range from no-cost/low-cost to very expensive(4, 28, 125).

Choosing an appropriate AT solution for students and workers does not take a one-size-fits-all approach but instead must take into consideration the unique attributes of each user to promote its impact while avoiding abandonment and other detrimental effects(19, 52). Several AT assessment models for matching the person with an appropriate technology are in use, including the Human, Activity, Assistive, Technology (HAAT) model, which assesses the interactions between the person, the activity to be performed and the appropriate AT solution for using a specific context(6, 51, 126). The Matching Person and Technology (MPT) assessment is a person-centred measure that utilises self-reported needs and the expected technology benefit to identify appropriate AT(126). Similarly, the SETT

(Student, Environment, Task, Tool) framework has been used as a collaborative decision-making process to help identify appropriate AT for students with disabilities(50). Traditionally, different types of AT products and solutions are used based on an individual's level of education/or employment requirements in conjunction with the type of disability, for example, mobility, sensory, communication, cognitive and learning disabilities, among others(39, 48, 127).

3.7.2   Review purpose and objectives: Employment and Education Passports

This literature review examines the application of the "Passport" concept within education and employment contexts, recognising its existing use in sectors like health and social care. As the second in a two-part series informing the research and development of an Assistive Technology Passport, this review prioritises descriptive comparative analysis over effectiveness evaluation.

Objectives:

1. **Analyse and Compare:** Examine and contrast the design and usage of passports within the education and employment sectors,

2. **Inform AT Passport Development:** Drawing upon a systems thinking lens, leverage the findings from Objective 1 to inform the conceptualisation and application of an AT Passport, specifically by:

3.7.3   Approach: Employment and Education Passports

This review aimed to comprehensively analyse the "passport" concept within employment and education, focusing on resources published after 2010. This differs from the health and social care passport review, which had a cut-off date 2009. This distinction stems from the fact that the health and social care review was conducted in 2019, while this review was conducted in 2020. Both reviews, however, aimed to cover ten years before their completion. The researcher conducted the review process with ongoing support and supervision from the supervisor and co-supervisor. A dual approach was employed for this review:

1. Literature Search:

- **Databases:** ERIC, Google Scholar.

- **Other Sources:** Government publications, program reports, and grey literature identified through web searches.

- **Keywords:** "Education passport," "student passport," "pupil passport," "school passport," "IEP," "disability passport," "reasonable accommodation passport," "employment passport," and "reasonable adjustment passport."

2. Snowballing: Reference lists of identified articles were examined for additional relevant sources.

Data from diverse sources were categorised into comparable streams based on their type and content to facilitate analysis.

3.7.4   Data Extraction and Synthesis

Selected articles underwent a structured data extraction process using a standardised template. This template captured key information, including:

- **Source:** Document origin and type (e.g., journal article, report).

- **Title:** Document title.

- **Population and Type:** The target population and the type of passport discussed.

- **Passport Concept/Purpose:** The article describes the passport's aims, key features, and intended outcomes.

- **Format and Characteristics:** Details about the passport's structure, content, and delivery method (e.g., physical document, digital platform).

- **Reported or Expected Outcomes:** Documented or anticipated impacts of the passport's use.

- **Relevance to AT Passport:** Insights and implications for conceptualising an AT Passport.

After data extraction, a systematic content analysis of the extant employment and education passport models was conducted. This involved identifying and categorising key content elements related to user information, support needs, and service provision based on the information gathered through the data extraction template. The goal was to determine their potential relevance and applicability to the AT Passport.

3.7.5 The Results

The review identified seventeen articles relevant to "passports" within education and employment contexts. These articles are presented in two separate tables:

- Table 4: Summarizes the thirteen articles focused on education passports.
- Table 5: Presents the four articles related to employment passports.

Each article underwent a detailed examination completed by the researcher and examined by the supervisor and co-supervisor and key descriptive data were extracted and organised within the tables. The tables utilise a structured format with distinct columns to present the following information for each article:

- **Source:** The article's origin, such as the journal or publication.
- **Title:** The title of the article.
- **Target Audience:** The intended population or group the passport aims to serve.
- **Passport Purpose:** The article describes the passport's goals and objectives.
- **Justification:** The rationale and arguments presented for implementing the passport concept.
- **Format/Method:** Details about the passport's structure, delivery method (e.g., physical, digital), and key components.

This systematic presentation of data facilitates comparison and analysis of the diverse approaches to "passport" initiatives within education and employment.

3.7.6 Interpretation and Integration of Data

This review employs a systematic content analysis approach to examine data on various employment and education passports(128). Following data extraction

from selected articles, key content elements related to passport functionalities, implementation considerations, and user interaction were identified and categorised. This involved a rigorous coding process to ensure accurate and consistent information classification. This analysis resulted in the identification of three key content categories:

1. **Functions of Passports:** This category encompasses five sub-categories:

   o Augmentation of communication.

   o Management of transitions.

   o Advocacy of person-centred approaches.

   o Increased access to supports/services and user empowerment.

   o Enhancement of participation.

2. **Validation for Passport Deployment:** This category comprises three sub-categories:

   o Legal underpinning.

   o Standardization of practices.

   o Adoption of best practices.

3. **User-Passport Interaction:** This category includes three sub-categories:

   o Paper-based iteration.

   o Digital version.

   o A blend of both modalities (hybrid approach).

Table 6 provides a detailed illustration of the content analysis process, presenting the extracted data from the selected articles, the identified content elements, and their subsequent categorisation within the content framework.

Table 4: Education Passports from Reviewed Literature

SOURCE	Title of Article and Target Population	Purpose of the 'Passport'	Rationale for use	Passport Format/Modality
(129)	"Education Passport. Primary school pupils in Ireland due to transition to secondary school	This Passport has two purposes. 1) Provide feedback to parents on students' progress. 2) Contains information to facilitate the transfer of a pupil to post-primary school	DES Circular 0056/2011 based on The Education (Welfare) Act 2000 and the (Prescribed Bodies) Regulations 2005	Booklet
(130)	The Interstate Passport: A new framework for seamless student transfer.	The passport aims to facilitate a seamless transfer of credits when a third-level student transfers between institutions in different federal states. The passport aims to standardise module credit applications and facilitate timely graduation for students and cost benefits.	General education policy agreed between 15 US federal states. Credit applications are standardised across the states.	Record all the credits earned by a student prepared by the original institution to be shared with the next.

(131)	Students Transition Project	This passport contains a record of students' progress from kindergarten to level 12, aiming to guide and plan transitions to secondary school and facilitate timely graduation.	Project supported by education ministries in the British Columbia province of Canada	Online tracked passport
	Primary and secondary students	The passport has a personal identification number to track each student's progress through education and employment. The information is meant to guide people in planning transitions to post-secondary education and facilitate graduation.		
(132)	Pupil Passport for primary school pupils	Pupil Passport is an online person-centred communication tool that conveys the learning needs, required adjustments, views, and opinions of pupils with Special Education Needs (SEN). The passport is useful during transition times to a new class or school.	UK's Department of Education's initiative	One-page Document/online profile of the pupil's
(133)	My Activity passport for primary school pupils	This is a general list of activity ideas to help children develop life skills and appreciate the world. Activities in the passport are age-appropriate and relevant to the curriculum.	UK's Department of Education's initiative	An adaptable template of activity
(134)	Personal Passport for children who are deaf	A personal passport is a summary document containing valuable information about a child shared with a significant other who provides support.	Equality and legislation and promoting inclusive education	An adaptable template containing a child's communication modes, AT

		The passport provides a record of information about a child to help professionals such as teachers, childminders, and support staff care for the child.		used as well as coping and safety strategies
(135)	My Rights Passport for Secondary school students	The passport contains all the articles of the Universal Declaration of Human Rights for students aged 11+	A reference for students that provides introductory lessons on human rights	A colourful pocket-sized booklet
(136)	IEP Passport (State-wide Autism Resources and Training; SMART) for school children with ASD from kindergarten	The passport is provided to the child in kindergarten and follows the child throughout the school. The passport guides families and school personnel in recording the child's Individual Education Plan (IEP) goals. It supports social and personal development alongside academics.	IEP is a statutory requirement in the education of children with special education needs	Written document kept by the child and a copy by the teacher
(96)	A School Passport as Part of a Protocol to Assist Educational Reintegration After Medulloblastoma Treatment in Childhood	The passport aids in reintegration for children post-medulloblastoma. into school It aims to enhance information sharing between parents and educational and health professionals. It also aids in school transition management and includes school data in health and long-term rehabilitation records.	Support person-centred care and integration of support structures between health and education practitioners.	Written document containing communication protocol between all stakeholders
(137)	Learning Passport for primary school pupils	This passport contains shared information between the teacher and pupil to encourage learning outcomes and facilitate access to opportunities. The passport promotes understanding of the pupil's needs by a new teacher or during school transitions.	Promotes inclusive, non-discriminatory education.	A standardised protocol of information included in the passport relevant for the child, school personnel, and health care professionals

(138)	The PAMIS passport for supporting communication of a person's needs in various contexts	This passport can be used in various contexts, such as home, hospital, and school, and it aims to support individuals in expressing their needs in a person-centred, simple, and effective way.	Support for a comprehensive framework for sharing and communicating individual needs, supports, and accommodations	This passport is an e-book that can be created and displayed on tablet devices, computers, and phones.
(139)	Introducing Passport for Life for students in primary schools	This passport details a student's physical literacy level, intending to support interventions and chart the child's progress.	Supports children's physical skills development alongside academics	It is generated by the school and kept by the family to check for progress.
(140)	The PASSPORT Program on self-esteem for children with a learning disability	This passport is a six-week self-esteem skill training program aimed at increasing the self-esteem of students with learning disabilities.	A training programme based on psychological well-being for students	Contains an assessment of self-esteem outcomes

Table 5: Employment Passports from Reviewed Literature

SOURCE	Title of Article and Target Population	Purpose of the 'Passport'	The rationale for the passport	Passport Format/Modality
(141)	The Workplace Adjustment Passport for disabled employees	This passport contains a mutual agreement between an employee with any form of disability and their manager regarding the required adjustments for the person to perform their duties. The document follows the bearer even during changes in employment.	Based on Employment legislation in the UK, the Equality Act 2010	A concise written record of individual needs and necessary adjustments.
(142)	Disability passport for employees with disability	A disability passport is a mutually agreed document between an employee and respective manager that contains a framework for facilitating all the reasonable accommodations required to accomplish their duties	Based on Employment legislation in the UK, the Equality Act 2010	A written form with details of the individual's needs and types of adjustments required
(143)	The Placement Passport for Occupational therapy students	This passport contains a summary of a student's pre-practice placements and an updated profile with post-practice placements to be shared with upcoming practice educators. This passport also contains any reasonable accommodation measures required at the workplace to facilitate the student's practice.	Code of practice for students in practice as well as Equality legislation	A booklet
(144)	Reasonable Accommodation Passport	This Reasonable Accommodation Passport is a written agreement between an employee with a disability and their manager detailing the accommodations needed for the employee to perform their job effectively.	Employment Equality Act 1998-2015 and the Equal Status Acts 2000-2015	A written form with details of the individual's needs and types of adjustments required

(145)	Accommodation request	An online form with accessibility features that offers an opportunity for potential job applicants with any form of disability to request any reasonable accommodation measures they may require throughout the recruitment process.	Relevant employment laws and regulations	Online accessible form
(146)	Disability and Adjustment Passport	A personalised plan outlining workplace adjustments for an employee with a disability, regularly updated to support career transitions.	UK Equality Act (2010).	An adaptable digital record held by HR and employee

Table 6: Categories Identified from Review,

Summary data derived from Passports	Sub-category	Category
This passport provides feedback to parents on student's progress(129).	*Enhancing Communication*	
Aimed to enhance information sharing between the parents, educational and health professionals(96)		
This passport contains a mutual agreement between an employee with any form of disability and their manager regarding types of adjustments(141).		
The passport is aimed at facilitating a seamless transfer of credits when a third-level student transfers between institutions in different federal states(130).	*Transition Management*	
The passport is useful during transition times to a new class or school(132).		
The passport promotes understanding of the pupil's individual needs by a new teacher or during transitions between schools(137).		
The passport is continuously adapted to reflect the employee's change in work and career circumstances to facilitate transitions and transfers(146).		Functions of the passports
The passport has a personal identification number to track each student's progress through education up to employment(131).	*Promote person-centeredness*	
This passport can be used in various contexts: home, hospital, school, etc. aimed at supporting individuals to express their needs in a person-centred, simple, and effective way(138).		
The passport contains all the articles of the Universal Declaration of Human Rights for students aged 11+(135)		

The passport aids in the reintegration of children post-Medulloblastoma into school.

The passport provides a record of information about the children who are deaf to help professionals such as teachers, childminders, and support staff care for the child(134).

This passport details a student's physical literacy level intending to support interventions and chart the child's progress(139).

The passport facilitates timely graduation and student cost benefits(130).

The passport contains a framework for facilitating all the reasonable accommodations required to accomplish their duties(144).

This passport contains a mutual agreement between an employee with any form of disability and their manager regarding the required adjustments for the person to perform their duties. The document follows the bearer even during changes in employment(141).

Pupil Passport is an online person-centred communication tool that conveys the learning needs, required adjustments, views, and opinions of pupils with Special Education Needs (SEN).

A reference for students that provides introductory lessons on human rights(135).

Based on Employment legislation in the UK, the Equality Act 2010(141).

Employment Equality Act 1998-2015 and the Equal Status Acts 2000-2015(144)

DES Circular 0056/2011, based on The Education (Welfare) Act 2000 and the (Prescribed Bodies) Regulations 2005, allows schools to share relevant information concerning a child transferring between recognised schools(129)

Timely access to support/services

Enhancing participation

Legal foundation

Justification for the Passport

General education policy agreed between 15 US federal states. Credit applications are standardised across the states(130).

Coordinated systems

Support person-centred care and integration of support structures between health and education practitioners(96).

The reasonable adjustment document follows the bearer even during changes in employment(141).

The passport is continuously adapted and changed to reflect the employee change in work and career circumstances to facilitate transitions and transfers(146).

Code of practice/guidelines for students in practice(143).

Instilling person-centred care, creating relationships, and enhancing communication are important(134).

Booklet (129)

A colourful pocket-sized booklet(135)

User-Passport Interface

A written form with details of an individual's needs and types of adjustments required(144)

Paper Version

This passport is an e-book that can be created and displayed on tablet devices, computers, and phones(138).

An adaptable digital record held by HR and employees(146).

Digital Version

One-page Document/online profile of the pupil's (132)

An adaptable template containing a child's communication modes, AT is used as well as coping and safety strategies(134).

Both Paper and Digital Version

3.7.7 Review Findings & Implications for an AT Passport

We will now explore the review findings, including the major categories and sub-categories and their impact on AT Passport conceptualisation through the lens of the 10Ps recommendations.

3.7.7.1 The Function of Passports

Enhancing Communication: Each passport design is tailored to address the unique needs of its target population. They collectively serve six core functions: communication enhancement, transition management, prompt access to support/services, user empowerment, and encouraging participation. The primary role of the passports, as outlined in the review, is to facilitate the exchange of information. This includes sharing an individual's profile, their specific needs, and required supports like reasonable accommodations between relevant entities (96, 129, 141) . However, the reviewed literature does not specify the extent of consent required to access relevant information contained in the passports.

Transition Management: The passports streamline the transfer of a user's data and services required from one educational or professional setting to another (131, 137) Examples include transitioning between different schools or educational stages and even the transference of university credits via a standardised validation protocol(130). In the workplace, passports aid in data transition during internal promotions or between different employers (141) Additionally, they enable data sharing between the health and education sectors to ensure user participation(96).

Prompt Access to Support/Services: Several passports under review have emphasised their role in facilitating timely access to support and services, especially in education and healthcare. For instance, the passport for children with medulloblastoma enhances their timely access to education by presenting their support needs and optimal strategies to foster their education from a health viewpoint. Additionally, the passport for deaf children ensures they receive equal educational opportunities via built-in support structures(96, 134). Likewise, reasonable accommodation passports guarantee immediate measures to enable persons with disabilities to work effectively(141, 144).

Promotion of Person-Centeredness: Encouragement of Person-Centeredness

The design and elements of the passport are fine-tuned to accommodate distinct individual needs, specific circumstances, and unique contexts. The passports evaluated have features that guarantee personalised information, with audit trails ensuring its authenticity. Also, these passports are crafted based on user requirements, prioritising simplicity, accessibility, and a user-focused design[131, 138, 141].

User Empowerment Passports are empowering tools since they communicate user needs, facilitate access to services or promote involvement in education and employment. The review indicated that passports could expedite processes like college graduation, thereby minimising the costs associated with prolonged education. Furthermore, they give students or employees a sense of control, enabling them to dictate the terms of their education or employment[132, 141, 144].

3.7.7.2 Justification for the Passport

The rationale behind these passports' utilisation in the education and employment sectors emerged as a distinct theme in the review. It could affect the conceptualisation of the AT passport by offering a foundation for legal, ethical, practice, or empirical considerations. The reasons for designing and developing the AT Passport could help validate its credibility, enhance its longevity, and guide potential scalability. Concepts emerging under this theme include Legal Foundation, Practice Standardization, and Best Practice Principles. Notably, the review reveals a gap in the empirical research-based background of these passports' conceptualisation, design, and development.

Legal Foundation: Employment passports seem responsive to the legal commitment to ensure equal participation for individuals with disabilities in work and employment. This is often achieved through reasonable accommodation/adjustment measures as outlined in specific laws such as Ireland's Employment Equality Act (1998-2015) and the Equal Status Acts (2000-2015) or the UK's Equality Act 2010[144, 147, 148]. On the other hand, education passports, particularly those for children with special needs, often reference circulars from the Department of Education based on the Education Act 2000 and

the Regulations 2005. These provide a structure for sharing information between public schools.

Practice Standardization: Practice standardisation also emerged as a key theme, serving as a basis for standardising transition management across sectors and different jurisdictional contexts. An exemplary instance is the Inter-State Passport Project in the US, which assembled 15 states to standardise the learning credits acquired by students(130). This facilitated a streamlined transfer of credits, promoting quicker and more efficient educational progress. This theme may have implications for the design of AT passports that are credible, acceptable, and valid across different settings, potentially even crossing country borders within the same regional authorities, like the European Union. Furthermore, several employment passports appear to have been developed by workers' unions, creating a standard template for adoption and utilisation by members and other interested parties (141, 146)

3.7.7.3 User-Passport Interface

The passports examined in the review were based on legal grounds (for instance, to provide reasonable accommodations), the need for service standardisation, or best practices. As elaborated below, these aspects carry significant implications for the development of AT passports.

Paper Version: Most identified passports were physical documents, appearing as booklets, colour-coded pocket-sized items, written sheets, or one-page records with mixed information. Institutions held some passports, made available upon a user's request, while others were exclusively held by users and included information from various contexts. Using a paper format for these passports has implications for the development of AT passports, primarily concerning data security and preservation. Risks associated with this format include data loss, challenging retrieval of original data, concerns about data protection, and unauthorised data storage and sharing.

Digital Version: These passports are typically created digitally, allowing for modification and access across various digital platforms such as desktops, tablets, and phones(138, 146). This level of flexibility and adaptability to user preferences could benefit the design of AT passports. Challenges exist, however, including some

users' preference for paper-based or less technical aptitude for engaging with digital platforms. With digital versions, data protection and storage become even more critical considerations, prompting a potential need to implement additional security measures to ensure user data integrity and safety.

Both Digital and Paper Version: This version mirrors the digital model but incorporates an extra feature, facilitating alterations to suit different user preferences and contexts. A notable benefit is the ability for users to generate a tangible paper record of their information. This flexibility could accommodate the diverse needs of AT users. However, concerns regarding data validation, secure storage, protection, and the careful distribution of information to appropriate entities remain pivotal considerations.

3.7.7.4 *Summary of Systems thinking application to categories.*

Applying a systems thinking approach reveals two core facets of the AT Passport: its function and validation. These facets align with various components of the "10Ps" model by MacLachlan and Scherer:

Function:

- **Communication & Empowerment:** The Passport is a vital communication tool. It empowers individuals to express their needs and request assistance, fostering participation in education and work.

- **Standardized Support:** It provides a standardised method for data transfer, assistance requests, and service provision, facilitating smoother transitions and optimising user participation across sectors.

- **Policy Influence & Resource Allocation:** The Passport's practical implications can influence policy and resource allocation, ensuring user needs are integrated into its design and development.

- **Bridging Needs Across Domains:** It bridges the gap between user needs in education and employment, highlighting how user data impacts resource allocation.

Validation:

- **Legal & Ethical Considerations:** The Passport must comply with policy regulations to safeguard individual dignity and promote equal opportunities.

- **Adaptability & Standardization:** Its adaptable nature allows for standardised policies across sectors and countries, keeping pace with technological and policy changes.

- **Accessibility & User Preferences:** The design should offer various formats and accessibility features to cater to individual preferences and diverse situations.

3.7.8 Summary of Findings

The review involved an analysis of articles relevant to education and employment passports. This examination led to the extraction of vital descriptive data. It was systematically sorted based on specific parameters such as source, title, audience, objective, justification, and the structure of the passport concept presented in each article. The assimilation and integration of the data facilitated a structured examination process. This approach led to the coding of the data into identifiable observations. An inductive analysis was conducted, highlighting three primary categories. These include the functions of passports, evidence for their application, and the interaction between the user and the passport. The roles of the passports have been elaborated on, pointing out their significance in enhancing communication, managing transitions, advocating for person-centric methods, increasing access to support/services and user empowerment, and promoting participation. The necessity for the passport was also investigated, revealing that legal foundations, standardised practices, and the adoption of best practices support it. The interaction between the user and the passport was also thoroughly examined, considering paper-based, digital, and combined versions. Through a systematic procedure of assimilation, integration, observation, and categorisation into key category domains, this review offers an all-encompassing understanding of the passport concept, its application, and functionality in both educational and employment contexts.

3.7.9 Education and Employment Passports Review: The Conclusions

This review examines the concept of a passport as an informational and transitional tool in education and employment settings. Passports serve dual functionality: a platform for communication and a device for transition management, facilitating seamless data transfer across different societal sectors. They empower users by addressing individual needs while promoting participation in sectors such as education and employment. Passports provide timely access to crucial supports and services, fulfilling legal, ethical, and practical obligations to ensure equal participation for all, especially those with disabilities. Lessons drawn from these findings can be applied to an Assistive Tech passport, which could follow a similar framework regarding communication, empowerment, transition management, and access to services. This analysis underscores the potential utility of the AT passport and outlines future considerations for its data protection, user-friendliness, accessibility, and disability inclusivity.

3.8 Analysis and Synthesis of the Literature: Implications of the Concept Passport for Assistive Technology Use across Health, Social Care, and Education Sectors

The literature review on the Assistive Technology Passport illuminates the instrument's integral roles across two main arenas: Health and Social Care and Education and Employment. Within the Health and Social Care ambit, the AT Passport manifests its core functionalities in augmenting communication and accelerating service access. By acting as the conduit for the exchange of individual profile information and support needs, it offers rapid access to vital healthcare and social services, particularly critical for individuals living with disabilities(59, 149).

Conversely, the domain of Education and Employment emphasises Transition Management, User Empowerment, and Practice Standardization. The AT Passport assuages the data transition process across different stages of education or the shift from education to employment. It furnishes students and employees, particularly those with disabilities, who can articulate their needs and actively engage in their education or employment(56, 150). In terms of methodological application, both sectors employ MacLachlan and Scherer's 10Ps recommendations for a systemic approach to Assistive Technology, affirming the

Passport's pivotal role in meeting the Legal Foundations and facilitating Practice Standardization(23). Viewing through the lens of the user-passport interface, both sectors acknowledge the AT Passport's format flexibility - it can be a paper version, a digital iteration, or a hybrid fusion, each presenting its advantages and drawbacks warranting consideration(52, 124, 151)**.** An analysis of these findings underscores the AT Passport's versatility as an individualised tool, particularly for individuals with disabilities across diverse sectors(16, 82, 152). While its uses may diverge in Health and Social Care compared to Education and Employment, its central grounding in the 10Ps endows it to meet individual needs, empower the user, and facilitate crucial transitions(44, 153-155).

3.9   Review Conclusions and Recommendations.

Based on the final review of the concept AT Passport, here are recommendations for research, design, and development:

> 1) Holistic Integration: Promote a system-wide adoption of the AT Passport, considering interconnections and interactions within the Health and Social Care, Education, and Employment sectors.
>
> 2) Tailored Innovations: Stimulate research to develop user-centric innovations, considering the different AT Passport formats suitable for varying scenarios and user preferences.
>
> 3) Standardization and Synergy: Foster synergy in practice standardisation across sectors, recognising the AT Passport's function in promoting a uniform and cohesive system.
>
> 4) User Empowerment in the System: Enhance efforts to provide education and resources to users within the system, enabling them to use the AT Passport fully.
>
> 5) Evaluative Feedback Loops: Establish feedback mechanisms to constantly evaluate, improve, and expand the implementation of the AT Passport based on real-time user experience and system response.
>
> 6) Systemic Governance and Accountability: Create a robust legal framework that safeguards user interests and data while sustaining system accountability in the deployment of AT Passport.

3.10 Chapter Summary

This chapter explored the "passport" concept across health and social care, education, and employment, drawing on diverse local and international sources. This analysis established a foundation for researching and developing an AT Passport—a tool promoting accessibility to AT. The review, structured around these three key sectors, revealed a common thread: the potential of passports to enhance individual access and participation. This critical finding underscored the significance of further research and development of the AT Passport, ultimately shaping the methodological approach adopted in this study. The insights gleaned from this review directly informed the subsequent mixed methods sequential explorative design employed to investigate the potential of the AT Passport. The following chapter delves into the methodological approach adopted in this research study, detailing the rationale and techniques employed in each phase.

Chapter 4: Methodology

4.1 Introduction

This chapter details the rationale behind the chosen research methodology and design. It illuminates the strategic application of the pragmatism paradigm, highlighting how its philosophical underpinnings contribute to understanding the complexities of the research problem. Delving further into the research process, this chapter outlines the specific methods employed during the investigation. Finally, it describes the tailored mixed methods design adopted for this study and concisely summarises the overarching research objectives and questions.

4.2 Research Design: A Phased Mixed Methods Approach

This research examines the Assistive Technology Passport's proposed concept as a potent solution to improve Assistive Technology accessibility in Ireland, where an established AT system is currently absent. This chapter expounds on the structured design of this research and the orienting principles steering it, commencing with an exploration of ontological grounds, advancing to epistemological postulations, and culminating in a thorough methodological schema designed to solve the posed research questions. To guarantee a streamlined and productive progression of research, it is crucial for the researcher to conduct the study with transparency, acknowledging their philosophical lineage, inherent assumptions, and lived experiences. A 'paradigm' in social research encapsulates the rudimentary beliefs and philosophical premises that guide the researcher's worldview and ensuing actions(156-158). Paradigms are instrumental conceptual and practical devices that aptly address specific research problems. The methodological philosophy of pragmatism serves as the bedrock of this research undertaking.

This study employed an exploratory sequential mixed methods design to investigate the potential of an Assistive Technology Passport for enhancing AT access for individuals with disabilities. This approach was chosen to provide a comprehensive understanding of the issue by first exploring the lived experiences of individuals with disabilities and then using those insights to inform a broader

quantitative exploration of user needs and perceptions. Figure 3 provides a clear visual overview of the research process, illustrating the interconnectedness of each phase.

Qualitataive: Understanding Lived Experiences
- **Objective:** Uncover how individuals with disabilities experience access to assistive technology.
- **Method:** Interpretative Phenomenological Analysis
- **Outcome:** Determine the need for and potential benefits of an AT Passport. This will inform the development of a quantitative survey and expert input.

Quantitative Survey (Data collection concurrently with Delphi)
- **Objectives:** To understand participants' comprehension, experiences, and perceived needs related to Assistive Technology use throughout their educational journey.
- **Method:** Quantitative survey designed based on the categories and insights generated from Qualitative study
- **Outcome:** Statistical data on user comprehension, experiences, and perceptions of AT throughout their educational journey.

Qualitative and Quantitative Data Integration
- **Objective:** Combine the in-depth understanding of lived experiences from Phase 1 with the broader statistical insights from Phase 2.
- **Method:** Triangulate findings from qualitative and quantitative data sources, identifying areas of convergence and divergence.
- **Outcome:** A comprehensive understanding of the need for and potential impact of an AT Passport, grounded in both lived experiences and quantitative data.

Delphi Study (Data collection concurrently with Quantitataive)
- **Objective:**
  - To identify AT Passport's main functionalities, design features and critical security an privacy consideartions
- **Method:** Delphi study involving two rounds of online survey questionnaires and feedback to refine AT Passport Concept
- **Outcome:** Expert consensus on the functionalities, features, system requirements, design considerations, and security/privacy aspects of an effective and sustainable AT Passport.

AT Passport Framework Development
- **Objective:** Integrate findings from all previous phases to develop a comprehensive framework for an AT Passport.
- **Method:** Data triangulation and synthesis techniques to identify converging and diverging categories and perspectives across all data sources.
- **Outcome:** A well-supported framework for an AT Passport, incorporating the lived experiences of individuals with disabilities, quantitative data on user needs and perceptions, and expert consensus on its design and implementation.

Figure 3: The study's exploratory sequential mixed methods research design

Phase 1: Qualitative Exploration of Lived Experiences

The research journey commenced with a qualitative exploration of how individuals with disabilities experience access to Assistive Technology. Grounded in a thorough literature review of the "passport" concept, the state of local and global AT context, and theoretical models such as the Human Rights-Based and the Capability Approach, this phase employed Interpretative Phenomenological Analysis (IPA). IPA was chosen for its strength in revealing the meaning individuals ascribe to their experiences, thus illuminating the complexities of AT access. This phase was essential in identifying the initial need for and potential benefits of an AT Passport, directly informing the development of the subsequent quantitative survey and shaping the focus of expert input in later stages.

Phase 2: Quantitative Survey of User Needs and Perceptions

Building upon the rich qualitative data from Phase 1, a quantitative survey was designed to gather broader insights into user comprehension, experiences, and perceptions of AT throughout their educational journey. This phase expanded the scope of the study beyond typical service provision at the primary or secondary level, capturing the experiences of individuals at the university level who had navigated AT access throughout their education. This provided valuable consolidation and refinement of the qualitative findings, highlighting key areas of need and informing the development of the AT Passport framework.

Phase 3: Data Integration and Triangulation

Phase 3 marked a crucial step in the mixed methods design by integrating the in-depth qualitative understanding of lived experiences from Phase 1 with the statistical insights generated in Phase 2. This triangulation process involved systematically comparing findings from both data sources, identifying areas of convergence and divergence to gain a more comprehensive and nuanced understanding of the need for and potential impact of an AT Passport. This integrated understanding provided a strong foundation for refining the ATP concept with expert input.

Phase 4: Delphi Study for Expert Consensus

This phase aimed to refine the AT Passport concept by achieving expert consensus on its functionalities, features, system requirements, design considerations, and security/privacy aspects. A two-pronged approach was employed to optimise data collection within the limitations imposed by the COVID-19 pandemic: a Delphi study with expert AT users ran concurrently with a quantitative survey of a broader user group.

It is crucial to note that while both data collection streams occurred in parallel, the quantitative survey findings did not inform the Delphi study. The Delphi study was designed to specifically leverage the rich qualitative insights gleaned from the preceding literature review and qualitative study, allowing for an in-depth exploration of user needs and preferences.

Participants for the Delphi study were drawn from the same cohort as the quantitative survey. However, participation was contingent on providing informed consent and self-identifying as an AT user. This ensured that the Delphi study participants possessed the requisite lived experience to contribute meaningfully to refining the AT Passport concept. Participants who declined to participate in the Delphi study or did not meet the inclusion criteria concluded their involvement after completing the quantitative survey.

Phase 5: AT Passport Framework Development

The final phase combined findings from all previous stages to create a comprehensive framework for an AT Passport. We identified and integrated converging and diverging themes and perspectives from all data sources using data triangulation and synthesis techniques. This framework, grounded in the lived experiences of individuals with disabilities, quantitative data on user needs and perceptions, and expert consensus, provides a roadmap for implementing the AT Passport and offers structured recommendations for improving access to assistive technology more broadly. This multi-phased approach ensured that the final AT Passport design aligns with the needs and expectations of its target user group.

4.3   Pragmatism

The pragmatic paradigm emphasises the role of practical actions in confirming knowledge or theory via applied research focusing on societal issues(159, 160). This perspective identifies the key intersection of multiple realities, using experiences and observations as the foundation for developing context-dependent understanding(161). Supporters of pragmatism maintain that singular or multiple realities evolve per human experiences within societal and environmental contexts(162-165). Pragmatism views reality as a normative concept, emphasising the link between human experience and the influence of context. The pragmatic researcher values the practical implications of research findings over accurately depicting reality. The multiple facets of pragmatism's theoretical framework, focused on handling real-world issues, provide ample opportunities for practicum-centred researchers(163, 166). As a research approach, pragmatism aims to address real-world problems(167). Pragmatists perceive the process of knowledge acquisition as a continuum and shun the strict objectivity or subjectivity espoused by postpositivist and constructivist researchers. Consequently, pragmatism allows researchers to choose methods to address their research inquiries.

In philosophical terms, pragmatism steps away from the classic tug-of-war between objectivity and subjectivity elements(166). Instead, it leans towards the concrete and observable, overriding the idealistic or strictly theoretical. This redirection allows researchers to sidestep the entrenched viewpoints of postpositivism and constructivism, centring their attention on distinct, innovative investigational techniques(163).

The pragmatic philosophy encapsulates the dynamic nature of human cognition, fluctuating between experience and observation to form knowledge and derive meaning from existence within any particular context(168). Pragmatism elucidates that all knowledge is temporary, requiring empirical validation. According to Morgan (2014), pragmatism emphasises abductive reasoning, fostering a synergy between practical and theoretical constructs; hence, it includes inductive and deductive reasoning within its theoretical framework(163).

The principles of transferability and inter-subjectivity are vital to pragmatism, and they bridge the gap between subjective interpretations, experiential elements, and

objective observations. The perceived meaning of physical and social entities is moulded through temporal interaction, impacting our self-awareness and perception of reality(168). This perceived reality provides the ontological groundwork for the research supported by pragmatism.

Morgan (2014) suggests that the pragmatic framework accommodates a coherent reality and individual interpretations of that reality(163). This amalgamation of multiple perspectives provides pragmatism with adaptability, facilitating researchers to change their methods depending on their contextual requirements. It is crucial, however, to acknowledge the limitations inherently present in any theoretical paradigm, pragmatism included. For instance, critics argue that pragmatism's focus on 'what works' can sometimes need a critical edge, potentially overlooking underlying power dynamics or ethical considerations in pursuing practical solutions(169). Regardless, pragmatism is exceptionally apt for qualitative studies because it can accommodate the merits and limitations of human perception, judgement, and practice. Therefore, it has been chosen as this study's most fitting philosophical foundation.

4.4 Mixed Methods Research

Mixed methods research is a methodology that integrates both quantitative and qualitative data collection, analysis, and result synthesis. This multimodal approach significantly contributes to the research design by enhancing the understanding of the research issue through the application of varied enquiry methods(160, 170, 171). A benefit of mixed methods research is its ability to enhance additional knowledge by integrating these two methodologies. Specifically, it is the substantial interactions between the methodologies that contribute to a comprehensive understanding of the research subject rather than a simple merger of the two approaches(168, 171-174). The premise of merging quantitative and qualitative data indicates that neither method can independently capture the complexity of the study phenomena. Therefore, combining both techniques can explain the research topic more comprehensively. Despite the increasing acceptance of mixed methods research, there is an ongoing debate about its philosophical alignment(167, 175). Currently, pragmatism is seen as the

most fitting paradigm, providing the philosophical underpinning that guides mixed-methods research(160, 163, 164, 167, 170, 171, 176).

Due to differing philosophical viewpoints, mixed methods research is debated(177). Critics argue that combining methods is unsuitable since quantitative approaches follow positivism, while qualitative methods are categorised under interpretivism(156, 178). However, supporters of mixed methods research counter by stating it enriches the data collection and simplifies decision-making(160, 179, 180). Adopting a mixed-method research design requires solid reason and should align with a distinct rationale for guiding the researcher(181). Reinforcing this notion, researchers suggest tailoring the research design to fit each specific rationale, guiding decision-making based on particular criteria for data collection and mixed methods study design analysis(182). Mixed methods research is favoured for several reasons, including its capability for triangulation, complementing the strengths and offsetting the weaknesses of qualitative and quantitative methods, and the completeness of its findings. Its credibility and enhancement of findings integrity are also noted advantages. Its explanatory and exploratory components offer a structured process of using one method to explore or explain a specific phenomenon (qualitative to quantitative or vice versa). For instance, an exploratory qualitative design could be used to develop survey items, serving as the basis for an instrument development framework. Three typical mixed methods designs are exploratory sequential, convergent, and explanatory sequential. The exploratory sequential design involves qualitative data collection followed by quantitative data collection, often utilised to refine data captured from research participant experiences and perspectives, possibly to aid in creating a subsequent survey instrument. The explanatory sequential design reverses this process, collecting and analysing quantitative data before qualitative data collection, using the following qualitative stage to explain the quantitative results in more depth. The convergent design involves collecting qualitative and quantitative data simultaneously and then analysing them separately before combining them in the interpretation stage. This design is suited for single-type research questions requiring understanding the research topic from both perspectives, emphasising convergence and

divergence in outcomes while counterbalancing the weakness of one approach with the strength of the other.

4.5   Explorative Sequential Design: The Rationale

This research presents an exploratory sequential design using an interpretative approach based on a pragmatic paradigm to help solve people's unmet AT needs. Stage one of this research explored people with disabilities' lived experiences, experiences of access to AT, and perceptions of the AT Passport concept through in-depth interviews and the application of interpretative phenomenological analysis. Findings from this qualitative, exploratory stage were essential in shaping the subsequent research stages. Specifically, these findings informed the development of the quantitative survey instrument and guided the structure of the Delphi study. For instance, the Delphi study directly addressed key functions, design considerations, and security components of the AT Passport concept, all identified through insights gathered during this initial qualitative phase.

Findings from the literature review on the concept of passport in use within health and social care, education, and employment settings preceded the use of an explorative sequential design in this study. The exploratory sequential design has the advantage of comparatively providing a higher and more robust study validity(183). Additionally, in-depth interview techniques benefit from expounding on and understanding issues of complexities and expanding concepts beyond the surface level, consequently generating rich data for further explanatory study(184). Furthermore, the ideographical nature of the qualitative phase of this research ensures that the primary findings from the initial exploratory study align seamlessly with the research objectives.

A review of the literature suggests that the research process into the AT Passport must ensure it is user-focused and strongly considers the personal and contextual factors to assess its suitability to improve access to AT and consequently enhance people's participation in their chosen activities. The review highlighted AT users' involvement and engagement in the research and informed the AT passport's design and development as necessary. In this regard, a qualitative exploratory research design allowed us to investigate the participants' lived experiences of access to AT and their perception of the AT Passport concept. Findings from this

study's explorative stage provided the foundation for further research to identify the AT Passport's specific functionalities and the users' experience features. This phase also offered the users perspectives on the concept of AT Passport, offering suggestions on its relevance and additional areas of consideration for refining the concept to ensure it is person-centric.

4.6   Qualitative Research

Qualitative research is a method that allows researchers to gain insights from the lived experiences of multiple participants, accounting for the significance of contextual factors in understanding individuals' narratives and their social and psychological implications(170). The process primarily involves generating knowledge from the participants' perceptions and experiences while acknowledging the researcher's role in co-producing this knowledge(170). It admits that the researcher's background and preconceptions play a part in knowledge co-construction during the data collection and analysis stages(185).

There is an emphasis on transparency and reflexivity to prevent researchers' biases originating from their perspectives and prior experiences from overshadowing the data(186). Qualitative exploratory research proves beneficial when the phenomenon under investigation has not been previously studied, providing a broad understanding of a social or psychological topic(187). Such studies promote flexibility, purposefulness, and open-mindedness during the data generation and interpretative process, intending to create a thorough understanding of the subject matter. Despite exploratory research not directly providing solutions to the social or psychological concerns under study, it effectively aids in understanding participants' perceptions of AT value and identifying its access barriers and facilitators(187). Consequently, this approach provides an opportunity to examine the existing understanding of the AT Passport concept and thereby guide the development of its conceptual framework to enable satisfactory person-centred access to AT. This study phase's findings were crucial in formulating the first questionnaire for the quantitative stage and significantly contributed to the first round of the Delphi study.

Qualitative research allows researchers to listen to multiple participants share their lived experiences and acknowledges the importance of contextual factors in

understanding people's stories and their impact at a social and psychological level(170). Studying the participants' perceptions and experiences is broadly a qualitative researcher's source of knowledge generation. However, this process also recognises the researcher's influence on the co-production of this knowledge with the participant(188). The researcher's background and preconceptions are acknowledged in qualitative research as influencing the co-construction of knowledge through the engagement in data collection and analysis stages (160). Researchers' biases based on their worldviews and prior experiences should not be shelved; researchers are encouraged to be transparent and reflexive(186).

Qualitative exploratory research is practical where the phenomenon of study has hitherto been studied, resulting in a generalised understanding of an area of social or psychological life(189). The concept of an AT Passport and its potential for enabling access to AT has yet to be examined, hence the choice of exploratory research. Explorative studies require flexibility, convenience, and broadmindedness in the data generation and interpretative process to produce an in-depth understanding of the study phenomenon(170, 189). The exploratory researcher's interest is not solving the enquiry's social or psychological problems. Nevertheless, in the current research, this process helps understand the participants' meaning-making of the value of AT to them. It explores the barriers and facilitators of access to AT. Subsequently, this approach offers an opportunity to explore the existing understanding of the AT Passport concept and, as a result, inform the development of its conceptual framework to facilitate adequate person-centred access to AT.

Reflecting on the study's primary objective, which is to understand and explore individuals' lived experiences with AT access and their perceptions of an AT Passport, the research adopts an interpretivist approach for a deeper exploration of their experiences(190). The interpretivist design facilitates understanding experiences as a product of interactions between participants and researchers, enabling knowledge acquisition about the phenomena under scrutiny(190-192). Therefore, in the qualitative segment of this research, the selected Interpretative Phenomenological Analysis design concentrates on the in-depth investigation of participants' lived experiences, perceptions, and the researcher's interpretation of

these experiences, thus providing a robust foundation to address the research questions(193). Essentially, the IPA approach affords a structure in which a researcher can carefully scrutinise participants' expressions, obtaining a first-hand perspective on aspects of their lives pertinent to the study(194). The researcher then interprets these experiential narratives to deduce meanings from participants' interpretations of their experiences. As a qualitative experiential research method, IPA is rooted in three main areas of knowledge philosophy – phenomenology, hermeneutics, and ideography(195). To thoroughly grasp the fundamental principles of IPA, it is crucial to elaborate on these philosophical foundations and comprehend how they contribute to understanding the participants' lived experiences with AT access.

4.6.1.1 Phenomenology

Phenomenology, a philosophical approach to studying experiences, collects rich, detailed, and context-specific data that capture the participant's perceptions(195, 196). Ideas from philosophical pioneers like Husserl, Heidegger, Merleau Ponty, and Sartre form the basis of phenomenology, aiming to understand individuals' relationships with the world by examining a specific aspect of their lived experiences(187, 193). In this regard, the researcher's role is interpretative, focused on gleaning meaning from individuals' world experiences and activities through a hermeneutic process, as will be further described.

4.6.1.2 Hermeneutics

Hermeneutics is the other theoretical basis of IPA that relates to the theory of interpretation(187). Schleiermacher, Gadamer and Heidegger are the most influential hermeneutic theorists(195, 197). Gadamer (1976) describes hermeneutics as a research analysis theory and an approach to understanding humans(198). He argues that the interpretation of historical texts focuses on the meaning of the texts and that the period and context of where the interpretation was made influences the meanings ascribed to it. Through a holistic and comprehensive analysis, the interpretative process may culminate in the researcher understanding the participants better than themselves. Schleiermacher asserts that a text's interpretation should go beyond simple comprehension and aim for a deeper understanding of the author's intentions and the historical

context in which the text was written. He emphasises the importance of the interpreter's historical and cultural background, acknowledging that it inevitably shapes their understanding(199). Nevertheless, considering that qualitative research is completed in real-time, Schleiermacher's assertions appear informative, albeit both philosophers' work influences IPA remarkably(195, 200).

In this research, however, I draw upon Heidegger's (1962) insights in interpreting research data(201). According to Heidegger, phenomenology draws out obvious and hidden meanings from research data, connecting phenomenology to hermeneutics. Additionally, Heidegger contends that the preconceptions in the interpretation process richly influence how we make meanings of the phenomena of interest(202). By embracing prior experiences, suppositions and assumptions, a researcher could provide a rich analysis of a person's articulation of their lived experiences. However, he cautions against superimposing his worldview but instead uses emerging data from the encounters to shape one's preconceptions(201, 202). Indeed, Smith (2021, pg. 20) asserts that Heidegger's positionality explains the foundational basis of IPA(195). In discussing hermeneutics, the hermeneutic cycle is essential in understanding the dynamic relationships between part and the whole of data. Essentially, the analysis process in IPA is described as iterative and cyclic through, for instance, the dynamic meaning-making of a line of text at different levels in an interconnected fashion, offering a variety of perspectives and a coherent linking of the part and whole of a text context(203). The research participants are experts on their lived experiences, while the researcher expands their understanding of the individual's experiences as they engage in a hermeneutic cycle.

4.6.1.3 Ideography

Ideography in IPA studies differs from other psychological disciplines by focusing on an individual-level perspective instead of general assumptions at a population or group level(190, 195). Ideographic inquiries aim to secure in-depth data collection, ensuring a comprehensive and systematic analysis that encapsulates individual perspectives within contexts(200). IPA studies typically employ small, convenience-selected samples, devoting considerable effort to specific events or life occurrences. This intensive focus yields an interpretative process with the

potential for transferability of insights to various contexts or groups(204, 205). Readers are encouraged to leverage their knowledge and experiences to discern the applicability of IPA findings to their settings(187). In this investigation, I will use each participant's experiential categories to identify patterns of similarities and variations in their experiences. This data will be presented as verbatim transcripts as a testament to the study's ideographic assurance.

4.6.1.4 The Rationale for Selecting IPA

The decision to use IPA as the research design for my project largely hinges on its focus on understanding individuals' interpretations of their world and lived experiences, which are central to my study(206). Importantly, IPA allows researchers to interpret lived experiences from the participant's standpoint while also going beyond the participant's understanding through inductive analysis appeals(207). Central to IPA is the treatment of detailed first-person reports as data. It emphasises context and nuanced meaning derivation, ranging from a single to multiple perspectives. This method facilitates assessing differing or similar views and opinions, thus generating rich interpretative results(206, 208).

This study uses IPA to explore the subject of interest, specifically how participants access Assistive Technology as a shared characteristic. Homogeneity was achieved through a selective sampling of individuals offering insight into their access to AT and their views on the AT Passport concept, all of whom are associated with the same service provider(203, 209). Utilising IPA's phenomenological and interpretative traits allows for understanding people's experiences with AT and their perspectives on the AT Passport concept. IPA's ideographic aspect ensures that the detailed experiences of each participant are examined through a two-sided hermeneutic analysis, capturing individual variances and facilitating deep interpretation of data. Combining these varied experiences prompts reflection on diverse and similar viewpoints, leading to a shared experiential claim(210). Furthermore, Reid et al. suggest that IPA is particularly valuable when investigating under-researched areas, which applies to this study exploring people's experiences with AT and the concept of the AT Passport, considering the latter's limited research(211). IPA's integrative approach allows for interpretations primarily derived from the participants' experiences, analysed

through both their and the researcher's lens. As long as it adheres to its core principles of phenomenology, Idiography, and hermeneutics, IPA also provides opportunities to use other theoretical positions in the human sciences to enhance interpretation, such as the capability approach discussed in this chapter(211).

Using IPA as an explorative approach aligns well with the mixed methods approach taken in this research, as it fits seamlessly into the explorative sequential space. It provides initial insights into individuals' unique experiences, especially about people's exposure to Assistive Technology, its value, and the barriers and facilitators of access. IPA also serves as a tool for examining the AT Passport concept, laying the groundwork for understanding its basic functionalities and usability traits derived from people's experiences. These traits will be further investigated using a Delphi method, which employs qualitative and quantitative methods. The qualitative phase of this research, which utilises the IPA approach, provides the raw data used to design the Delphi questionnaire.

Insights derived from the qualitative phase informed the formulation of quantitative questionnaires, adding another dimension to understanding access to Assistive Technology throughout students' education. This phase involved surveying university students affiliated with a specific disability support office. Conducting a quantitative analysis after qualitative research guarantees a thorough and diverse scope of data collection, strengthening the entire data collection by cross-verifying the findings. This method increases the credibility and integrity of the conclusions drawn from the research(182). The decision to survey university students was made for three reasons: Firstly, the qualitative study's participant pool was deliberately drawn from individuals connected with a disability service organisation, potentially missing out on the perspectives of people who have not used such services. Secondly, the qualitative participants' age demographics included children (via parents' representation), adults older than typical university students, and elderly adults. Finally, tertiary education students offered additional input on their AT experiences across different educational phases, facilitating a comparative analysis of AT experiences. Comprehensive methods and findings of this phase will be elucidated in Chapters 7 and 8.

4.7 Quantitative Method

This study adopts a pragmatic mixed-methods framework, recognising the value of merging qualitative and quantitative insights to understand Assistive Technology needs and solutions comprehensively. This approach allows for a more holistic and nuanced exploration of complex phenomena(182).

Building upon the insights gained from the literature review and the initial qualitative phase, which explores the AT Passport concept and reveals significant barriers to AT access, particularly within educational settings, this study proceeds with a quantitative phase designed to provide a broader, generalisable understanding of these challenges(212). Quantitative research, with its emphasis on numerical data and statistical analysis, is crucial in this mixed-methods study as it allows for the testing of patterns identified in the qualitative phase, strengthens the reliability and validity of the findings, and facilitates a deeper understanding of the prevalence and impact of the identified barriers across a larger population of university students registered with disability services(157, 160, 213).

Specifically, this phase investigates university students' AT journeys through a survey questionnaire directly informed by the qualitative findings(160). This approach highlights the integrative nature of the research design, where qualitative findings directly shape the direction of the quantitative inquiry(157, 172, 213, 214). Chapters 7 and 8 discuss the quantitative phase's data collection, analysis, and findings.

4.8 Delphi Method

The Delphi technique is an iterative, multi-stage consensus method where the opinions of participants, seen as domain experts, are integrated to achieve consensus or convergence on the topic(215-217). This technique utilises consecutive questionnaires interspersed with feedback periods to gather specific participant input. Delphi studies typically involve two to three rounds of anonymous surveys, providing anonymous feedback and the opportunity to adjust ratings until a consensus is reached. This method is particularly effective when unanimous agreement is needed from an expert group, especially when achieving ultimate agreement on specific issues of interest proves challenging(218-220).

The Delphi Method was selected for this research due to its ability to construct an expert consensus on the contents, organisation, and elements of a specific technology or phenomenon(220, 221). Using iterative questionnaires dispersed with periods of targeted feedback, the Delphi study elicits the most reliable consensus from an expert group. AT users in this study are considered 'experts' due to their hands-on AT experience. The Delphi method can also generate insights into challenges, mainly when information is scarce, such as the AT Passport concept. Moreover, since the AT users are the anticipated beneficiaries of this research, a robust consensus-building technique should be employed to determine the AT Passport's final design features effectively. Chapter 10 will focus on the detailed findings and analysis from the Delphi study.

4.9   Data Integration

In mixed methods research, the interaction between the study's quantitative and qualitative phases is critical(214, 222). Combining qualitative and quantitative data increases the value of mixed-methods research(160, 223). The relationship between these methods hinges on how they are examined independently or in conjunction. Data integration has several notable implications: the qualitative element can inform the development or refining of quantitative data collection methods; quantitative findings' validity can be explored through qualitative data; conversely, quantitative data can facilitate the generation or interpretation of qualitative data or hypotheses can be generated in the qualitative component for testing in the quantitative part(224). Procedures and data amalgamation follow a strategy influenced by research design, methods, interpretation, and reporting levels(160, 225). This study incorporated interactions at the design, method, and interpretation stages. The exploratory sequential design was employed during the design phase, with results from the qualitative analysis informing the quantitative data collection(226). Supplementary to the fundamental design, a participatory research framework was utilised, emphasising leveraging the input from the target population, notably bringing issues related to inequities and social injustices to the forefront. In this early phase, the participatory framework explored participants' experiences with accessing AT and their perceptions of it. These initial findings

informed this research's subsequent quantitative and Delphi data collection phases.

The method stage integrates data collection and analysis, utilising approaches such as connecting, building, merging, and embedding(160). In this exploratory sequential design study, the results of the qualitative data inform data collection during the building part of the integration, essentially forming the preliminary study's outcomes(227). Integration occurs via narratives, data transformation, and joint visuals at the interpretive and reporting stage. Various strategies for integrating methodologies have been suggested, with this study opting for a narrative approach, precisely the contiguous approach(170, 228). In this study, the findings from the qualitative and quantitative methods are examined separately before being jointly presented. Other narrative strategies include the staged and weaving approaches. The weaving approach coordinates qualitative and quantitative findings according to specific categories or concepts. In contrast, the staged approach, suitable for multi-stage mixed methods studies, sequentially presents the results as the data undergo analysis and separate publication. A single report presents the findings with the staged approach, with separate sections for qualitative and quantitative results.

Similarly, integration occurs at the analysis phase when producing a mixed methods matrix. Quantitative and qualitative data are examined and displayed for cases within a matrix table. Unlike the other approaches outlined above, Triangulation occurs at the interpretation phase following the separate analysis of quantitative and qualitative data. The triangulation methodology applied in this study, guided by the works of O'Cathain et al. and Farmer et al., looks at the collected data through the lenses of convergence, complementarity, silence, and dissonance(224, 229). Consistency or congruence in results is sought with' convergence', whereas 'complementarity' implies different perspectives on the same topic, which help amplify and consolidate individual findings. 'Silence' denotes the occurrence of a theme in one dataset and its omission in a different set, while 'dissonance' points to contrasting results (229, 230)The integrative discussions detailed the analysis of the shared categories unearthed from the integrated findings of the quantitative and qualitative sections. Chapter 9 presents

the outcomes of this mixed-methods integration and summaries of the integrative discussions.

Limitations of mixed methods study

Mixed methods studies pose substantial challenges related to planning and execution due to their intricate nature, particularly concerning the time dedicated to data collection, analysis, and interpretation (231). Such studies often necessitate additional researchers; however, as the sole researcher in this study, I heavily relied on consistent supervision for its reliability. I consulted my colleagues at the ALL Institute (an interdisciplinary research institute within the Psychology Department at Maynooth University, where I am undertaking my PhD) for guidance, particularly during the data integration phases.

The effectiveness of a mixed methods study often hinges on the researcher's ability to generate data and analyse methods efficiently. However, identifying individuals proficient in both domains can be a daunting task(170). Furthermore, the credibility, reliability, and generalizability of a mixed methods study's findings can be scrutinised and challenging to extend(232). Each research method has distinct quality, reliability, and rigour standards, challenging adherence to these principles. To maintain the quality of this research, I strived to consistently follow the good reporting guidelines of mixed methods studies.

4.10 Ethical Issues

Establishing credibility in research calls for solid reliability, validity, and generalizability to instil confidence in readers(233)**.** Quantitative and qualitative methods stem from distinct axiological traditions and adhere to specific criteria(234). Some viewpoints suggest the potential limitations of a pragmatic approach, arguing that it may not encapsulate the genuine nature of diverse method integration(235)**.** Ethics is central to mixed methods research, demanding consideration during research planning, design, and participant selection, thereby setting the tone for the relationship between the researcher and participants(235).

Unlike quantitative analysis, which deals primarily with numerical data and their statistical interpretations under a reductionist, logical and strictly objective paradigm, qualitative research handles non-numerical information and its phenomenological interpretation, which inextricably ties in with human senses and subjectivity. However, the issue of research subjectivity and the impact of contextual factors have fuelled controversy regarding the quality and trustworthiness of qualitative research(233).

The trustworthiness of research and the level of confidence readers can derive from the findings can be evaluated by considering aspects such as validity, reliability, and generalizability; benchmarks are fundamentally applicable to quantitative research(233). In contrast to quantitative research's statistical tools that focus on validity and reliability, qualitative research strives for authenticity in its results using different strategies. These include the recognition and accounting for any inherent bias in the researchers, self-aware consideration and reflection on the methods of data collection and analysis, thorough documentation of research decisions, considering all angles by comparing different accounts, enriching findings with detailed descriptions from participants, transparency in thought progression during analysis, collaboration with other researchers to minimise bias, encouraging participants to review and comment on the findings, and combining different methods and viewpoints to yield a more extensive set of results(236).

Validity in research offers a measure of confidence in the accuracy of the study's results. Usually, the interaction between researcher and participant is seen as neutral or unobservable in traditional research, a perception that bolsters the research's internal validity. Any divergent relationship could tamper with this internal validity. Nonetheless, objectivity is traded for reflective subjectivity when the relationship dynamics level out and every participant's viewpoint is valued. The impact of participants' subjective experiences cannot be overlooked as they invariably shape their responses within the research process and, given the control, the research process itself.

Reliability in research refers to the consistency of the process and the extent to which the tools and techniques used can produce results that can be replicated(236, 237). Consistency is a critical indicator of qualitative research

reliability. Five essential approaches have been suggested to enhance this dependability: refutational analysis, constant data comparisons, complete utilisation of gathered data, consideration of deviant cases in analysis, and organisation of extensive data using tables. Cumulatively, these approaches increase the robustness and reliability of the research undertaken(237). A verification process is required to accompany the data extraction process from the source, with researchers providing the reader verification of form and context through triangulation, either alone or with peers(237).

This research prioritises ethical considerations through maintaining reliability, validity, and generalizability to ensure credibility(238). Quantitative and qualitative methods adhere to different criteria, with the mixed methods approach being acclaimed and critiqued. Ethics is emphasised in every study phase, including planning, designing, and participant selection. Validity, acting as an accuracy gauge, can be threatened if researcher-participant interactions deviate from neutrality, but it is maintained when each participant's perspective is valued. Reliability, marked by consistency and the possibility of method reproduction, is essential in qualitative studies(233, 236).

4.11 Chapter Summary

This chapter outlined the methodological roadmap for this inquiry, emphasising a pragmatic research paradigm to effectively address the multifaceted research problem of improving Assistive Technology accessibility in Ireland. The chapter also details the chosen exploratory sequential mixed methods design, a robust approach that leverages the strengths of both qualitative and quantitative methods.

Beginning with a deep dive into the lived experiences of individuals with disabilities through Interpretative Phenomenological Analysis, the research progresses to a broader quantitative exploration of user needs and perceptions via surveys. This phased approach allows for a comprehensive understanding of the complexities surrounding AT access.

The chapter culminated in a concise synopsis of the overarching research objectives, emphasising the development of a robust and user-informed

framework for an Assistive Technology Passport. This framework, grounded in the lived experiences of individuals with disabilities, quantitative data on user needs and perceptions, and expert consensus, aims to provide a clear roadmap for improving AT access in Ireland.

The following chapters will elaborate on the methods and findings of the qualitative and quantitative studies, followed by a chapter dedicated to integrating these findings into a cohesive and insightful analysis.

Chapter 5: Qualitative Phase, The Method

5.1   Introduction

This chapter provides an in-depth perspective on the qualitative component of a multifaceted, exploratory mixed methods investigation. It communicates the rationale and objectives underpinning this study phase, including the applied methods, research design, participant selection process, data procurement techniques, analytical protocols, and pertinent ethical considerations.

Restating the Research Aim

This qualitative enquiry aims to garner the involvement and engagement of Assistive Technology users with dual aims:

1) Determine the value of an AT passport as a user-centric instrument that facilitates access to Assistive Technology resources and support.
2) Guide and enhance the conceptual understanding of the AT Passport.

Study Goals:

1) Investigate the participants' experiences associated with using Assistive Technology.
2) Examine the participants' journey in accessing AT services, including their perceived interaction with the service provision pathways.
3) Determine in what capacity and form an AT passport could potentially augment access to AT services and related support systems.

5.2   Study Design

This qualitative research offers the exploratory dimension of the mixed methods research approach. The employed methodology incorporates the IPA qualitative design, outlined in the methodology chapter, selected specifically for its emphasis on understanding and interpreting real-life experiences and perspectives(195). This design offers a balanced assimilation of participants' personal experiences from their perspective while concurrently incorporating external sense-making of experiences(195, 203). IPA presents an analytical and interpretative perspective into the participant's comprehensive first-hand data, accentuating the role of

context and perception-driven meaning construction while transitioning knowledge from individual to a multiplicity of perspectives. To derive profound meaning from multiple participants concerning their experiences with AT and their perceptions of the AT Passport, IPA facilitates the evaluation of variance or convergence in viewpoints. This consequently leads to the opportunity to generate rich, substantial data to shape the following stages of the study(195, 238).

5.3   Participants Selection

The initiation and supervision of the selection process for study participants were handled by a gatekeeper, a manager in an Irish state-funded organisation providing various services, such as AT services, for individuals with disabilities and their kin. The intermediary dispersed a call to participate in the study letter (Appendix E1) accompanied by printed and electronic study details and consent forms (Appendix A1) to potential participants, underlining the separation between the study and their existing services. Any queries for clarifications or follow-ups could be addressed through my contact details as the researcher.

The study initially aimed to employ purposeful sampling to recruit a diverse group of individuals with specific characteristics relevant to the study. This approach was intended to capture a wide range of perspectives on the AT experiences and AT Passport concept, encompassing varying levels of familiarity, experience, and opinions. However, the unforeseen circumstances of the COVID-19 pandemic forced a shift to convenience sampling due to time constraints and logistical limitations. Though a departure from the original plan, this change was deemed necessary to navigate the challenges posed by the pandemic.

The decision to employ convenience sampling was further justified by the need to gather rich, insightful data from individuals with a deep understanding of the AT Passport concept and significant experience with the organisation's services. This focus on homogeneity in AT experience ensured the collection of focused and relevant data. Additionally, the gatekeeper's expertise in identifying participants with profound insights on the subject further validated the use of convenience sampling in this context.

A comprehensive information sheet that delineated the specifics of the research, confidentiality assurances, and the voluntary aspect of participation was circulated among potential study participants. It was further stressed that opting out would not impact their access to services, and consent could be signed, spoken, and recorded. Initially, eleven participants gave consent, but two withdrew ahead of data collection. Table 7 provides the demographic details of the nine participants, including two parents, participating as representatives for their children. The study was granted ethical approval from the Enable Ireland Research Ethics & Quality Committee and the Maynooth University Research Ethics Committee (See Appendix B1 and B2, respectively).

5.4   Data Collection

Data collection adopting the Interpretative Phenomenological Analysis approach allows for capturing individuals' lived experiences, setting semi-structured in-depth interviews as the ideal data collection method(195, 207). Initial plans to collect data at a physical location convenient for participants were sidetracked by COVID-19 restrictions in early 2020, necessitating a shift to realising online semi-structured interviews via video conferencing software(206). Participants re-consented to this modification, welcoming the convenience of online research interviews, which is particularly crucial for participants regarded as an at-risk population for COVID-19. The benefits of online interviews extend to overcoming challenges such as transport logistics, physical accessibility issues, and time investments. Precautions were taken to manage potential ethical and psychological issues that may present themselves, impacting participant well-being, health, and safety. Measures included providing contact details for the gatekeepers and researcher and emergency services information as needed. Ensuring that the video conferencing platform was secure was also crucial, as was procuring additional informed consent for audio and video recording. Participants maintained the right to withdraw from the study at any point and request that their data not be used(207, 208). In alignment with the IPA data collection methodology, the interview guide (Table 8) aimed to foster an open-ended discussion on the participants' narratives concerning the study domain. Broad questions on the topic served as a starting point, with successive questions being driven by participants'

responses. The main discussion points included participants' experiences with AT services in Ireland, participants' perspectives on AT, their understanding and thoughts on the AT Passport concept, and its possible influence on AT access.

Table 7: Participant Demographics

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

Table 8: Semi-structured Interview Guide

1)	Can you please tell me why you use AT?
2)	Can you tell me how access to your AT makes you feel?
3)	Can you tell me how you would feel if you no longer had your AT?
4)	How would you describe the process of obtaining your AT?
5)	Based on your experience, what is your view on obtaining AT in your context?
6)	Can you tell me how you would like AT to be provided?
7)	How would you describe the current proposed AT Passport concept?
8)	Can you tell me how AT Passport may or may not be relevant to you?
9)	In your opinion, how would an AT Passport resemble

5.5 The Analysis

In this research, the Capability Approach offered a theoretical lens to assess how Assistive Technology aids individuals in leading fulfilling lives(75, 239). This framework enabled the evaluation of Assistive Technology's potential to enhance the study participants' capacities towards achieving their desired functional levels, which is viewed as a resource. Moreover, the Capability Approach provided a platform to examine personal, societal, and environmental factors possibly impacting access to Assistive Technology. Consequently, the Capability Approach facilitated the conceptual structuring of the role of the AT Passport, giving prominence to its function in augmenting the potential of Assistive Technology to foster well-being and agency rather than merely providing access to Assistive Technology(73).

Complying with the IPA method, the analysis utilised an iterative and inductive process to deeply comprehend the participants' experiences (210). Influenced by the advice of Smith, Flowers, and Larkin, an analytical method was employed, integrating the philosophical fundamentals of the ideographic approach that is significant to IPA. This strategy allowed a detailed and sequential analysis of all experiential data(195). Following the detailed evaluation, initial experiential statements for each participant were created by finding patterns in the data, carefully considering convergence and divergence points, and recognising similarities and intricacies. The Capability Approach provided the theoretical

framework for further interpretative analysis to make sense of participants' Assistive Technology experiences.

Subsequently, several experiential statements were assembled to create Personal Experiential Categories. These terms, namely Experiential Statements and PETs, represent recent terminological introductions to the IPA analysis by Smith, Flowers, and Larkin. Historically, experiential statements were labelled 'emergent categories', while PETs - an aggregation of related individual experiential statements, were referred to as 'subordinate categories.' Upon analysing at the collective level, what materialises Group Experiential Categories is a terminology update that supersedes the previous 'superordinate theme'. Extrapolated from the consolidation of multiple PETs, GETs embody recognised patterns and distinguishing details within the data set.

Adopting a method of analysis as delineated in Figure 4 guided by Smith and Flower, it must be recognised that the analytical process is predominantly iterative and inductive, not necessarily fulfilling a linear pathway as visually depicted. The analysis, initiated with a line-by-line examination of experiential statements, incorporated diverse strategies that identified convergence and divergence at personal and broader levels(194). Assiduously engaging with the data, my interpretative approach was anchored in IPA's theoretical framework, enabling the realisation of a double hermeneutic process(195). This engagement involved a deep comprehension and discernment of meaning from the participants' experiential narratives. I then deployed my psychological insights and presuppositions to create an interpretative perspective(194). In this research, I employed the idea of the hermeneutic circle – a method that interprets the interconnections between the part and the whole(195). The hermeneutic circle manifests as a non-linear and dynamic mode in the interpretative journey. Acknowledging Heidegger's philosophical perspective prompted a comprehensive interaction with the data, endorsing researchers' immersion into the sense-making process of participants' experiences. Heidegger overtly rejected a presupposition-less approach to data analysis, emphasising instead the necessity for reflexivity by the researcher to counter pre-conceived notions(68, 195, 238). Throughout this methodology, my conceptual insights and psychological knowledge were

consciously incorporated as reflecting mirrors of my preconceptions. I ensured the coherence and plausibility of my interpretation and traceability of the interpretative process through regular supervision. Chapter 6 presents a comprehensive representation of the analytical process by incorporating the diverse experiences that contribute to the study's final interpretative assertions.

- Reading and re-reading verbatim Transcripts; Descriptive notes taken
- Constructing initial Experiential Statements
- Collection of Personal Experiential Categories (PET)
- Constructing Group Experiential Categories (GET)
- GET Narratives supported by data extracts
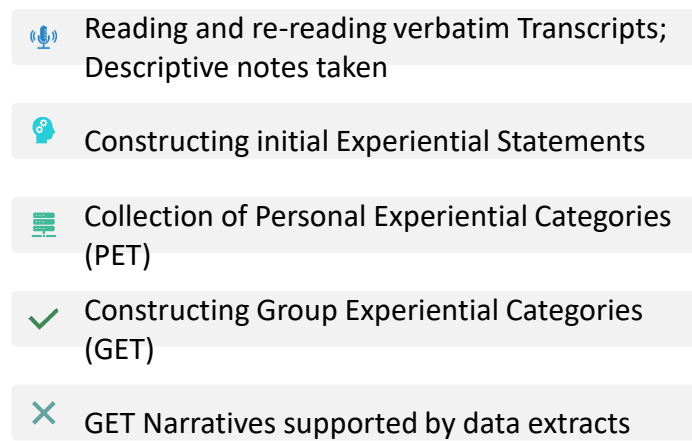
Figure 4: Analytical process

5.6   Ethical Issues

The study at hand primarily focuses on individuals with disabilities. An array of ethical considerations tends to emerge when conducting research within this demographic, such as accessibility-related issues, both with information and physical environment, power relationship concerns within the service delivery systems, and decision-making capacity considerations, especially in connection with consent to participate(68, 207, 240). Additional concerns include potential psychological distress and harm risk, confidentiality, and safeguarding participants' anonymity. The capacity to consent might exclude key potential participants due to exploitation fears, prohibiting them from contributing to potentially impactful research(241). This study addressed these apprehensions by ensuring that the information pack and consent forms were accessible. The transition of the study location to an online videoconferencing platform further enhanced this accessibility, circumventing physical access barriers. Interviews were conducted via the university's secure, premium video conferencing account. Anonymity and confidentiality were maintained by assigning pseudonyms to all

participants, and data were securely stored in a password-protected file. To mitigate power dynamics, information sheets informed participants of their unalienable right to withdraw consent at any phase of the study, with the reassurance that their receipt of services would not be affected by their participation or lack thereof. Risk management was ensured by providing participants with information on local support networks, and a gatekeeper was on call to assist in risk management. Convenience sampling was employed in this study to balance between a rich participant pool, comprehensive enough to generate inclusive and reflective data in addition to their availability, considering data collection was completed at the height of COVID-19 restrictions.

The potential harm to participants stemming from their involvement in this study was negligible. The overall risk was considered low since the subject matter under investigation did not delve into sensitive issues. As a significant proportion of the participants were regular users of Assistive Technology and were already conversant with the related benefits and challenges, any likelihood of adverse outcomes was further reduced. Nonetheless, contingencies were in place, and in the unlikely circumstance that a participant became distressed, relevant contact information for supportive services was readily available in the easy-to-understand language statement provided.

5.7   Ensuring Credibility in Qualitative Research

The integrity and believability of qualitative findings invoke considerable debate, stirring controversy due to their intrinsic subjectivity and the influence of contextual factors. Indeed, readers are prompted to verify credibility when assessing qualitative findings to ascertain trustworthiness through the attributes of validity, quality, and reliability of research findings, which can bolster readers' confidence in their scholarly exploration(233).

Validity, defined as the extent to which a reader can derive confidence in a study's findings due to a sound, appropriate, and credible methodological approach, plays a vital role in a study's interpretation(195). Objectivity, commonly associated with a researcher's neutral position in the research process, upholds the internal validity of quantitative research outcomes. In contrast, the less-defined

relationship between the researcher and participants in qualitative research means that validity necessitates reflective subjectivity rather than objective measure(242).

Concerning IPA studies, the validity of research outcomes is appraised by reflecting on the quality of the work and comparing the attributes that constitute a study to be 'good enough' (195). Indeed, in Interpretative Phenomenological Analysis studies, detailed guidelines are available to ascertain the credibility of the delivery and articulation of study findings(187, 243, 244).

In the present study, I employ Levitt et al.'s (2018) criteria for reporting qualitative research as adapted for use in IPA studies by Smith and Larkin (2021),(195, 245). At the stage of formulating research objectives and questions, I ensured the semi-structured interviews were designed to explore experiential matters related to Assistive Technology and the perspective of an AT Passport. While the initial intention was to employ purposeful sampling, aiming for a diverse group of individuals with specific characteristics relevant to the study, the unforeseen circumstances of the COVID-19 pandemic necessitated a shift to convenience sampling. Though a departure from the original plan, this decision was deemed necessary due to the pandemic's time constraints and logistical limitations.

The rationale for employing convenience sampling rests on two key points discussed earlier. Firstly, the study sought participants with a deep understanding of the AT Passport concept and significant experience with the organisation's services. This focus on individuals already engaged with the subject matter ensured homogeneity in their AT experience and the ability to provide rich, insightful data. Secondly, the gatekeeper was crucial in identifying and recruiting participants with a vast and comprehensive understanding of the topic. Their expertise in recognising individuals with valuable insights justifies using convenience sampling in this context.

The diversity of participants, encompassing parents and individuals of different ages, genders, functional abilities, and educational backgrounds, ensured a rich tapestry of experiences. Data collection employed a semi-structured interview approach, reflecting best practices in Interpretative Phenomenological Analysis for

eliciting participants' experiential reasoning. Following an interview guide that allowed for flexibility across participants, the process ensured a comprehensive understanding of individual experiences. To further enhance the study's rigour, interview transcripts were shared with respondents for feedback and validation before analysis, ensuring accuracy and providing an opportunity for clarification or elaboration. In the subsequent section, I reflect on my positionality and reflexivity during data collection and the research process.

I have detailed my analytic procedure in the data analysis section, from generating exploratory notes and formulating experiential statements to applying the phenomenological tools. The chapter offers an in-depth data analysis process and discussion of findings while ensuring the incorporation of IPA's quality markers as outlined(195). These quality markers focus on the depth of findings and the comprehensive application of PET and GET by using the hermeneutic cycle to encapsulate convergent and divergent perspectives.

5.8 Reflexivity

Advocates of the Interpretative Phenomenological Analysis method maintain that cognition is critical in phenomenological investigations(187, 246). Notwithstanding, this perspective on the importance of cognition in examining and interpreting individual experiences is not echoed by mainstream cognitive psychology views, which highlight objective investigations(247-249). According to IPA proponents, however, the double hermeneutic process, entailing the researcher's interpretation of the participant's understanding of their experiences, exemplifies consciousness and is a significant element in phenomenological deliberations(195). An IPA researcher embarks on an inquiry that triggers a participant's conscious reflection of their relevant experiences. Following this, the researcher engages with the study transcripts using strategies from phenomenological analysis to interpret the participant's reflections. Cognition operates within this reflective space, interlinked with our engagement with the world(203).

In this study, I employed a reflective practice approach at both the data collection and analysis stages, leveraging my cognitive processes to comprehend the

participants. Extracting meaning from this data and ensuring the validity of my interpretations and findings necessitates presenting my worldview to the reader. As an experienced Occupational Therapist (OT) who has interacted with various cultures, contexts and service populations, my practice demands a holistic view of everyone. Further, OT's philosophical background corresponds with the interaction between the person, environment, and occupation, shaping an individual's opportunities for functional participation(31, 250).

Assistive Technology service provision brings forth my presuppositions, particularly from a clinical service provider's viewpoint. I counteracted any potential bias from these preconceptions through reflexivity, in line with Heidegger's recommendations against presupposition-less data collection and analysis(195). As a researcher, my interview guide during data collection encouraged participants to reflect on their Assistive Technology experiences using phenomenological reflection. Here, my role was to guide participants to reflect consciously on their experiential events, allowing me to capture comprehensive and detailed data for analysis. As participants shared their reflective experiences, I would mentally process, recall, and recapture my feelings and cognitive processes by considering my related experiences and perspectives. For instance, conversations around their Occupational Therapy service experiences, whether positive or negative, spurred my curiosity to delve deeper, make internal assessments, and occasionally resonate with their experiences. This reflexivity continued into the phenomenological analysis of transcripts, wherein I reflected on the participants' reflections during the interpretation process. I utilised my reflexive self to engage in double hermeneutics, interpreting the participants' experiences.

Although I did not maintain a comprehensive research journal, I noticed myself jotting down thoughts on topics of importance, hurdles encountered, and doubts, giving me an opportunity for introspection and leading to a deeper understanding of my assumptions(251). This activity allowed me to assess my role as a service provider more critically, challenging my beliefs and perceptions. As an Occupational Therapist, I thoroughly believe in our profession's compassionate and holistic nature. However, some participants' adverse encounters with OT

services startled me and prompted a re-evaluation of my professional assumptions. This unexpected revelation revealed that our therapeutic approach might need to be more inclusive. This feeling extended to the point where I even felt that, by association, I was inadvertently contributing to inefficient Assistive Technology provision. These experiences highlight the critical need for consistent self-reflection and adjustment in qualitative research to acknowledge and address such potential discrepancies.

5.9   Study Limitations

Examining the study, there is potential for certain limitations to come to fruition due to the methodologies used and the context of the circumstances. Firstly, the study incorporated Interpretative Phenomenological Analysis, paying attention to individuals' perceptions and experiences(200, 252). This method facilitated a deep understanding but could impose limitations on the generalizability of results, potentially excluding some users of Assistive Technology. To mitigate this limitation, the mixed methods approach of the study was instrumental. By including both a quantitative and qualitative perspective, the study could corroborate findings across different methods, and where the depth of individual experiences within the IPA may limit generalizability, the quantitative data could help to balance this limitation(214)**.**

Secondly, the participant sampling was directed by a gatekeeper and based on convenience sampling, which may unintentionally underrepresent specific experiences and perspectives. Additionally, the small sample of nine participants may limit the depth of individual experiences; however, to control this, the level of detail gained through in-depth ideographic attention as per the IPA counteracted this limitation(200, 253)**.**

Thirdly, the unprecedented implementation of COVID-19 restrictions in early 2020 forced the switch from in-person to online interviews. This change could introduce technical issues and digital literacy barriers. However, the benefit of greater accessibility was noted, and this limitation was tackled by providing digital flexibility to the participants as needed.

Fourthly, the semi-structured interview format depended heavily on the interviewees' abilities to describe their lived experiences. Thus, bias might occur due to emotional states, memory recall, or reluctance to share difficult experiences. Method triangulation and constant comparison during the data analysis can help to mitigate these issues, increasing the reliability of the findings(186).

Lastly, the ethical steps taken to safeguard participants, such as allowing withdrawal at any stage, might affect the total data collected. This limitation was openly acknowledged and handled with rigorous pre-study procedures to ensure participants fully understood their involvement. It is important to remember that the study's core objective was exploring access to Assistive Technology and perceptions of the Assistive Technology passport. Despite their potential limitations, the chosen methodologies offered a rich and depth-filled exploration of these areas.

5.10 Chapter Summary

This chapter strives to deliver a comprehensive overview of the qualitative component of a multi-faceted, exploratory, mixed-methods investigation. It detailed this study segment's rationale and objectives, encompassing the methods employed, research structure, participant selection procedures, data gathering techniques, analytical protocols, and relevant ethical considerations. Reflexivity was integral at different stages of the research, incorporated through methods such as Interpretative Phenomenological Analysis, double hermeneutics, consciously making sense of experiences, eliciting phenomenological reflections, and combining personal experiences and perspectives. This approach facilitated the extraction of in-depth, meaningful data and comprehensive exploration. The researcher's awareness, cognitive processes, and perspective as a service provider were integral to the research design and implementation. As we progress into the next chapter, we will outline the findings and implications of this study, specifically of the AT Passport research and development.

Chapter 6: Qualitative Phase, The Results

6.1   Introduction

This chapter unveils the outcomes garnered from the qualitative study, constituting the initial phase of the mixed methods investigation, concurrently presenting a discussion that juxtaposes these results with the pre-established study objectives. This segment draws substantively from my latest contribution to a peer-reviewed journal on this study(25). The analytical pathway utilises the IPA approach, intricately linking it with the theoretical framework of the Capability Approach, integrating a reflexive perspective to decode the participants' interpretations and lived experiences with their Assistive Technology and comprehension of the AT passport. The chapter wraps up with a discussion on the implications of these revelations on the existing body of knowledge, underscoring potential repercussions for impending research.

6.2   The Analytical Process

The procedural activities linked to analysis necessitate showcasing the outcomes within an Interpretative Phenomenological Analysis study by fostering a linkage and discourse between the descriptive accounts of the participants and the interpretive annotations by the researcher. Within the scope of this analysis, resources were allocated to decipher the data spawned from the narrations and excerpts from the participants in association with my decoding of the meanings that the data underlines. An IPA investigation consisting of over three participants is classified as large-scale, mandating a distinct, discerning analytic framework diverging from the comprehensive description methodically devised for every subject in research with smaller sample sizes. An ideographic analysis operation can be appropriately executed with a minimal-sized group of three to five participants, which originates from a singular experiential proclamation, paving the path to a Personal Experiential Theme for every participant, culminating in the formation of General Experiential Categories. Considering the participation of nine subjects in this investigation, it is not viable to encapsulate individual experiential statements for each participant. However, stringent efforts were employed to

precisely capture the identical and differing patterns exhibited by the participants to facilitate the generation of PETs and GETs. Experiential statements across case examinations helped compile a series of PETs, accentuating the similarities and disparities within experiences and thematic interpretations. Consequently, PETs with similar attributes were juxtaposed to furnish GETs concisely depicted in the corresponding table.

Primarily, I elucidate the findings via experiential statements in scrutinising the participant discussions. Consequent to this, an interpretative critique is put forth by forging links amidst the participant quotations, pinpointing congruencies and divergences, and reinforcing how the participant anecdotes initially give rise to the PET and then transition to the GET. In this composition, GETs utilise bold, regular characters, while PETs are presented with *italics* characters corresponding to experiential utterances. It is cardinal to note that in IPA-centric studies, the creation of GETs is not a product of collective-level norms or median experiences but an instrument deployed for cross-analysis to discern recurring and unique patterns.

The researcher's interpretative critique assists the reader in navigating the comprehension process between the research subjects and the researcher, ensuring the findings' unambiguous disclosure. Integrating hermeneutic cycle principles across the compartments (individual and collective analytical endeavours) to the entirety (consolidated interview and research compilation) contributes to capturing this investigation's interpretative analytical modality. To guarantee the dependability and lucidity of my analytic procedure, I corroborate that all experiential statements embedded in the data can be tracked to the preliminary observational notes and transcripts when necessary. In addition, through reflective practice and supervisory guidance, I affirm that my analytic approach genuinely reflects the participants' experiences. Moreover, I invoked the capability framework discussed in Chapter 2, which provides an elevated interpretative theoretical foundation.

6.3 The Findings

The nine individuals participating in the research provided rich narratives of their daily experiences with disabilities and how Assistive Technology functions. These participants also communicated their understanding and insights into the AT Passport concept. Examining these experiences highlights shared perspectives, particularly on AT's perceived worth and advantages, while revealing overlapping and sometimes contrasting perspectives on the hindrances and promoters of access to AT. A common thread amidst these participants' responses was the importance of exercising personal agency to lead a life of their choosing and acknowledging human diversity as a critical element for an individual's and broader societal well-being. The potential of an AT passport as a mechanism to enrich accessibility to AT was further examined by the participants. I identified three group experiential categories (GET) summarised in Table 9.

    1) Strive for Human Diversity, Equity, and Social Cohesion

    2) Individual agency and the freedom to make choices.

    3) The conceptualisation of the AT passport as a capability-enhancing resource, resulting in access to AT

Initial Experiential statements	Personal Experiential Categories (PET)	Group Experiential Categories (GET)
Daily struggle adjusting to a non-inclusive world.	*Social and Structural Discrimination*	**A strive for Human Diversity,**
Built environment and web accessibility challenges.		**Equity and Social Cohesion**
Lack of information on accessibility		
Indirect discrimination accessing employment.		
AT use is sometimes a source of stigma		
Lack of public awareness of diversity		
Lack of disability-conscious policymakers		
Disability as part of human diversity.		
Psychological impacts: Grief and expectations		
Independent living philosophy	*Self-identity and Choice*	
AT should be personalised and non-generalized.		
AT must fit the user's lifestyle and needs.		
AT systems facilitate individuals' expression of their self-image and identity.		
Knowledge and skills to advocate and promote AT use.		
Knowledge of the rights of a person with a disability		
AT must conform to user needs and preferences.		

Table 9: Group Experiential Categories (GET)

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Initial Experiential statements	Personal Experiential Categories (PET)	Group Experiential Categories (GET)
Knowledge of own AT requirement Value of network of supports.		
AT opens people's rights to equal participation. AT is a human right, and failure to provide AT denies 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*	**Individual agency and the freedom to make choices.**
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.	*Social Contextual barriers to AT access*	

Table 9: Group Experiential Categories (GET)

Initial Experiential statements	Personal Experiential Categories (PET)	Group Experiential Categories (GET)
Abandonment of AT due to poor matching of Technology to the person		
Awareness of the availability of funding opportunities		
AT Passport facilitates transitions.		AT Passport as a capability-enhancing resource for access to AT
AT Passport as a source of information on AT service provision pathways.	*AT passport functionalities*	
AT Passport records the user's AT journey, including AT needs and requirements for effective communication.		
AT Passport to function within the broader service provision system		
Accessibility: Meet the highest accessibility standards, reflect user needs and self-identity diversity, and incorporate universal design for all features.	*AT Passport's Usability feature*	
User experience: Ease of use and simplicity at the core of the design, Communicates information.		
User Ownership: The user controls ownership of the AT Passport, granting or denying access to others.	*AT Passport Acceptability features*	
Information Security and Privacy: Ensure the Security and privacy of its information.		
Operability into the broader system: AT Passport must operate seamlessly into the more comprehensive system.		

6.3.1 Strive for human diversity, equity, and social cohesion.

Leo: "I don't see myself at the edge; I am part of greater society, you know, in the same way as there are different races or creeds or whatever it is. People have different abilities, and that's all just a great patchwork of life."

The engagement and availability of Assistive Technology operates amid a broad societal environment, ingraining the study's participants in a greater social milieu. A Group Experiential Theme (GET), christened as 'Strive for Human Diversity, Equity, and Social Cohesion,' marked its presence to emphasise the quotidian trials faced by individuals with disabilities. As Leo's interview relayed, societal well-being hinges on accepting human diversity. He posits that a community symbolises an aggregate of our distinct backgrounds and abilities. Eradicating social and structural discrimination calls for recognising varied facets of humanity, advocating for equal opportunities, and preserving social solidarity. Additionally, the affirmation of an individual's identity, autonomy, and decision-making capacity aids in enabling people to lead a personally defined life. These two Personal Experiential Categories notably demonstrate this GET:

    1. Social and Structural Discrimination.
    2. Autonomy, Self-Identity, and Choice.

6.3.1.1 Social and Structural Discrimination

In the research, participants underscored instances of discrimination, both explicit and implicit, fuelled by deficient policy structures or limited access to information, infrastructural design, and public services. Fiona, a blind participant, shared her habitual encounters with discrimination, which begin the moment she leaves her abode, primarily attributed to the unaccommodating and inaccessible demeanour of the society she navigates in.

Fiona: "As a person who is blind, I live in a sighted world, and that's very apparent in every day." "The issue is when my world has to interact with the world, so it could be electronic information that isn't accessible."

Fiona's account implies the societal alienation experienced by individuals with disabilities stemming from inaccessible environments. Her apprehension towards venturing out, driven by the uncertainty of her surroundings, further compounds her exclusion. She ascribes such discriminatory circumstances, in part, to a deficient awareness of disability issues in the public sphere and an obsolete policy landscape.

Fiona: *"Oh well, once I leave the house, it is an absolute lottery; it really is bingo "There's part of it is around awareness, and part of it is just policy that people haven't changed policies."*

Leo aligns with Fiona's depiction of structural discrimination as a significant factor in marginalising individuals with disabilities in workplaces and cultural spaces, primarily due to the dearth of accessible facilities. In Leo's perspective, this situation results in the exclusion of people with disabilities from the considerations of policymakers and decision-makers during public policy formulation.

Leo: *"But the consistent thing of a problem ……….is that you go out to dinner, or you go to work, you don't see other people in wheelchairs because of the many obstacles that are put in their place to allow them to be there."*

Fiona mirrors these sentiments, suggesting that local and international policies necessitate tangible implementation strategies to materialise what is theoretically outlined. In their absence, these policies lack substance and, in some instances, can inadvertently contribute to discriminatory practices.

Fiona: *Policies don't really; I don't think they always benefit the people that they need to benefit."*

Equivalently, Garry, drawing from his personal experiences, contends that the rights of individuals with disabilities are insufficiently championed owing to entrenched systemic discrimination.

Garry: *"And I don't think there's rights for disability in this country because the system is upside down."*

Individuals develop resilience towards structural and societal discrimination by employing various coping mechanisms and self-advocacy practices. For instance, Mary, being well acquainted with her children's needs, has cultivated resilience against insufficient service provision through enhanced knowledge, empowerment, and adaptive strategies over time. Similarly, Grace chose to participate in an Assistive Technology training program, augmenting her capabilities to support her children better and provide guidance to their educators. Fiona's case presents a different approach; having previously had her sight, Fiona is adapting to her current functioning state. Simultaneously, she is contending with a process of grief while working on boosting her capabilities.

Mary: *"I do everything myself. I've learned to adapt to the gaps in service, so I improvise, I improvise."*

Grace: *"Because when I started even doing the course in AT, and you know the course I'm doing now. I went into it looking for education really as my you know I want into upskill myself".*

Fiona: *"Personally, speaking in one way, I have a much-fulfilled life, and I'm happy with you know, proud of how I have adapted and stuff, but in another way, I'm not happy I can't adapt. I always grieving because I know what I've lost and the life that I had, the independence I had."*

Mary's experience exemplifies how decision-makers and, correspondingly, society at large fail to appreciate the lives of individuals with disabilities, as demonstrated by recurrent underfunding of services, which constitutes systemic discrimination against them.

Mary: *"I think the role of these services is undervalued, and in general, the funding to the disability services has been cut so drastically... in my view. Their value is not promoted enough by us as a society".*

The practice of self-advocacy and the necessity to uphold their rights to respect, dignity, and the pursuit of a fulfilling life represents a continual contention. Garry, who was previously under his parents' care and is now transitioning into early adulthood, has assumed the responsibility of self-advocacy from his parents. Garry

believes he must contend for an equitable society an endeavour not limited to his own benefits but extending to everyone's welfare.

Garry: *"She fights for me. Now I have to take over this fight because she has fought for me for 18 years, and she is tired of fighting for everything. I don't give up on things easily; I fight for my disability. My main mission at the minute is to get other services for people with disabilities like me."*

In association with Garry's identified responsibility as an advocate for disability rights aiming to eradicate discrimination and encourage equal enjoyment of life, Jess's advocacy endeavours extend to students with disabilities as part of her professional role and her network of friends. Conversely, Grace perceives the system as constructed so that users can battle for services incessantly. She finds it difficult to understand why a justification for the necessity of Assistive Technology, crucial for accessing educational curricula, is frequently demanded at every stage of a child's progression through education.

Jess: *"I have a very, very, very close friend who I would be an advocate for; he is non-verbal."*

Grace: *"I don't really know why I feel that we'll have to fight for all of that again, even though he should be automatically entitled to it."*

While individuals such as Garry and Jess are proactive in advocating for services for themselves and others, Scott advances this agency further by creating a method to boost the accessibility of hotels, empowering individuals with disabilities and the public to make informed decisions when planning visits. The resultant economic and social effects of dismantling accessibility barriers for both businesses and individuals hold substantial significance.

Scott: *"When we talk about accessibility, we talk about it in the broader sense, so your elderly mother or father with a bad hip or bad who can manage three or four steps and that billion people globally with an accessibility need, so that's the way we tackle this problem."*

Stigma and social exclusion are occasionally linked directly to the non-participatory and unsuitable provision of Assistive Technology, which

predominantly adopts a narrow model focus rather than a more comprehensive approach. For instance, during her secondary school years, Jess confronted a communication deficit with her service providers, who dismissed her needs. Consequently, she felt deprived of opportunities to engage socially and relish her youth. This lack of positive engagement and comprehensive understanding of her needs led to her social exclusion, mirroring society's perception and behaviour towards young people with disabilities.

Jess: *"When I moved to secondary school, I only had a manual wheelchair from first year to third year in school; I feel like I should be given a powered wheelchair so that I could be involved to keep up." You still need to be free to go with your friends.*

Amy: *"Like everything like that is funded in this country regarding AT, or whatever it is, you need a clinical assessment. I cannot go in and say I need this; this will work for me".*

Subtle or indirect discrimination, particularly in the contexts of employment and school enrolment, emerged as a prevalent theme from the interviews. Leo proposes that despite anti-discriminatory policies, employment-related discrimination remains widespread due to prevailing societal attitudes. In her scenario, Grace is inclined to refrain from disclosing her sons' special needs when applying for their secondary school of choice, fearing potential discrimination, despite cognisance that this may not necessarily be the most ethical course of action.

Leo: *"Whereas if you know, you're talking about employment, you know, the employers will say all the right things, but at the end of the day, No."*

Grace: *"I won't be putting anything on the application form about his difficulties because I feel that if I do that, he might not get in. So even like that, it's so wrong,…I should be able to put some information there, but again, that's not something that I would feel confident in doing so.*

6.3.1.2 Self-Identity and Choice

The acceptability of visible Assistive Technologies, such as wheelchairs and canes, is determined by their presentation to the person and spectators. Nevertheless, the

existing system for Assistive Technology provision fails to incorporate individuals' self-identity and preferences during the selection process of these assistive tools.

Amy: *"So like it's more aesthetically acceptable in our society to maybe wear apple glasses, you know the Apple glasses, to navigate the environment as opposed to using a cane, for example."*

Assistive Technology users are undoubtedly experts in their own lives, and therefore, Assistive Technology provision frameworks should consider user's opinions and lifestyle preferences. Amy recounts an instance where her individual preferences and self-concept were overlooked during the assessment. Consequently, she was furnished with an Assistive Technology that, from her perspective, propagated social stigma and imposed supplementary costs as she endeavoured to integrate the device 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."*

Valuing people's choices and recognising self-worth is pivotal in aligning individuals with the correct Assistive Technology. However, systemic discriminatory practices prioritising functionality over aesthetics may lead to the disuse or abandonment of Assistive Technology, thereby intensifying social stigma.

Amy: *"I don't think service provision looks at how people present in whatever AT they're using, how it looks to other people, and this affects a person's identity, and it affects like if they feel different. like if you are using a piece of equipment that makes you more different or compounds that difference, you are just making it worse and worse."*

In addition, the current system of Assistive Technology provision suffers from a lack of user engagement and training. This often leads to the inappropriate purchase of Assistive Technology, triggering detrimental economic implications for both the user and the government while further reinforcing social exclusion. Jess recounts an incident involving a student she supports, whose Assistive Technology was procured without any consultation, subsequently cultivating a negative experience for the end user. In a parallel vein, John has witnessed the abandonment of Assistive Technology due to insufficient trials and follow-up

support, as user needs, choices, and situational factors were not considered at the assessment and provision stages.

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."*

Aligning Assistive Technology with the individual requires a highly personalised approach; hence, acknowledging people's self-identity and choices based on their usage context is indispensable. Individual variations should be acknowledged as a part of human diversity and integrated into Assistive Technology decisions. Fiona's experiences with various types of Assistive Technology reveal that respective devices ought to be customised to the individual, and any generic assumptions about their use should be abandoned.

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.*

The utility of an Assistive Technology for everyone depends on various personal, environmental, and product design factors, suggesting that its availability may not always equate to usability or value. Jess and Amy attribute the inconsistent benefits of voice-activated software to their design, which struggles to capture the entire spectrum of speech tones and intonations. Fiona aptly summarises the subjective nature of Assistive Technology usability by stating that even though a product or service declares itself to be accessible, it does not necessarily imply that it is user-friendly.

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".*

Fiona: *"Like a program can tell you it's accessible, but that doesn't mean that it's easy for a user to actually use or that it interacts with another piece of Technology."*

Scott exemplifies an individual who adjusts and personalises his Assistive Technology to complement his lifestyle. He has a well-defined plan mapping out his desired path to match his functional needs with the most suitable Assistive Technology available. Similarly, John demonstrates a profound understanding of his practical capabilities and the most applicable Assistive Technology for his needs. He is also open to embracing future advancements in Assistive Technology that could align with his preferences.

Scott: *"I don't have any movement in my arms, so I'm using my head for everything. What I'm moving towards is a full voice control house."*

John: *"I think it's (AT) there; if I, if I want it, I use it. So that's, that's the beginning of that new artificial intelligence that will start reading the papers to me, it will get to know what I want, and it will start to give it to me."*

"And therefore, planners and decision-makers don't put those people in their mind's eye, when they're formulating policy and making decisions."

6.3.2   Individual agency and the freedom to make life choices

Two personal experiential categories have been identified that highlight individual agency and the autonomy to make life choices facilitated by access to Assistive Technology. The first theme discusses the value of Assistive Technology in promoting equal participation and enhancing the enjoyment of life. The second theme presents the challenges and barriers encountered when accessing Assistive Technology.

1. Value of Assistive Technology in Promoting Equal Participation and Enjoyment of Life.
2. Social Contextual Barriers in Accessing Assistive Technology.

6.3.2.1 *Value of AT in Promoting Equal Participation and Enjoyment of Life*

The recurring motif among all participants is the enhancive role of Assistive Technology in fostering independence, autonomy, and the freedom to participate in society equitably. However, the perception of how and in what context the value of Assistive Technology was recognised varied among participants. Jess succinctly characterised Assistive Technology as a means to "open people's rights to equal

participation in society." Similarly, Scott underscored its relative importance, stating that Assistive Technology transcends mere luxury; instead, it is a critical mechanism for attaining freedom.

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

Mary emphasised the importance of communication tools for her daughter's basic needs and the importance of having an equal basis with others. She further ascribes the failure to equip her daughter with such a device to violate her inherent communication rights.

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

John conceptualised the value of Assistive Technology for individuals with disabilities by offering the metaphor of a bridge.

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".*

As Garry expressed, the fundamental value of Assistive Technology, particularly for individuals with physical disabilities, is almost described as embodiment.

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".*

Similarly, Scott draws an analogy between the importance of Assistive Technology to an individual with a disability and the significance of legs to others. Jess also perceives her Assistive Technology as a lifeline, indispensable to her ability to function and enjoy life. By equating access to Assistive Technology with ensemble human embodiment, it could be suggested that participants view the denial of access to Assistive Technology as a limitation on 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 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 encapsulates the value of Assistive Technology in granting freedom and offering her the opportunity to live life on her terms. Rather than merely 'assistive', she characterises Assistive Technology as 'enabling', pointing out that it affords her a good quality of life by fostering 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".*

6.3.2.2   Social Contextual barriers to AT access

The participants investigated the barriers to Assistive Technology access that presently restrict their ability to exercise their freedom. While most encountered barriers to sufficient Assistive Technology access, the challenges were articulated differently; some identified hurdles in existing Assistive Technology service provision paths, while others offered insight from a societal and structural standpoint. Mary and Grace refer to the currently fragmented Assistive Technology service provision systems, characterised by uncoordinated and often poorly communicated pathways amongst various 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".*

A common theme among the study participants who access Assistive Technology through state service provision systems is the lack of user information. For instance, Grace was uninformed of the assessment pathways and support structures available for her children, owing to insufficient information and guidance from the school.

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 expresses frustration about the need for more thorough information concerning the selection of Assistive Technology products and services, encompassing customer support from the supplying companies. Assistive Technology access persists even after equipment delivery; the maintenance and aftercare aspects are equally vital.

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".*

The transition phase through education represents another sector needing coordination among the health, social care, and education realms. There is a prevalent lack of communication concerning users' Assistive Technology requirements to ensure uninterrupted educational participation during this transition period. Jess voices her annoyance with the recurrent requital of requested information at each educational stage and the continuous re-evaluation of Assistive Technology needs without the due diligence 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"*

Similarly, Grace is concerned that the system might not be organized to facilitate her sons' transition to secondary school 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 exigency for a resilient Assistive Technology policy infrastructure and the negligible recognition of Assistive Technology's value among policymakers constitute a significant structural barrier to Assistive Technology's access. However, where policy exists, it is often described as deficient in execution, vague, and tokenistic. Fiona emphasises that policymakers need a deeper personal understanding and appreciation for Assistive Technology's benefits for the user and broader societal wellness. She maintains that policies might be languishing in public records given the lack of political initiative and the translation of policy into practice. For instance, she indicates that the State's ratification of the UNCRPD provision lacks a robust implementation plan, with limited financial resources frequently used as an excuse. Any efforts towards implementation are typically short-sighted.

Fiona: *"I think policymakers 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".

Based on his experience, Garry underscores the need for greater political will, further emphasising that public bodies endowed with providing services are unapproachable and inflexible. Similarly, Mary hints that policymakers tend to prioritize the financial implications of service delivery over its intrinsic value and benefits to users, thereby exacerbating the obstacles 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 competence and expertise of Assistive Technology personnel in health, social care services, and educational sectors also pose hindrances to accessing Assistive Technology. These personnel often lack a deeper understanding and explicit

Assistive Technology provision pathways guidelines. As a result, user involvement in evaluating and providing appropriate Assistive Technology is restrained, culminating in offering inferior products and, ultimately, abandonment. John points out that the absence of user involvement in Assistive Technology provision leads to relinquishment, while Mary attributes the deficiency of variety and choice to inexperienced Assistive Technology 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".*

In a similar vein, Garry notes that primary care personnel, and in his experience some Occupational Therapists working with people having complex physical conditions and living independently in the community, often lack the training and understanding needed to interpret people's expressions. Amy experienced a similar issue when she was provided with an unsuitable Assistive Technology despite her efforts to express her needs based on self-expression and functional requirements. She was disheartened that the professionals she perceived as experts could not meet her expectations.

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".

There is an apparent deficiency in communication skills among Assistive Technology personnel, along with an overreliance on a medical model for Assistive

Technology provision. Jess felt her perspectives were not valued during her younger years.

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 frustrating and impacts 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, 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?"*

Aside from the issue of subpar Assistive Technology maintenance services, the delays emanating from such services negatively affect the 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".*

Assistive Technology users are indeed experts in their own lives; hence, Assistive Technology provision systems ought to consider individuals' views and lifestyle

choices. However, Amy recounts an incident where her Assistive Technology and self-concept preferences were overlooked during the evaluation process. She ended up with an Assistive Technology device that, from her perspective, fostered social stigma and incurred extra costs as she endeavoured to integrate the equipment into her daily routine.

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".*

Pairing Assistive Technology with an individual is a notably personalized effort. Therefore, it's crucial to recognize a person's self-identity and choices based on their context of use. Individual differences should be accepted as an element of human diversity and factored into decisions concerning Assistive Technology.

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".*

6.3.3 AT Passport as a Capability-Enhancing Resource for Access to AT

The study participants deliberated on the concept of an Assistive Technology Passport and its significance for them. Most interviewees understood the Assistive Technology Passport as a support tool centred and driven by individuals, which holds the potential to simplify the process of accessing Assistive Technology. Yet, for some participants, the concept seemed to lack clarity, primarily concerning

how it would function within the broader system and outside of traditional service provision. Under the conceptualisation of an Assistive Technology Passport, two key Personal Experiential Categories are:

1. Assistive Technology Passport functionalities, and
2. Assistive Technology Passport Usability and Acceptability features.

6.3.3.1   AT Passport Functionalities

Participants pinpointed the ensuing broad functionalities that an Assistive Technology Passport could afford users:

1. Enable smoother transitions.
2. Serve as a source of information on Assistive Technology service provision pathways.
3. Allow for effective communication to facilitate easy access to Assistive Technology.

6.3.3.1.1 Facilitates Transitions

The current practice of duplicating information regarding an individual's Assistive Technology requirements at each transition stage—such as moving from primary school to secondary school and then on to university—has been identified as a significant obstacle to Assistive Technology provision. Introducing an Assistive Technology Passport is perceived as a solution to streamline this process, ensuring coordination between pertinent transitional phases. Mary suggests the Assistive Technology Passport could facilitate a smooth information exchange amongst all stakeholders during transitions. Jess mirrors this sentiment, arguing that the Assistive Technology Passport would alleviate stress for users by eliminating the necessity of filling out countless duplicate forms at each transition stage. John also advocates that an Assistive Technology Passport introduced early would ensure seamless access, reflecting and evolving with the individuals' changing needs and technological advancements.

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 believes that the Assistive Technology Passport ought to be a dynamic, user-centred tool that aids in streamlining the procedure of Assistive Technology provision and can adapt to the user across various contexts. Similarly, Jess opines that the Assistive Technology Passport could make the provisioning process more efficient by eliminating information duplication and should be flexible enough to adjust 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 exemplified how an Assistive Technology Passport could facilitate transitions, leading to the implementation of suitable accommodations for individuals, such as students, which would significantly enhance their involvement in education. Similarly, Leo, reflecting on his childhood, opined that the Assistive Technology Passport could prove particularly beneficial during the school years. The provision of appropriate support during these formative years is critical to an individual's subsequent success within their 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".

From Grace's perspective, without an Assistive Technology Passport, she would have to rely on memorization to communicate her child's needs to their prospective secondary school. In her view, an Assistive Technology Passport would be highly beneficial in such a situation.

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".*

6.3.3.1.2 *Source of information on AT service provision pathways.*

The Assistive Technology Passport is perceived as a valuable source of information to help individuals navigate the Assistive Technology service provision system more efficiently. The participants proposed that access to information could be better coordinated within and between different sectors, including healthcare and education. For example, Mary emphasised, based on her experience, the considerable information gap currently existing for users and the potential of the Assistive Technology Passport to address this gap. In addition, Mary voiced her hope that the Assistive Technology Passport would be user-owned, enabling individuals to personalise the information and resources they wish to access, such as information regarding 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 champions a vision for an Assistive Technology system that is user-centric, transparent, and seamless, with the potential to augment peoples' capabilities to choose their way of life. Reflecting upon her own experiences, she posits that the Assistive Technology Passport—when supplemented with a robust support structure and a keen understanding of its benefits— could have equipped her with the necessary information to make educated decisions concerning Assistive Technology.

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

"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 view the Assistive Technology Passport as a beneficial informational resource which could expedite access to Assistive Technology. Both appear to express positive receptivity towards the concept. Furthermore, Grace identified a gap in the current service provision systems where access to Assistive Technology gets delayed due to the absence of centralised information systems, a gap that the Assistive Technology Passport could effectively address.

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 the AT Passport presented to an employer during recruitment 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?".*

Expanding upon her thoughts, Fiona asserted that the current conceptualisation of the Assistive Technology Passport necessitates greater transparency, particularly concerning its interaction and integration with more extensive health systems, including Assistive Technology.

Fiona: *"It's not standalone; it has to integrate into a wider thing".*

In agreement with Amy, Fiona further contends that the potential benefits and value of the Assistive Technology Passport to the individual user should be made evident. She urges caution against its adoption as the sole avenue for people's access to Assistive Technology. She advises that individuals should have the autonomy to choose whether to utilise it, as part of enhancing their suite of capabilities for accessing such technology.

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".

6.3.3.1.3 Enables Effective Communication.

The participants perceive the Assistive Technology Passport as an efficient medium for individuals to relay their Assistive Technology preferences, necessities, and stipulations across varying contexts. The Assistive Technology Passport has the potential to disseminate user's Assistive Technology selections and predilections, fostering self-advocacy and self-empowerment, which is echoed in the extracts provided by Mary and Amy.

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".*

Echoing this sentiment, Jess posits that the Assistive Technology Passport could expedite access to specific Assistive Technology needs; for instance, for a person experiencing visual impairment, by lucidly expressing their needs to prospective

schools or employers, thereby streamlining the reasonable accommodation implementation process. Similarly, Leo opined that the Assistive Technology Passport might prove beneficial in sharing pertinent information with Assistive Technology personnel, consequently aiding in clinical assessments.

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 perceive the Assistive Technology Passport's potential in presumptively informing service provision and possibly even policy. Nevertheless, they believe it necessitates extensive consciousness-raising efforts about its utilisation and potential user advantages. Furthermore, the Passport must attain acceptance in more comprehensive systems.

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 may be unable to advocate for themselves, as highlighted by Leo, Scott, and Amy. Fiona concurs with the benefit of the AT Passport for this population in particular; nevertheless, she questions how best they could harness the communication benefit of the 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".*

6.3.3.2 AT Passport Usability and Acceptability Features

Key to the design of the Assistive Technology Passport, as identified by the participants, are two essential characteristics: its usability and its acceptability. In terms of usability, the Assistive Technology Passport's design needs to accommodate its users' diverse needs from an accessibility standpoint. The ability of the Assistive Technology Passport to individualise its features to cater to each user's unique characteristics while simultaneously enhancing their user experience is paramount. Moreover, integrating universal design elements is crucial for the Assistive Technology Passport to cater to a wide-ranging user population.

Table 10 presents the usability features identified by participants that need to be integrated during the development of the Assistive Technology Passport. Extracts from participants' contributions complement this information.

Table 10: 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." **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."
User experience	**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."

6.3.3.2.1 AT Passport Acceptability Factors

For the Assistive Technology Passport to effectively achieve its functionalities, the participants engaged in discussions surrounding its acceptability features.

Elements like data protection, privacy and confidentiality, information ownership, larger systemic issues, and the user interface were deemed critical.

Table 11 catalogues the acceptability features recognised by the participants that should be contemplated during the development process of the Assistive Technology Passport. Extracts from participants' discussions accompany this data.

Table 11: 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."

6.4   Discussion

This study sought to comprehend individuals' real-life experiences accessing Assistive Technology, including the meanings and values they attach to it. We delved into the personal, social, and environmental aspects that potentially expedited or obstructed their efforts to access Assistive Technology. Additionally, we investigated participants' perspectives on an Assistive Technology Passport, a proposed person-centred resource intended to simplify access to Assistive Technology. The positive impact of Assistive Technology in creating opportunities for individuals to lead lives of their choosing was understood as endorsing their freedom to express their agency. Access to Assistive Technology was conceived as broadening individuals' capabilities and promoting quality of life. Central to the Capability Approach postulated by Sen is the principle that individuals should have the liberty to choose the lives they value and the reasons for valuing them(210). The intrinsic importance of freedom rests on individuals' ability to utilize provided opportunities to achieve functionalities that hold value(254). The results of our study indicate that the fundamental goal of access to Assistive Technology is to amplify individuals' capacity for equitable participation and enhancement of their life's quality. The autonomy to determine pertinent capabilities hinges on the individual's values and the functionalities they aspire to accomplish(239). Among the capacities our participants found pertinent due to access to Assistive Technology were opportunities for autonomous living and equal involvement in

society's various social, political, and economic domains. The role of Assistive Technology in augmenting people's capabilities, choices, and motivation to live a quality life has been extensively underscored(7, 255-257). In fact, the Global Report on Assistive Technology emphasises that limited access to Assistive Technology significantly hinders individuals' opportunities for access to education and livelihood, thereby exerting a detrimental effect on both personal and societal well-being(4).

According to the Capability Approach, individuals leverage resources, such as Assistive Technology, to actualise their freedoms and foster well-being. However, this transformation of resources into functionalities or capabilities is influenced by personal, social, and environmental factors that Sen collectively refers to as 'conversion factors(23, 258). Conversion factors can either hinder or enhance an individual's ability to transform available resources into actual functionality(259, 260).

This research revealed that individuals strongly desire to boost their functional capabilities and live a life that holds personal value. The benefits of Assistive Technology in allowing people to reach their desired functionalities are evident from our study. However, the presence of social contextual obstacles to Assistive Technology limits the prospects for individuals to reap its full benefits. One major barrier is the lack of awareness and comprehension of Assistive Technology, including the means to access related products or services(261-263). Moreover, another critical barrier identified is the lack of user involvement in the process of Assistive Technology selection. This includes the neglect of user self-identity and preferences in the decision-making stage of Assistive Technology, further limiting its full potential usage(149, 151, 254). Indeed, the absence of user engagement and incomplete alignment between end-user needs and the requisite technology often precipitates the non-use of products. This, in turn, leads to an increased rate of Assistive Technology abandonment. Such conditions foster social exclusion while simultaneously escalating individual and public resource costs(19, 47, 50, 54, 152).

Social and environmental factors that could either support or impede access to and use of Assistive Technology encompass elements like societal awareness about the importance of Assistive Technology, the availability and competence of Assistive

Technology personnel, local and global policy infrastructure, as well as the systems for Assistive Technology service provision(19). Our study revealed significant social contextual barriers to accessing Assistive Technology. These include the inadequate strategic implementation of UNCRPD provisions, lack of political will, and deficient local policy infrastructure. Moreover, where Assistive Technology service provision is available, it requires heightened cohesiveness, coordination, and medicalisation. Previous studies have indeed made similar observations regarding the negative impact of disorganised Assistive Technology service delivery systems and suggested the establishment of cohesive AT systems(21, 23, 24). Developing an Assistive Technology service provision system and a policy environment that acknowledges and caters to individuals' diverse needs and valued functionalities would significantly enhance overall well-being(7). Moreover, to fully leverage the advantages offered by Assistive Technology, a comprehensive understanding of social contextual factors that can obstruct or promote a person's functioning – as conceptualised in the International Classification of Functioning, Disability and Health – is a prerequisite. In this vein, access to Assistive Technology should consider an individual's needs in the fluid interaction with their environment to maximize its potential.

Our discourse delved into the freedom that individuals with disabilities aspire to maximize their opportunities to engage in their chosen activities, and the pivotal role of Assistive Technology in facilitating these capabilities. However, we discovered that various personal and social environmental barriers complicate translating Assistive Technology into actual and novel opportunities. Therefore, employing the Capability Approach framework offers a lens to scrutinise how these conversion factors can be effectively translated to ensure that access to Assistive Technology is transformed into opportunities and functioning(63). To confront these barriers, participants in this study expressed their perspectives on the concept of an Assistive Technology Passport and its potential impact. The current shortcomings in Assistive Technology service provision are influenced mainly by uncoordinated service delivery systems operating within weak policy infrastructures, which significantly affects the accessibility of Assistive Technology. In this regard, the Assistive Technology Passport is recognised as a viable resource with the potential to streamline access to Assistive Technology information and

associated supports, including funding, product selection, maintenance, and training. The Assistive Technology Passport was also perceived as a crucial informational resource that can aid in communicating user needs during transitions, thereby ensuring the uninterrupted transfer of necessary technology. Additionally, centring the user in the design and development of an Assistive Technology Passport could enhance the acceptability and use of Assistive Technology and subsequently influence policies and practices.

To actualise its proposed functionalities, the Assistive Technology Passport's design and development need to incorporate essential features that render it effective. The Assistive Technology Passport should account for the diverse user needs and contextual realities reflected through its usability and acceptability features. Our study participants represented various backgrounds - parents, ages, genders, functional abilities, and educational backgrounds. This diversity offers an opportunity to examine each person's value with Assistive Technology and the specific obstacles they would like their Assistive Technology Passport to address. Moreover, our study revealed that participant usage of Assistive Technology ranged from supporting functional capabilities to facilitating full participation in social and economic life. Embracing a universal design or 'design for all' principles in developing the Assistive Technology Passport could provide an opportunity for more extensive usability and acceptability(81, 264, 265). The Assistive Technology Passport has the potential to place Assistive Technology users at the heart of Assistive Technology provision systems, acknowledging them as experts of their own lived experiences. It also presents the opportunity to transition from the conventional clinician-led medical model towards a collaborative systems approach to service delivery(76, 83). The World Health Organization's Global Cooperation on Assistive Technology initiative advocates for a people-centred Assistive Technology system model. This model, often called the 5 P's, aims to promote affordable access to Assistive Technology(3, 4, 23). Insufficient Assistive Technology service provision systems and barriers to accessing Assistive Technology information are significant areas that the Assistive Technology Passport seeks to narrow and thereby improve people's capabilities. An understanding and awareness of the benefits of Assistive Technology, as well as ways to access it, directly affect user acceptance and usage and contribute to a

broader societal awareness of Assistive Technology, ultimately reducing stigma(19). The expanded 10P approach - which includes the additional Ps of partnership, place, pace, promotion, and procurement - draws attention to factors within the Capability Approach's conversion factors. These factors significantly influence local contexts, figuring out if access to Assistive Technology can be substantiated through effective system integration. This, in turn, helps the user fully leverage Assistive Technology's potential benefits.

With proper design and development, the Assistive Technology Passport has notable potential to diminish the accessibility gap, enhancing individuals' personal and societal contextual capabilities to ensure access and reap benefits from Assistive Technology. Notwithstanding, our literature scan did not discover innovations similar to the Assistive Technology Passport that alleged to augment access to Assistive Technology. The Assistive Technology Capability Building Framework professes to be a user-centric innovation aiming to augment the capabilities of Assistive Technology users(2). While this framework could aid in developing the personal capabilities of Assistive Technology users, it does not appear to underscore the crucial macro-level social contextual factors and their impact on facilitating Assistive Technology access. Another promising innovation is the My Assistive Technology Outcomes Framework, which aspires to offer an informational resource for users, consumers, and stakeholders concerning their Assistive Technology outcomes(49). This tool also harbours the potential to shape policy and practice by leveraging data derived from it via systemic advocacy. Hence, the development of the Assistive Technology Passport could glean insights from analogous concepts. Therefore, we posit that adopting a person-centred approach to the Assistive Technology Passport concept can potentially enhance people's ability to access and utilise Assistive Technology to achieve their valued goals, leading to an incremental improvement in individual well-being.

6.5 Conclusions

In our research, we aimed to encapsulate the journeys of our participants in accessing Assistive Technology and its significance in their pursuit of a fulfilling life. By employing a participatory approach, complemented by an Interpretative Phenomenological Analysis, we sought to comprehend our participants'

interpretation of their individual experiences and how these views align or differ within the context of their social environments. The Capability Approach framework aided our analytical process in situating the relevance of Assistive Technology in broadening individuals' abilities or potential to meet their aspirational life objectives. Our findings corroborate that accessibility to Assistive Technology is a prerequisite for enjoying human rights and equal participation. We also found that the mere presence of Assistive Technology does not necessarily transpire into achieving or having the opportunity to attain the necessary functioning if vital personal, social, and environmental factors which can impede or enhance it, are not present. The Assistive Technology Passport emerges as a people-oriented, capability-boosting resource capable of mitigating personal and social contextual barriers to Assistive Technology. Guided by the Capability Approach framework, we advocate that the design and development of the Assistive Technology Passport must consider the diversity of user needs to guarantee quality access to Assistive Technology and subsequently extend individuals' capabilities to live a desirable life.

6.6   Implications for Future Research and Practical Applications

Understanding user engagement and ownership's importance and value is essential for accepting new initiatives or service delivery systems. Therefore, future designs and developments of the Assistive Technology Passport and similar initiatives should be built on this study's findings. We aim to operationalise the concept with the Assistive Technology Passport through a subsequent study. This follow-up study will further pinpoint the functionalities and acceptability features of the Assistive Technology Passport for implementation. These findings will aid in refining a design model for the Assistive Technology Passport through user engagement, ensuring inclusive and functional development. This phase will draw inspiration from studies and strategies that advocate inclusive design, thereby ensuring the design fits a wider range of user needs and preferences(76, 81, 83).

6.7   Limitations of the Study

While acknowledging that data confidentiality only extended to the research supervisor, resulting in most of the analysis being conducted by me, it's crucial to note that such a setup may potentially introduce a degree of bias. Nonetheless, an established system of regular supervision bolstered the reliability and validity of the data along with its interpretations, thus mitigating this concern considerably. Furthermore, it is recognised that this study examines the experiences and perspectives on Assistive Technology and the Assistive Technology Passport from a singular service-providing organisation's viewpoint. Corresponding experiences and views from other service providers and users may differ significantly, offering potentially contrasting practices and perspectives. Additionally, the lack of representation of individuals with higher support needs within the sample could limit the transferability of the findings. Hence, while this research provides meaningful insights about the considered organisation, broader generalisability might require similar scrutiny of other service providers and end-users.

6.8   Chapter Summary

This chapter presents the initial findings of a mixed-methods study, interpreting participants' experiences with Assistive Technology and the Assistive Technology Passport through the lens of Interpretative Phenomenological Analysis and the Capability Approach. Despite these insights, it is crucial to note the study's limitations. Potential researcher bias and the focus on a single organisation's perspective may affect the generalizability of the results. These limitations point to areas for further consideration in future research.

Chapter 7: Quantitative Phase, The Methods

7.1   Introduction

This chapter presents an in-depth report on the methodologies and procedures carried out in the quantitative portion of this research. It outlines the study's purpose, the survey's design, the approach utilised for participant recruitment, methods for data gathering and analysis, and ethical issues confronted in the study. Concurrently, it highlights how the present research contributes to and broadens the qualitative study elaborated in chapters 5 and 6 by affording a further quantitative analysis.

7.2   Study Design and Rationale

The literature review highlights the crucial role of Assistive Technology users in the research, design, and development of an Assistive Technology passport. The study's objectives are shaped by these findings and insights from qualitative research in establishing the AT Passport concept. This chapter presents the quantitative phase of exploratory mixed-methods research, building on the initial qualitative phase's findings. It provides a correlating viewpoint to enhance the comprehensive data collection following a mixed-methods design(182). The qualitative research unravelled diverse barriers to AT access from various participants, with educational service provision being a significant challenge. This study stage examines university students' AT journey, shedding further light on these barriers. The survey questionnaires for this study are informed by the findings of the qualitative phase, underlining the integrative character of the mixed-methods research design discussed in Chapter 6.

7.3   Study Aim and Objectives

Study Aim

The primary objective of this study is to ascertain the participants' comprehension and experiences regarding the use of Assistive Technology throughout their educational journey.

Study Objectives

The specific objectives of this investigation are:

1. Investigate participants' understanding and perceptions of Assistive Technology.
2. Examine participants' experiences accessing Assistive Technology throughout their educational journey.

7.4   The Procedures

7.4.1   Ethical Approval

The study was granted ethical approval by the Maynooth University Research Ethics Committee (Appendix B2).

7.4.2   Participants Selections

For this investigation, a well-defined group of students registered with the disability support service at an Irish University was chosen. These students, either users or prospective users of Assistive Technology, constituted the participant base. An email was disseminated to all service users who use university disability support services through the Gatekeeper. This correspondence introduced the study and provided a link for those interested in participating or wanting more information about it. It was projected that this group would comprise individuals with diverse service utilise experiences, spanning from early childhood to education or from various health and social care providers, thus providing unique firsthand knowledge. Further, the participant recruitment approach included various ages and demographic categories, augmenting the resulting data's depth and breadth. A formal sample size estimation was not conducted for this study. The focus was gathering data from as many students as possible within the Maynooth University community who had experience with Assistive Technology during their education.

7.4.3   Participants' Recruitment Process

The gateway to this study's participants was the Educational Technology Officer from the university's disability support services. Acting as the study gatekeeper, this officer accessed a database of emails from students registered under the

university's Disability support services. The gatekeeper helped disseminate through an email (Appendix E2), an information datasheet (Appendix A2) regarding the study, and a link to an anonymous survey questionnaire (Appendix D1), which incorporated a consent form (Appendix A3), to potential participants in electronic format. My contact details were also made available, offering a pathway for any required assistance or requests for additional information. The protocol was to protect personally identifiable data, including email addresses, and to disallow access to such information. This was underscored in the information sheet, which further emphasised that involvement in this study was not mandatory and thus attracted no penalties for non-participation, nor was it linked to the services received from the university's disability support. Participants could withdraw from the study at any point or decide against submitting their feedback. Once the feedback was submitted, owing to its anonymous nature, there was no provision for its subsequent withdrawal. To foster participation, the gatekeeper delivered two follow-up emails over two months. When participants resolved to partake, an email hyperlink redirected them to a webpage demanding an electronic signature, thus paving the way for the survey.

7.4.4   Data Collection

In this study, participants were required to submit responses using an online survey facilitated by the Microsoft Forms Application (Appendix D2). The estimated completion time for the survey was approximately 10 minutes, and it was constructed with the ability for respondents to withdraw their participation at any moment before they submitted their responses. Anonymity and accessibility, evaluated via the Microsoft accessibility checker, were pivotal in formulating the survey. A real-time, online, and accessible survey was strategically considered to ensure the inclusion of a vast and diverse set of participants while eliminating the necessity for physical meetings. This selection proved particularly beneficial in the COVID-19 pandemic, facilitating convenience for the participants. Anonymity served as a valuable parameter, guaranteeing opinion confidentiality, alleviating personal sensitivities, and enhancing neutrality. The study also collected non-identifiable demographic data, encompassing gender, age spectrum, disability category, and AT use or non-use status. Our study relied on a Likert scale for

questions, exploring the diverse lived experiences of participants related to AT throughout their educational journey.

The following section elucidates the inquiries embedded in the questionnaire of this study, with a complete version located in Appendix D1.

1. How would you evaluate your present knowledge level of Assistive Technology?

2. How confident do you feel in using your AT efficiently?

3. Please select the types of Assistive Technology frequently utilised in all environments (education and daily living)

   - Mobility (for example, wheelchair, scooter, cane, prosthetic, orthotic device etc.)

   - Hearing (for example, hearing aid, on-screen subtitles)

   - Cognitive support (for example, memory aids, attention, thinking)

   - Magnification (for example, screen enlargement, handheld magnifiers)

   - Computer assistance (for example, screen reader, voice recognition)

   - Physical tools/ modifications (for example, book holder, smart home enhancements, adaptive switches, and utensils)

   - None of the above

4. In which educational environments have you used Assistive Technology? (Primary School, Secondary School, University or None of the above)

5. The essential purposes for me to use Assistive Technology are to:

   - Live Independently

   - Access Education

   - Partake in Employment

   - Communicate effectively.

- Engage in Sports and Leisure

- Access Culture (for example, theatre, concerts, cinema)

- Access Justice

- Not Applicable/None

6. How Important is Assistive Technology in your life?

7. How do you perceive educators' knowledge and understanding of Assistive Technology throughout your educational journey?

8. How would you evaluate your experience accessing Assistive Technology during transitions?

9. Rate the efficacy of communication processes on your AT needs during transitions (from Primary School to Secondary School and Secondary School to University)

10. Was any record of your Assistive Technology requirements maintained by you or your educational institutions (including paper or electronic documents of your existing or potential AT product and service needs)?

7.4.5 Demographics and Study Variables

This study employed a survey instrument to gather demographic information and insights into participants' experiences and perceptions of Assistive Technology. Demographic variables included gender, age, education level, disability status, pathways into higher education, and the presence of formally documented AT requirements.

To explore the interrelationships among these variables, we grouped them into three thematic clusters:

1. **AT Utilisation:** This cluster captured participants' practical engagement with AT, encompassing where, why, and how they utilised AT.

2. **AT Knowledge and Perception:** This cluster delved into participants' understanding and views of AT, including their self-reported proficiency in AT use, confidence levels, and the perceived importance of AT in their daily lives.

3. **AT Access and Integration:** This cluster examined participants' experiences accessing and integrating AT throughout their educational journeys. It encompassed their perceptions of educators' understanding of AT across different educational stages (primary, secondary, and university), their experiences accessing AT support services during transitions between these stages, and their satisfaction with current AT services.

7.4.5.1   Rationale for Cluster Analysis

We employed cluster analysis to analyse these data because it is suitable for addressing our research objectives. Specifically, we aimed to identify distinct profiles or groups of individuals based on their unique combinations of responses across the three thematic clusters.

While factor analysis could have been used to uncover latent factors potentially explaining the relationships between variables, our primary goal was not to reduce the data into underlying dimensions. Instead, we were interested in understanding how the observed variables clustered together to form meaningful profiles representing different experiences and perceptions of AT. Cluster analysis provided a more direct and interpretable approach to achieving this goal. By grouping individuals based on their similarities across the various AT utilisation, knowledge, perception, access, and integration variables, we aimed to uncover distinct profiles that could inform targeted interventions and support strategies for different groups with varying needs and experiences related to Assistive Technology.

7.5   Data Collection Instrument

This research employed a self-report online survey administered through MS Forms to gather participant data. The survey utilised Likert-type scale questions, chosen for their ability to efficiently collect data from a diverse group of respondents and reliably capture their perspectives and feelings on the topic. This approach also allows for various data analysis and validation techniques. All items utilised a 5-point Likert scale for responses, though the wording of scale anchors varied to reflect the specific question best.

7.5.1   Survey Design and Development

The survey design process ensured that the Likert-type questions effectively addressed the research questions and elicited relevant responses. This process involved identifying the construct, developing corresponding items, establishing scale descriptions, gathering feedback, and distributing the survey online.

7.5.1.1   Construct Identification and Item Development

As the second phase of an exploratory mixed-methods study, the construct under investigation emerged from the literature review and the preceding qualitative research phase. This construct focused on understanding participants' experiences accessing Assistive Technology throughout their educational journey.

In collaboration with my research supervisor and the study gatekeeper (who also served as a secondary supervisor due to their extensive knowledge of students), we developed clear and concise questions to measure this construct. Each question was designed to address specific variables of interest identified through the literature review and qualitative data.

7.5.1.2   Scale Development and Refinement

During the development phase, the survey questions underwent multiple revisions based on feedback from the gatekeeper and my research supervisor. This iterative process ensured clarity and relevance before finalising the survey for distribution.

Different response scales were chosen for each question based on the specific construct and variables being measured.

7.5.2 Response Scales Used

This section details the specific 5-point Likert scales used in the survey:

- **Understanding and Confidence in AT Use:** Participants rated their understanding and confidence in using AT on a scale ranging from "Very High" to "Very Low." The option "No Experience of AT use" was included to differentiate between AT users and non-users.

- **Perceived Importance of AT:** Participants rated the perceived importance of AT on a scale ranging from "Very Important" to "Not at All Important." The response option "No Experience of AT use" was included to distinguish between those familiar and unfamiliar with AT.

- **Access to AT During Educational Transitions:** A scale ranging from "Very Good" to "Very Poor" assessed participants' perceived access to AT during key educational transitions (primary to secondary and secondary to university). The option "No Experience of AT use" was included to identify individuals who had not used AT during these transitions.

- **Educators' Familiarity with AT:** Participants rated their perceptions of educators' familiarity with AT across primary, secondary, and tertiary education levels on a scale ranging from "Very Informed" to "Not Informed." The option "No Experience of AT use" was included to differentiate between those who had and had not used AT in these educational settings.

- **Knowledge of AT Services:** Participants indicated their level of agreement with statements about their knowledge of AT services at their current university on a scale ranging from "Strongly Agree" to "Strongly Disagree." The option "No Experience of AT use" was provided.

- **Satisfaction with AT Services:** Participants rated their overall satisfaction with AT services at their current university on a scale ranging from "Very Satisfied" to "Very Dissatisfied."

7.5.3 Instrument Validity and Reliability

The validity of the implemented Likert-type scale questions within this investigation was safeguarded through face validity checks, including clarity of information, presentation, and data accuracy(266). While the survey was not formally piloted with a separate group of AT users, steps were taken to ensure the clarity and validity of the instrument:

- **Oversaturation During COVID-19:** Conducting a separate pilot study with AT users during the COVID-19 pandemic was not feasible. Students were already facing significant survey fatigue due to the increased reliance on online data collection during that period. Adding another layer of survey participation could have negatively impacted response rates and potentially skewed results.

- **Expert Review and Feedback:** To mitigate the lack of a formal pilot, the survey instrument underwent a rigorous review process by individuals with expertise in both Assistive Technology and educational research:

  - **Principal Investigator:** Provided feedback on the survey's alignment with research objectives and methodological soundness.

  - **Co-Investigator/Education Technology Officer/Gatekeeper:** Offered insights from both an educational technology and gatekeeper perspective, ensuring the survey's relevance and appropriateness for the target population.

With its iterative feedback loops, this collaborative approach aimed to achieve a level of refinement and content validity comparable to a traditional pilot study, even amidst the challenging circumstances of the pandemic.

Instrument reliability is assessed through its internal consistency, assuring that items within the tool consistently evoke responses across disparate constructs, including its elements of administration and scoring(160, 212). Reliability, specifically of the Likert-type questions utilised in this study, was verified by employing Cronbach's alpha test as part of MS Excel calculations. The Cronbach's alpha test was implemented on two sets of variables featuring Likert-scale data. In the category with three items investigating AT knowledge and perception, the

Cronbach alpha score of. 69 (α = .69). The subsequent category, encompassing nine items that scrutinise the experience of access to AT, yielded a Cronbach alpha value of .89 (α = .89). When the two categories were combined, the resultant Cronbach alpha score was .84(α = .84) This denotes that the survey was found reliable across all categories and items. A comprehensive representation of Cronbach's alpha for each section is illustrated in the subsequent Table 12, providing a detailed view across all categories.

Table 12: Cronbach Alpha reliability scores

Item Categories	Item Numbers	Cronbach Alpha score	Internal consistency
AT Knowledge and Perception	3	.69	Acceptable
Experience with AT access	9	.89	Good
Combination of a + b above	12	.84	Good

7.5.4 Data Characteristics

The participants of this study were extracted from the 'registered with the disability support office' segment of a university in Ireland's student demographic. This research endeavours to methodically investigate the scope and intricacies of AT knowledge, along with the attendant experiences of AT access throughout the educational journey of these students. This part of the paper presents explicit details regarding the distinct data treatment techniques, ensuring thorough alignment with this study's intentions, targets, and fundamental objectives. Characteristics of Variables identified in this study were designed for a comprehensive data collection that spans the personal demographics of the participants, AT characteristics, AT knowledge inventory, perception towards AT, and experiences of AT access.

While conceptualising the survey, adherence to the study's design and objectives necessitated an initial focus on the experiences of actual AT users. Consequently, it was imperative to identify and distinguish between individuals with AT usage experience and those without it to enhance the robustness of the research's validity. Specific survey questions incorporated options for an opposite stratification of AT users and non-users, such as 'no experiences of AT use', 'none

of the above', or 'not applicable'. Additionally, for analysis, all non-demographic variables excluded respondents who noted 'no experiences of AT use', and similar responses were treated as omitted values. These variables, usually formulating Likert-scale survey questions, captured areas including but not limited to AT knowledge, confidence in AT usage, the significance of AT, perception of educators' knowledgeability about AT, awareness about AT support, satisfaction levels with AT support services, and variables addressing AT access experiences during different education levels.

Accessing AT experience, particularly during transitions at different educational levels, is elemental to the study's objectives. A discriminative survey question designed to identify AT users with documented records of AT needs and necessities versus those without helps compile valuable data for a subsequent comparative analysis. The results of this analysis will be presented in the next chapter 8. Table 13 details the diverse range of responses received for each question.

Table 13: Participant Responses - AT Requirement Records

	Records of AT needs and requirements exist.	
	N	%
YES	16	28.57%
NO	7	12.50%
I DO NOT KNOW	21	37.50%
No experience of AT use	12	21.43%

7.5.5   Likert-type Survey Questions

Each Likert-style survey question had a positive tone, and the description scales were explicitly designed to represent the construct being evaluated accurately. Various range scales, such as 'strongly agree' to 'strongly disagree' or 'very important' to 'not at all important', were used, each tailored to capture the nuances of the inquiry.

We converted the textual responses into numerical data using a 5-point Likert scale to analyse them. The highest level of agreement ("Strongly Agree") was

assigned a value of 5, while the lowest ("Strongly Disagree") received a 1. Responses like "No experience of AT use" or "Not applicable" were treated as missing data. Table 14 provides a clear overview of all Likert scale items' valid and missing data points.

Table 14: Valid and missing values

Variables (Likert-types survey questions)	N. Total Respondents	No. Missing Values (Blank & No experience with AT use)	N. Valid Data
AT Knowledge	57	3	54
AT Confidence	57	4	53
AT importance	57	11	46
Knowledge of educators at the primary level	57	14	43
AT Knowledge of educators at the Secondary Level	57	13	44
AT Knowledge of educators at the University	57	5	52
Awareness of AT support services	57	4	53
Satisfaction with AT support services	57	8	49
AT access experience on the transition from primary to secondary	57	33	24
AT access experience on the transition from secondary to university level	57	30	27
Communication of AT requirements on the transition from primary to secondary level	57	36	21
Communication of AT requirements on the transition from secondary to university level	57	33	24

7.6 Data Analysis

Raw survey responses were initially collected from MS Forms and compiled into an MS Excel spreadsheet. Data cleansing and analysis were then conducted using MS Excel. During data cleaning, extraneous information such as survey start and completion times, anonymisation validations, and language specifications were removed. The remaining data were categorised as either Likert-scale or non-Likert-scale questions. Non-Likert-scale questions provided demographic data and information about AT characteristics, including responses from individuals without AT experience. On the other hand, Likert-scale questions measured participant perceptions, knowledge, and experiences related to AT access.

The study used descriptive and inferential statistics to ensure robust and reliable findings. Descriptive statistics, including frequencies, percentages, and means, present demographic and AT characteristics data in the next chapter's tables and figures. Following the presentation of these descriptive findings, the subsequent "Results" chapter will delve into the inferential statistical analyses.

I opted for non-parametric testing for inferential statistics, as all variables failed to assume the normal data distribution in normality testing using a histogram. Normality testing was executed for all variables in the study. As this study utilised Likert-type items, the data generated was ordinal, making non-parametric methods the most suitable choice. As a result, ranks and scores were summarised as medians, with the median serving as the measure of central tendency. The following steps ensued in the study's analysis:

1. ***Mann-Whitney U Test:*** This test was used to compare two groups of participants (those with documented AT needs and those without) on their:

    o **Knowledge and Perceptions of AT:** This encompasses their AT knowledge, confidence in using AT, and perceived importance of AT.

    o **Experience Accessing AT:** This includes their ranking of experiences accessing AT during transitions (e.g., moving from primary to secondary education) and the quality of communication they received during these transitions.

2. ***Kruskal-Wallis Test:*** This test was employed to compare the perceptions of AT knowledge among educators across three different education levels: primary, secondary, and university.

3. ***Spearman Correlation:*** This correlation analysis explored the relationships between Likert-scale survey variables related to AT knowledge, perceptions, and access experiences. Other variables were not included in this analysis as they were not ordinal.

7.7 Ethical Issues

Upholding rigorous ethical standards, the research accentuated the importance of anonymity, confidentiality, and non-maleficence towards the subjects(207, 267, 268). This research ensured that no personally identifiable information was procured or collated, upholding confidentiality and anonymity throughout the process, from participant recruitment to the data analysis phase. Early, a gatekeeper disseminated the online invitations to the study and the informational booklets to students enlisted in the disability support service, indirectly and privately, through a blind copied email, abstaining from any direct contact with potential participants' data. Every point of data interaction, confined solely to responses gathered via MS Forms, was structured to prevent the collection of distinct personal identifiers, thereby safeguarding respondent anonymity and data confidentiality.

Encouragingly, the received data lacked personal identifiers such as names or email addresses. However, it should be noted that the unique structure of the research, encompassing a single institution, could potentially breach anonymity due to the nature of the disseminated data - including the categorisation of disability and level of study. To rectify this potential pitfall, the data analysis was systematically structured to showcase only aggregated data, thereby minimising identifiability risks in the research results. Sensitivity was an additional priority; the research opted against gathering sensitive information to reduce any conceivable harm or risk.

The voluntary nature of participation allowed the subjects to withdraw at any point before submission. Relevant information on support services was provided

in the information booklet, ensuring assistance to any participant deterring risk from their study involvement.

7.7.1 Study Limitations

Key limitations in this study are linked to the methodology, data collection instruments, and sample selection, all of which significantly shape the interpretation of the results(269). The narrow scope of participants from a single institution could constrain the outcomes' applicability as it may not encompass the experiences of all AT users. Dependence on self-reported data, despite its subjectivity, increases the risk of individual biases, thus potentially influencing the responses received.

Using Likert-scale questions converts intricate human behaviours and experiences into quantitative values, a simplification with limitations. Additionally, the cross-sectional design taken by this study provides a snapshot of a specific period, an approach with its constraints. Furthermore, using ordinal data from the Likert scale for inferential statistics may lead to conceptual disparities(270-272). Furthermore, this study relied on an unvalidated survey instrument. While the survey questions were designed to address the research objectives, the lack of formal validation may raise concerns about the reliability and validity of the findings**.**

However, this drawback is mitigated by integrating previously collected qualitative data from the exploratory phase, which nourishes and fortifies the current research(214). The richness and context provided by the qualitative data not only balance the limitations of the quantitative study but also enrich the overall research insights, offering a comprehensive understanding of the research objectives.

7.8 Chapter Summary

This chapter details the quantitative component of the research, outlining the study's purpose, design, recruitment strategies, data collection, analytical methods, and ethical considerations. It emphasises the importance of upholding ethical standards, including confidentiality, anonymity, and non-maleficence, to protect participants. The analysis employed a comprehensive range of statistical methods to ensure credibility and precision. This chapter sets the stage for the subsequent presentation and discussion of the quantitative findings.

Chapter 8: Quantitative Phase: The Results

8.1 Introduction

This chapter presents a bifurcated analytical structure designed to convey the research's quantitative phase results with utmost significance. The first half illustrates the findings, factoring in the participants' backgrounds and utilising descriptive and inferential statistical methodologies. The latter half presents a comprehensive summary discussion, interpreting the conclusions drawn from this study segment and highlighting the importance of the findings in the context of the AT passport concept.

8.2 Demographics, Disability, and Assistive Technology Use

This section moves beyond simply identifying the prevalence of AT use and delves into a detailed analysis of the collected data. We aim to explore the intricate relationships between demographics, disability categories, and utilisation patterns of assistive technology. Uncovering these connections is essential for understanding the variations of AT use within diverse student populations and, ultimately, informing the development of the AT Passport.

8.2.1 Demographic Characteristics

The survey, encompassing responses from 57 participants, was designed to be inclusive, spanning an age range of 18 to over 50 years. Key demographic findings include:

- **Gender:** Most respondents (59% - 35 participants) identified as female.

- **Age:** Most respondents (60% - 34 participants) belonged to the 18-23 age demographic. This aligns with the finding that a significant majority (84% - 47 participants) were pursuing undergraduate studies.

- **Year of Study:** The largest group (30%—17 participants) of undergraduate student respondents were first-year students.

- **University Access Route:** The most common avenue to university education was the Disability Access Route to Education, chosen by 51% of

respondents (29 participants). The Central Application Office route was a close second, with 40% (23 participants).

The survey recognised eleven disability categories defined by the Association for Higher Education Access & Disability and Higher Education Ireland(273). Participants could identify with one or multiple categories or select "no disability".

Key findings regarding disability identification include:

- **Disability Representation:** Most respondents identified with at least one disability. Nineteen participants indicated a co-existing combination of at least two disabilities.

- **Most Prevalent Disability Categories:** The most frequently identified disability categories were:

  - Specific Learning Difficulties (dyslexia or dyscalculia): 21% (18 participants)

  - Mental Health Conditions: 17% (15 participants)

  - Significant Ongoing Illness: 11% (10 participants)

- **No Disability:** A small number of respondents (5% - 4 participants) did not identify with any of the provided disability categories.

Table 15 presents an overview of the participant's demographic characteristics and disability categories

Table 15: Participants' demographics and disability categories

	N	%
Female (Total)	**35**	**59%**
18-23 Years old	25	48%
23-30 Years old	3	4%
31-40 Years old	2	2%
41 and 50	1	1%
51 and over	3	2%

Undisclosed	1	1%
Male (Total)	**21**	**38%**
18-23 Years old	13	22%
23-30 Years old	4	9%
41 and 50	2	3%
51 and over	2	4%
Non-binary		**3%**
18-23 Years old	1	3%
Grand Total	**57**	**100%**

	N	%
Level/year of study		
Undergraduate (Total)	**47**	**84%**
First Year	17	30
Second Year	15	26
Third Year	13	23
Fourth Year	3	5
Postgraduate (Total)	**8**	**15**
Postgraduate Masters	6	11
Postgraduate Doctoral	2	3
Other (Certificate Module)	1	1
Total no. of Participants	**57**	**100**

Category of Disability	Number of Participants Identifying with Each Disability	%
Specific learning difficulties (dyslexia or dyscalculia)	18	21%

Mental Health Condition	15	17%
Significant Ongoing Illness	10	11%
Physical/Mobility Disability	9	10%
Developmental Co-ordination Disorder (Dyspraxia/Dysgraphia)	8	9%
Neurological Condition	7	8%
Attention Deficit Disorder/Attention Deficit Hyperactivity Disorder (ADD/ADHD)	4	5%
No Disability	4	5%
Autism Spectrum Disorder	4	5%
Speech and Language Communication Disorder	4	5%
Blind/Vision Impaired	2	2%
Deaf/Hard of Hearing	2	2%
Total no. of entries (Multiple entries)	87*	100

8.2.2 Assistive Technology Characteristics

This section outlines the participant group's usage patterns for assistive technology (AT). Data was gathered on various aspects of AT use, including the types of AT used, reasons for use, and settings where AT was employed.

Of the 57 participants:

- **Assistive Technology Users:** The majority (84% - 48 participants) were identified as AT users, having used assistive technology at some point in their education.

- **Non-Users:** A smaller proportion (16% - 9 participants) reported no AT use experience.

8.2.2.1 Reasons for AT Use

Participants who used AT were asked to identify their primary reasons for doing so. The most common reasons cited were:

- **Access to Education:** The most prevalent reason, chosen by 55% of AT users, highlights AT's importance in enabling educational participation.

- **Effective Communication:** 16% of AT users identified communication support as a key motivator.

- **Employment Participation:** 13% of users utilised AT to support their participation in employment.

- **Independent Living:** 9% of users relied on AT to maintain their independence in daily living.

8.2.2.2 Settings of AT Use

AT users were asked to indicate the educational settings where they had explored AT. The most frequently reported settings were:

- **University:** Nearly half (43%) of responses indicated university as a setting for AT use.

- **Secondary School:** 26% of responses indicated AT use during secondary education.

- **Primary School:** 16% of responses mentioned AT use during primary education.

8.2.2.3 Types of AT Used

Participants were given a list of standard AT categories and could select multiple options. The most used AT types were:

- **Computer Assistance:** This category, which includes screen readers and voice recognition software, was the most prevalent, representing 40% of responses.

- **Cognitive Support:** This category, representing 19% of responses, encompasses tools that aid memory, attention, and thinking skills.

- **Physical Tools/Modifications:** This category, covering a range of adaptations like book holders, smart home enhancements, and adaptive switches, constituted 14% of responses.

Table 16 provides an overview of Assistive Technology usage patterns among participants.

8.2.3   Summary Analysis of AT Needs and Usage Patterns

Sections 8.2.1 and 8.2.2 detailed the study participants' Assistive Technology needs and usage patterns. This section aims to synthesise the key findings from both sections, offering a comprehensive overview of AT within the context of this research.

Key Findings:

- **Prevalence of AT Needs:** A significant proportion of participants (84%, or 48 out of 57) reported utilising assistive technology during their education, highlighting the prevalence of such needs within this population.

- **Diverse Range of Disabilities:** The data revealed a wide range of disabilities represented among the participants, with specific learning difficulties being the most common. This diversity underscores the need for flexible and adaptable AT solutions catering to individual needs.

- **Computer Access as a Primary Need:** The most frequently reported type of AT used was for computer access (40%), emphasising the critical role of technology in enabling participation in education and other aspects of life.

- **Motivations for AT Use:** Participants primarily used AT to access education (55%), followed by effective communication (16%), employment participation (13%), and independent living (9%). These motivations highlight the multifaceted impact of AT on various life domains.

- **Transition Between Educational Levels:** The data indicated challenges related to AT access and support during transitions between educational levels. This finding underscores the need for improved communication and coordination between educational institutions to ensure the continuity of AT support.

Table 16: Assistive Technology usage pattern

PARTICIPANTS	N	%
AT users	48	84%
No experience of AT use	9	16%
Total	57	100%
REASON FOR AT USE	N. of Entries*	%
Access education	37	55%
Communicate effectively.	11	16%
Participate in employment	9	13%
Live independently	6	9%
Access to justice	3	5%
Health support	1	1%
Participate in sports and leisure	1	1%
Total number of entries* (multiple entries).	66*	100%
SETTINGS OF AT USE	N. of Entries*	%
University;	29	43%
Secondary school;	18	26%
Primary school;	11	16%
None of the above;	9	13%
Other (work)	1	1%
Total number of entries* (multiple entries).	68*	100%
TYPES OF AT USED.	N. of Entries	%
Computer assistance (screen reader, voice recognition);	23	40%
Cognitive support (memory aids, attention, thinking)	11	19%
Physical tools/ modifications (book holder, smart home enhancements, adaptive switches, and utensils);	8	14%
Hearing (hearing aid, on-screen subtitles);	6	11%

Magnification (screen enlargement, handheld magnifiers)	6	11%
Note-taking/concentration aids.	1	2%
Total number of entries* (multiple entries)	55*	100%

8.3   Knowledge and Perceptions of AT

We explore the participants' knowledge and perceptions of Assistive Technology, examining how these factors relate to their experiences and the potential implications for AT adoption and support.

8.3.1   Distribution of Knowledge, Confidence, and Perceived Importance

This part delves into participants' understanding and perceptions of Assistive Technology by examining the distribution of scores across three key survey parameters: Knowledge of AT, Confidence in AT Use, and Perceived Importance of AT. Figure 5 visually represents the variability and range of these parameters.

A notable observation emerges when we compare the median scores: Participants consistently rated the Perceived Importance of AT higher (median score of 4) than their Knowledge of AT and Confidence in AT Use (both with a median score of 3). This suggests a general recognition of AT's value, even if practical knowledge and confidence lag slightly behind.

Examining the distribution patterns reveals further insights:

- **Perceived Importance of AT:** This parameter reveals an interesting pattern: while the median score is high, indicating a general agreement on AT's importance, the distribution exhibits a wider spread of scores compared to the other two parameters. This suggests that while most participants value AT, there is a greater diversity of opinions and levels of perceived importance.

- **Knowledge of AT and Confidence in AT Use:** These parameters show a more clustered data spread around the median, with less pronounced variability than Perceived Importance. This suggests a more homogenous distribution of moderate knowledge and confidence levels among participants.

These findings highlight a potential area for improvement: while participants generally recognise the value of AT, there is scope to enhance their knowledge and confidence in using it effectively.

Figure 5: Participant Knowledge, Confidence, and Perceived Importance of Assistive Technology

8.4 AT Access and Integration

This section delves into participants' experiences accessing and integrating Assistive Technology throughout their educational journeys. It explores their perceptions of educators' understanding of AT across different educational stages (primary, secondary, and university), their experiences accessing AT support services during transitions between these stages, and their overall satisfaction with current AT services.

8.4.1 Perceptions of Educators AT Knowledge

Figure 5 visually represents participants' perceptions of educators' AT knowledge across three educational tiers. The relatively low median ratings of 1 and 2 for primary and secondary education suggest that educators at these levels may have more limited knowledge of AT than university educators. As indicated by the left-skewed distribution and wider data spread, the variability observed within these levels highlights the need for a more nuanced understanding of these perceptions.

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In contrast to the perceptions of primary and secondary educators, a more favourable opinion is observed at the university level, with a median score of 4. This finding suggests that participants generally perceive university educators to have a stronger understanding and awareness of AT. This difference highlights a potential disparity in AT knowledge and awareness across educational stages, emphasising the need for targeted professional development and support for educators, particularly at the primary and secondary levels.

8.4.2 Experience of AT Access During Transitions through Education

Here is an examination of the participants' experiences accessing and managing their AT during transitions between educational stages. Four questions were posed, focusing on two key aspects: the overall transition experience and the quality of communication regarding AT needs and requirements. These aspects were explored at two transition points: primary to secondary school and secondary school to university.

Participants rated their overall transition experience and the quality of communication regarding AT needs during the transition from primary to secondary school relatively low, as indicated by a median score of 2. The data also exhibited a left-skewed distribution, suggesting that most participants encountered challenges during this transition.

Comparatively, the transition to university yielded a higher median score of 4 for overall experience and communication quality. However, the data spread, with a concentration between 2 and 4, suggests inconsistencies in individual experiences. Notably, in both datasets, only a few participants attained the highest rating of 5, represented as outliers in Figure 6. This observation underscores the need for improvement in ensuring smooth and supportive AT-access transitions.
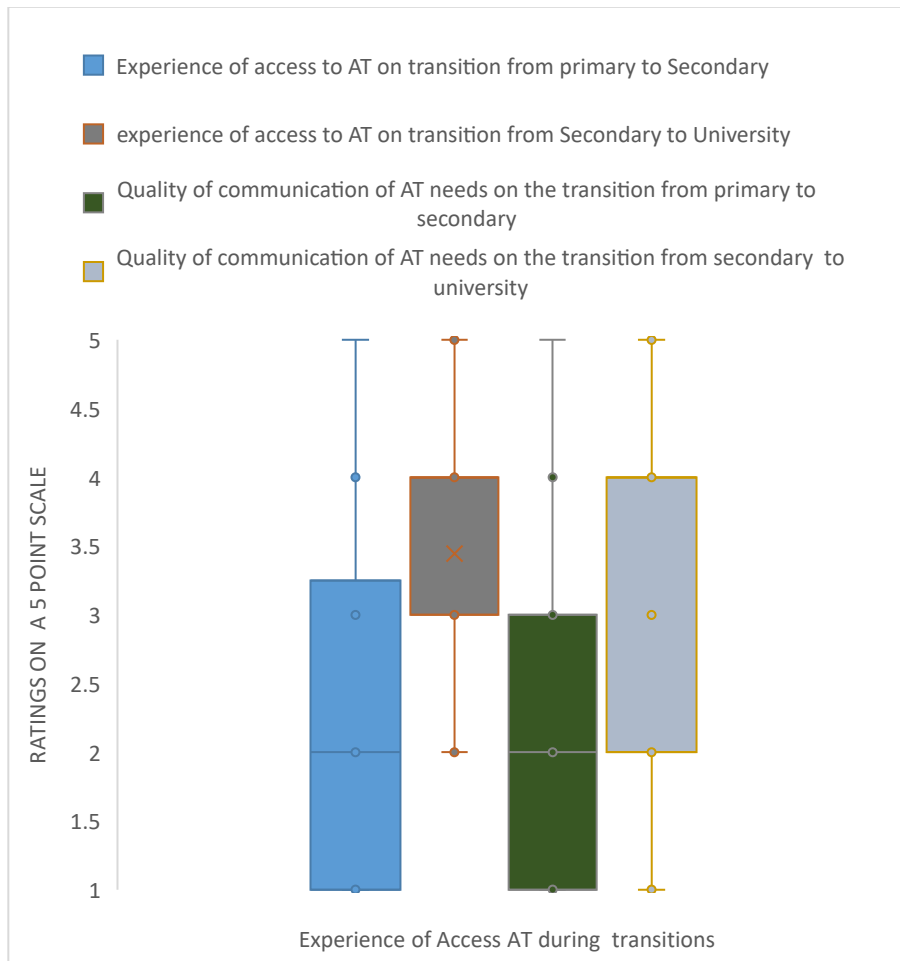
Figure 6: Participant Experiences and Communication Quality: AT Access During School Transitions

8.4.3   AT Service Provision

Participants generally reported high levels of awareness and satisfaction with university-provided AT support services, with median scores of 4 for knowledge and understanding of services and 5 for satisfaction with support services. This suggests that most participants know the AT support and are generally satisfied with the services provided, as illustrated in Figure 7.

The concentration of data points towards the higher end of the scale for both awareness and satisfaction, despite some variability caused by outliers, suggests a positive perception of university AT service provision. This observation, alongside the previously discussed findings regarding university educators' AT knowledge (Section 8.5.1), hints at a potential correlation between these factors. This possible link will be explored further in the subsequent section.
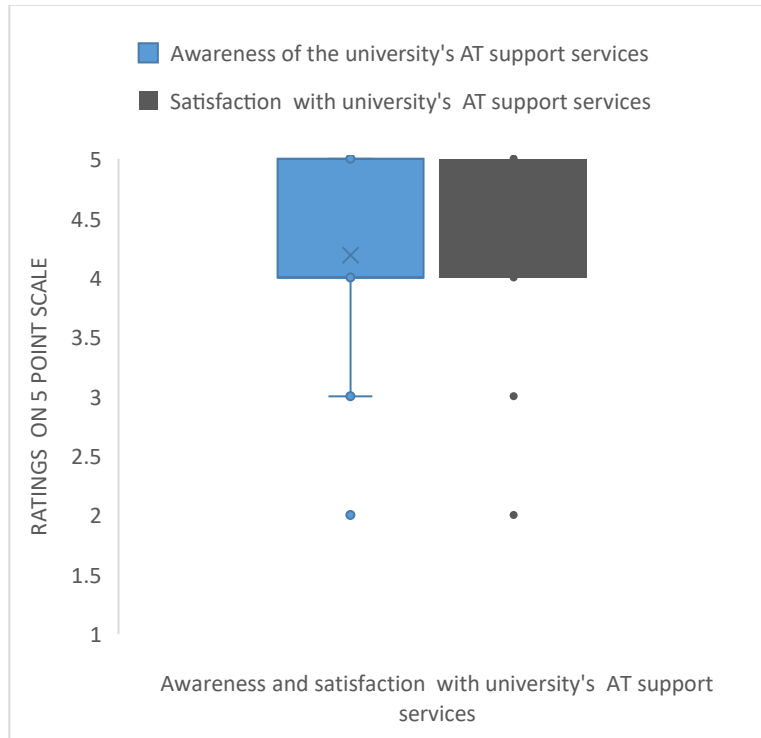
Figure 7: Student Awareness and Satisfaction with University AT Support Services

8.4.4 Record of AT Needs on AT Knowledge, Perceptions, and Access

This section investigates the relationship between having a documented record of AT needs and individuals' AT knowledge, perceptions, and access experiences.

8.4.4.1 AT Knowledge and Perceptions

We explored whether having a documented record of assistive technology needs was related to individuals' knowledge, perceptions, and confidence regarding AT. The findings revealed a significant link between documentation, AT knowledge, and perceived importance. Specifically, individuals with documented AT needs demonstrated a stronger grasp of AT concepts ($U = 33$, $z = -4.76$, $p = .01$). They considered AT to be more important ($U = 44$, $z = -2.12$, $p = .05$) compared to those without such documentation. Interestingly, having a documented record of AT needs did not appear to influence individuals' confidence in using AT ($U = 51.5$, $z = -0.24$, $p = .40$). This suggests that while documentation might be tied to greater awareness and understanding of AT, other factors likely contribute to an individual's confidence in utilising assistive technologies. All findings related to this aspect of the analysis are presented in Table 17.

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Table 17: Mann-Whitney U Test Results - AT Knowledge & Perception Variables

Variables	U score	Standard Error	Z-Score	p-Score
AT Knowledge	33	4.10	-4.76	0.01
AT Importance	44	4.01	-2.12	0.05
AT Confidence	51.5	4.09	-0.24	0.40

8.4.4.2 Access to AT

The *Mann-Whitney U test* was employed to examine potential differences in accessing AT during educational transitions (primary to secondary and secondary to university) and the communication of AT requirements between groups: those who reported having a documented record of AT needs and those who did not.

Employing the *Mann-Whitney U Test*, independent responses from a Likert question were analysed to explore potential variations in participants' experiences of accessing AT, depending on whether they acknowledged having a record of AT needs and requirements. Two specific experience-related variables were examined: AT needs and requirements. These *variables* were compared independently between the groups before being combined to represent the overall construct of Access to AT, as displayed in Table 18.

The *Mann-Whitney U Test* revealed statistically significant differences between the two groups in their experiences of accessing AT during transitions ($p = 0.05$, $U = 53.5$, $SE = 4.10$, $z = -2.14$) and in the communication of AT requirements during these transitions ($p = 0.01$, $U = 46.5$, $SE = 4.23$, and $z = -0.12$). The combined Access to AT construct differed significantly between the two groups ($p = 0.01$, $U = 393.5$, $SE = 15.08$ and $z = -3.33$).

These findings suggest that individuals with documented AT needs may have different experiences accessing AT during transitions than those without documented needs. The qualitative phase of this research provided valuable insight into the specific challenges individuals face during educational transitions, highlighting a range of difficulties experienced when transitioning through education. A deeper understanding of these challenges and how they relate to the presence or absence of documented AT needs will be further explored in the mixed methods integration of data chapter.

Table 18: Mann-Whitney U Test Results - Access to AT Variables

Variables	U score	Standard Error	Z-Score	p-Score
Experience in accessing AT during transitions	53.5,	4.10	-2.14),	0.05
Experience in communication of AT requirements during these transitions	46.5,	4.23	0.12	0.01
Access to AT	393.5	15.08	3.33	0.01

8.4.5 Access to AT: Educators' AT Knowledge and Awareness

The *Kruskal-Wallis H* non-parametric statistical test was employed to examine potential differences in perceptions of educators' AT knowledge and awareness across three educational settings: primary, secondary, and university. This statistical test is appropriate for determining statistically significant differences among the ratings of multiple groups. The analysis was conducted using MS Excel, with the independent variable defined as the education setting (primary, secondary, or university) and the dependent variable defined as the perceived level of AT knowledge and awareness.

A *Kruskal-Wallis* test indicated that there was a significant difference in perceived levels of assistive technology knowledge across three levels of educators (primary, secondary, university), $\chi2$ (2, *N* = 125) = 16.16, *p* = .0003. The median perceived AT knowledge scores were 1 for primary educators, 2 for secondary educators, and 4 for university educators. *N* = 125 represents the number of cases (ratings) for each school level, not the total number of participants. These results, displayed in Table 19, suggest that there may be differences in the perceived levels of AT knowledge and awareness among educators at different educational levels, with university educators perceived as having higher levels of knowledge and awareness compared to primary and secondary educators.

Table 19: Independent Samples Kruskal-Wallis Summary

Total (N)	125
Test statistics *(H)*	16.16
Degree of Freedom *(df)*	2
p-Value	<.003

8.5   Data Characteristics

This section outlines the characteristics of the data used in this study.

8.5.1   Data Variability

A methodical descriptive analysis was conducted to investigate the variability, distribution, and range of scores associated with the variables in question. This was achieved through the visualisation tool of a box plot, encapsulating all responses garnered on the Likert-type scale. The summarised statistics from this descriptive analysis, offering an overall perspective on these variables, are presented in Table 20. The standard deviation values provide insights into each variable's spread or dispersion of responses. Lower standard deviation values indicate that responses tended to cluster closer to

the mean, while higher values suggest more significant variability in the data. For instance, the variable "AT Knowledge" exhibited a relatively small standard deviation (SD = 0.7), indicating that participants' self-reported knowledge about AT was relatively consistent. Conversely, the variable "Knowledge of educators at the primary level" had a larger standard deviation (SD = 1.2), suggesting more diverse perceptions regarding primary educators' knowledge of AT.

Examining the mean and median values can also offer insights into the data distribution. For instance, the variables "AT Importance" and "Satisfaction with the university's AT support services" have mean values greater than their respective medians. This suggests a slight right skew in the data, indicating that responses for these variables tended to be skewed towards the higher end of the Likert scale.

Table 20: Data variability

Variables (Likert-types survey questions)	Valid counts	Mean	Median	Mode	SD
AT Knowledge	54	3.0	3.0	3.0	0.7
AT Confidence	53	3.2	3.0	3.0	0.9
AT importance	45	3.9	4.0	5	1.1
Knowledge of educators at the primary level	43	1.9	1.0	1.0	1.2
AT Knowledge of educators at the Secondary	44	2.3	2.0	2.0	1.2
AT Knowledge of educators at the University	52	3.5	4.0	4.0	1.1
Awareness of AT support services	53	4.2	4.0	4.0	0.7
Satisfaction with AT support services	49	4.5	5.0	5.0	0.8
AT access experience on the transition from primary to secondary	24	2.3	2.0	1.0	1.4
AT access experience on the transition from secondary to university level	27	3.4	4	4	0.8
Communication of AT requirements on the transition from primary to secondary level	21	2.4	1.0	1.0	1.3
Communication of AT requirements on the transition from secondary to university level	24	3.2	4.0	4.0	1.2

8.5.2 Data Intercorrelation

A *Spearman correlation* analysis was conducted to understand the relationships between the different variables in this study. This analysis looked at how strongly different Likert-type items were related to each other.

The analysis revealed that, overall, there were positive correlations between all the variables. This means that as one variable increased, the others also tended to increase. Many of these correlations were statistically significant, meaning they were unlikely to occur by chance. The significance level (α-alpha) was set at $p < 0.05$, denoted by one asterisk (*), and any correlations below 0.01 were denoted in table 20 by double asterisks (**).

The strongest relationships, with correlations near or exceeding 0.9 (**) were observed in areas related to *access to AT*:

- **Strong Connection Between Transition Experiences and Communication:** Students who reported positive *AT transition experiences* from primary to secondary and secondary to tertiary education also tended to report high-quality *communication* regarding their AT needs during these transitions.

- **Communication Remains Key Across Educational Stages:** The strong link between transition experiences and communication about AT needs held across both educational transitions, highlighting the importance of clear and effective communication throughout a student's educational journey.

Interestingly, the analysis also revealed some unexpected findings where variables were *not* significantly correlated:

- **Personal knowledge does not guarantee smooth communication:** There was no significant correlation between a student's *AT knowledge* and the *quality of communication* about their AT needs during the transition from primary to secondary education. This suggests that knowing about AT does not necessarily translate to better communication about individual needs during this critical transition. Other factors, such as self-advocacy skills or family support, might play a role.

- **Educator knowledge is not solely driven by perceived importance:** No significant correlation emerged between educators' perceived importance of assistive technology and their actual knowledge of these tools at the primary school level. This implies that factors beyond simply recognising the importance of assistive technology might play a role in shaping educators' understanding and knowledge in this area.

- **Past transition success does not guarantee future communication:** The analysis did not find a significant correlation between a positive *transition experience* from primary to secondary education and the *quality of communication* about AT needs at either transition stage. This suggests that a smooth transition at one stage does not necessarily guarantee effective communication about AT needs at a later stage. Each transition presents unique challenges and requires dedicated attention to communication.

Table 21 displays the correlations between all variables analysed.

Table 21: Spearman Correlations - All Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. AT Knowledge	1											
2. AT Confidence	0.830**	1.000										
3. Importance of AT	0.690**	0.755**	1.000									
4. AT knowledge of primary school educators	0.385**	0.466**	0.297	1.000								
5. AT knowledge of Secondary School Educators	0.630**	0.650*	0.556**	0.537**	1.000							
6. AT knowledge of University Educators	0.604*	0.652**	0.489**	0.552**	0.770*	1.000						
7. Awareness of the university's AT support services	0.715**	0.703**	0.521**	0.351**	0.707**	0.697**	1.000					
8. Satisfaction with the university's AT support services	0.759**	0.774**	0.586**	0.564**	0.717**	0.888**	0.763**	1.000				
9. Transition experience primary to 2nd level of education	0.522**	0.550**	0.372	0.689**	0.577**	0.579**	0.496**	0.609**	1.000			

10. Transition experience 2nd to 3rd level of education	0.594**	0.612**	0.514**	0.507**	0.760**	0.715**	0.679**	0.748**	0.802**	1.000		
11. The quality of Communication of AT needs on the transition from primary to 2nd	0.422	0.505*	0.328	0.684**	0.637**	0.618**	0.459**	0.558**	0.916**	0.870**	1.000	
12. The quality of Communication of AT needs on the transition from primary to 2nd	0.696**	0.583**	0.385	0.577**	0.694**	0.714**	0.639**	0.795**	0.786**	0.900**	0.753**	1.000

*p < 0.05, **p < 0.01

8.6 Discussion

This study aimed to explore participants' understanding of and experiences with Assistive Technology throughout their educational journey, explicitly investigating their perceptions of AT and their experiences accessing it across different educational stages. Our findings highlight a critical need for inclusive and adaptable approaches to AT provision that cater to individuals' unique challenges in these diverse educational settings.

One of the significant findings of our study is the existence of significant disparities in educators' AT knowledge across primary, secondary, and university levels(274-276). Participants perceived AT knowledge among educators as higher at the university level than in primary and secondary education. This disparity has tangible consequences, with participants reporting less favourable experiences accessing and managing their AT during primary to secondary school transitions than university transitions. This aligns with existing literature that identifies transitions between educational stages as particularly challenging for students with disabilities, often leading to disruptions in AT access and support(277).

The finding further compounds this knowledge gap and shows significant differences in addressing AT needs during these critical transition periods. Specifically, individuals with documented AT needs reported statistically significant differences in their experiences accessing AT during educational transitions (p = 0.05) and communicating AT requirements (p = 0.01) compared to their peers without documented needs. This suggests that current systems may not adequately support the transfer of assistive technology information and resources, potentially leaving students without crucial support during these challenging periods. To address this multifaceted challenge, comprehensive strategies are needed to bolster AT knowledge among educators across all tiers of education(278, 279). Equally important is establishing clear protocols for documenting, transferring, and communicating AT needs during educational transitions(280). This could involve developing standardised forms, fostering

communication between educators at different levels, and empowering students to advocate for their AT requirements(9).

A holistic approach to AT provision reinforces the need for a centred approach to service delivery(60, 281). In essence, clarity in AT requirements improves AT awareness and perception, potentially also enhancing accessibility, thereby refining the overall AT experience(282, 283). Similar to other research on the need for AT use for students, the primary motivation for AT use expressed by participants was to enhance educational accessibility, effective communication, and employment support. This underscores the importance of recognising and addressing AT needs in education(123, 284).

The implication of this study for the AT Passport is the need to consider the complexity and diversity of AT use across demographics in its design and development. There was a notable discrepancy in AT understanding and attitudes between participants who had established and documented AT needs and those who did not. This suggests that the AT Passport design could benefit from implementing techniques to raise awareness(9). These methods could promote a better grasp of and a more positive attitude towards ATs, thus improving the user's overall AT journey. Indeed, a lack of information has been shown as one of the major barriers to Assistive Technology access; the AT Passport has the potential to be developed to fill this gap(10, 19, 54, 285). For example, incorporating interactive tutorials, success stories, and personalised recommendations could enhance AT awareness and understanding for all students. Furthermore, recognising that simply documenting AT needs does not bolster user confidence, the AT Passport should go beyond cataloguing and incorporate features like user training modules, in-depth information resources, and peer support networks(278, 279). This empowers users to engage with their AT and actively maximise its benefits. This approach aligns with a systems thinking perspective, emphasising the interconnectedness of various factors, including user knowledge, skills, and support networks, in achieving successful AT outcomes(23). The study also highlights the potential of the AT Passport in promoting early intervention, given the disparity in AT use between tertiary and primary education levels(286). Integrating early assessment tools, a resource directory, and

longitudinal tracking capabilities can facilitate timely identification and support for students' AT needs throughout their educational journey(287-289).

While this study offers valuable insights, it is essential to acknowledge its limitations. This quantitative phase, exploring the entirety of the AT user journey in education, complements a preceding qualitative exploratory phase that examined the AT experiences and perceptions of the AT Passport concept through semi-structured interviews. Primarily, the study relied on self-reported data, which can be susceptible to response bias and may not fully capture the complexities of students' lived experiences. Additionally, using a Likert scale while providing a quantifiable measure simplifies the multifaceted nature of AT experiences into numerical values. Future research could benefit from incorporating qualitative methods, such as interviews or focus groups, to understand students' perspectives and challenges better. Furthermore, the study's cross-sectional design limits our ability to conclude the long-term impact of AT use and the factors influencing its sustained adoption. Longitudinal studies tracking participants over an extended period would provide more robust evidence regarding the effectiveness of AT interventions and students' evolving needs.

Finally, it is vital to acknowledge the limited scope of this study. The research was conducted at a single institution and utilised an unvalidated survey instrument, which may limit the generalizability of the findings to other contexts and populations. Future research should aim for larger, more diverse samples and consider employing validated instruments to enhance the rigour and generalizability of the findings. While the data provides valuable insights into disability representation, it lacks information on the severity or specific impact of these disabilities on students' learning experiences. Additionally, the over-representation of certain demographics, such as younger female students with specific learning difficulties, should be considered, as this may skew the results and limit generalizability. Future research should aim for a more balanced representation of disability types and explore the nuanced ways in which different disabilities and their severity levels influence AT experiences and needs.

8.7 Conclusion

This quantitative phase of the explorative sequential mixed methods study examined the current landscape of Assistive Technology utilisation, revealing a predominant use of computer and cognitive support within university and workplace settings. The study found that while individuals are motivated to use AT to enhance academic performance, improve resource access, and foster independence, a significant discrepancy exists in AT understanding and attitudes between those with and without formally recognised needs. This disparity and observed limitations in current AT usage reinforce the need for a systems-thinking approach to promoting effective access to AT. This approach, which emphasises the interconnectedness of various factors, including user knowledge, skills, and support networks, is crucial in achieving successful AT outcomes. These findings, informed by a preceding qualitative study, provide a foundation for understanding the complexities of AT use and highlight key considerations for developing the AT Passport.

8.8 Chapter Summary

This chapter presented a quantitative analysis of Assistive Technology utilisation patterns among diverse respondents. The study used descriptive and inferential statistical methods to examine relationships between demographic factors, AT usage, and user perceptions. The findings were then interpreted through the lens of the broader research objectives, highlighting key considerations for developing the AT Passport. The following chapter will integrate these quantitative insights with the findings of the preceding qualitative phase, providing a comprehensive understanding of the AT landscape and informing the design of the AT Passport as a tool for promoting equitable access and participation.

Chapter 9: Consolidated Outcomes and Interpretations

9.1   Introduction

This chapter amalgamates the results derived from the initial and consequent phases of this explorative sequential mixed-methods investigation. Our primary ambition lies in closely scrutinising the premise of the Assistive Technology Passport, discerning its contribution to ameliorating access to Assistive Technology, identifying its pivotal functionalities along with design attributes, and proposing a schema for its continuous evolution and ubiquitous acceptance. Commensuration of the findings brings forth a more overarching and integrated viewpoint on the AT Passport research, design, and development study. Moreover, this chapter encapsulates a critical discourse of the foremost findings gleaned from this mixed methods investigation.

9.2   Synthesis of Outcomes from Stage 1 and Stage 2

In this study, triangulation methodologies were utilised to blend the findings from both stages(222, 229). This protocol incorporated steps such as pinpointing findings related to the research question from each phase, identifying key categories, discerning similarities and dissimilarities between the phases, and comparing the findings to ascertain the degree of convergence, that is the extent to which the findings were convergent, complementary, silent or dissonant. It also involved developing overarching categories by integrating findings from both phases to offer a more in-depth interpretation of the data. The following sections detail the convergence, complementarity, silence, and dissonance instances this mixed-methods research identifies. The overarching categories, or meta-categories, are discussed towards the end of this chapter.

The triangulation procedure, employed to amalgamate findings from the two phases, entailed(222, 229):

1) Isolating research questions-related findings from each phase and identifying fundamental categories.

2) Discerning commonalities and disparities across the phases,

3) Comparing findings to gauge the level of congruence (i.e., assessing whether the outcomes were matching, complementary, unvoiced, or discordant),

4) Developing comprehensive categories emanating from the collective interpretation of results from both phases provides a more profound understanding of the data.

The upcoming sections present convergence, complementarity, silence, and dissonance observed throughout this mixed-methods study. The comprehensive categories are duly presented in the discussion section towards the end of this chapter.

9.2.1 Convergence of Findings

This research employed a mixed methods approach to examine the potential of Assistive Technology and the factors influencing its implementation and use. Qualitative and quantitative data analysis revealed convergent categories regarding AT's role and the conditions necessary for its successful utilisation while shedding light on significant barriers hindering its adoption.

Both datasets demonstrate AT's capacity to enhance accessibility and inclusion. Qualitative findings consistently positioned AT as a means for individuals to overcome barriers and participate more fully in various life domains. This perspective aligns with quantitative data indicating that individuals are motivated to use AT to enhance capabilities and achieve greater autonomy.

However, the qualitative study strongly emphasised the presence of personal, social, and contextual barriers hindering the seamless adoption of AT. Participants revealed experiences of stigma surrounding AT use, creating a social barrier that discouraged them from fully embracing these tools. Furthermore, the disparity between educators' perceived importance of AT and their actual knowledge underscores the significant impact of educator knowledge on AT adoption, awareness, and use. This gap suggests a societal barrier rooted in inadequate training and resource allocation, hindering educators' ability to promote and support AT utilisation among students effectively.

For instance, quantitative analysis indicated a disconnect between student knowledge of AT and their ability to communicate their needs during educational

transitions effectively. This finding aligns with the qualitative emphasis on contextual barriers, suggesting that support systems and communication channels within the educational setting need strengthening to ensure a smoother transition and continued AT access for students. Furthermore, the lack of correlation between educators' perceived importance of AT and their actual knowledge points to a societal barrier rooted in inadequate training and resource allocation.

Notably, both research strands highlight the influence of "conversion factors" – the personal, social, and environmental elements that mediate the relationship between AT access and meaningful use. Qualitative data provides nuanced insights into the lived experiences of AT users, illustrating how personal anxieties, social stigma, and contextual limitations directly impact their ability to benefit from AT. Meanwhile, quantitative data goes beyond individual experiences to reveal broader trends, demonstrating these conversion factors' prevalence and quantifying their impact on overall AT utilisation patterns. For example, statistically significant differences in perceived levels of AT knowledge among educators across different educational levels (with university educators perceived as more knowledgeable than primary and secondary educators) highlight how contextual factors within the educational environment can create barriers to AT utilisation. Furthermore, the variability in perceptions, as indicated by standard deviation values, underscores the complex interplay of factors influencing AT use.

These findings suggest that adequate AT service provision requires a comprehensive approach that considers individual needs and contextual influences and addresses the identified barriers. Both studies advocate for initiatives that empower users through increased AT awareness, knowledge dissemination, and tailored support mechanisms. Qualitative data simultaneously emphasise the value of user-driven support systems; the quantitative findings underscore the need for individualised support strategies and targeted interventions to address barriers related to AT transitions, their impact on AT knowledge and use, and broader societal barriers.

The proposed AT Passport represents a potential tool for bridging the gap between AT access and meaningful utilisation. By integrating insights from both qualitative and quantitative findings, the AT Passport can be designed to address the

identified "conversion factors" and support individuals in leveraging AT effectively. Moreover, by incorporating strategies to overcome the highlighted personal, social, and contextual barriers, the AT Passport can create a more inclusive and supportive environment for AT adoption and utilisation.

9.2.2   Complementing Findings

This study benefits from the interplay of quantitative and qualitative data, providing a comprehensive understanding of assistive technology use. The quantitative data offers an analytical lens, highlighting the dynamic relationship between demographic factors (age and education level) and AT utilisation. For instance, the data reveals a higher prevalence of AT use among university students than secondary or primary students, suggesting a potential correlation between age, educational stage, and AT adoption. Furthermore, a key observation is the marked difference in AT understanding and perception between participants who have formally documented their AT needs and those who have not.

Complementing this perspective, the qualitative data delves into the lived experiences of individuals interacting with AT. It uncovers the personal meanings and values associated with AT, revealing the challenges faced while accessing these technologies and exploring user perspectives on the proposed AT Passport. This qualitative exploration provides depth to the quantitative findings, shedding light on why certain demographic groups might be inclined to utilise AT.

Both datasets converge on a crucial point: clearly understanding one's AT needs is vital for increasing awareness, shaping positive perceptions, and promoting greater AT accessibility. The quantitative data demonstrates a strong link between documented AT needs and higher levels of AT knowledge and perceived importance. This aligns with qualitative insights, emphasising how a strong understanding of personal AT requirements empowers individuals to advocate for their needs and navigate the path toward acquiring and utilising AT effectively.

However, a nuanced finding emerges from the quantitative data regarding user confidence. While documenting AT needs is linked to increased knowledge, this does not automatically translate into greater confidence in using AT. This

highlights a crucial area for future qualitative research: exploring the factors beyond knowledge contributing to user confidence in AT utilisation.

The quantitative and qualitative data harmonise to provide a holistic understanding of AT use. The quantitative data paints a broad picture of the landscape, while the qualitative data adds nuanced details and personal experiences. Together, they offer a robust foundation for guiding future strategies to augment AT use, including developing and implementing the proposed AT Passport.

9.2.3   Instances of Silences

One of the apparent silences in the quantitative data is the specific linguistic, cultural, or economic barriers that may inhibit AT usage. While the study acknowledges demographic differences, noting, for instance, that most participants were undergraduate students who accessed university through a Disability Access Route, it does not delve into how these factors might be intertwined with AT access and usage. For example, do specific cultural backgrounds view AT use more favourably, or are there economic disparities that limit access to certain technologies for specific groups? Exploring these potential issues in AT adoption is critical in formulating truly inclusive AT policies that address not just the presence of diverse needs but also the systemic factors that might be creating barriers for specific groups.

In addition, the quantitative exploration underscores the utilitarian aspects of AT usage, with limited insight into the socio-emotional factors that may impact AT use. Users' feelings, attitudes, fears, and anxieties related to AT use are not explicitly considered, and this silence may risk oversimplifying the complex socio-emotional dynamics that often play a role in technology adoption and usage.

Similarly, the qualitative data also embodies some silences. While the data provides critical insights into users' experiences and attitudes towards AT, it does not elaborate on the impact of geographical variations on access to and utilisation of AT. This omission fails to capture potential limitations or advantages posed by different geographical areas, including disparities related to infrastructure, connectivity, and proximity to AT service providers. The qualitative findings also

remain silent on the specifics of AT training, which is crucial for bridging the knowledge gap and enhancing acceptance of AT. While the need for greater AT awareness among educators and students is acknowledged, the dataset must expound on how much awareness or training programs could be effectively implemented and the ideal contents of such initiatives. It is important to address these gaps in the data to ensure the development of comprehensive and effective strategies for improving AT utilisation in educational settings.

9.2.4   Periods of Dissonance

Examining the intersection of our quantitative and qualitative findings reveals several key points of divergence that challenge assumptions and offer fertile ground for deeper exploration.

A primary divergence emerges in the understanding of AT Passport perception. While the qualitative data directly probed participants' perceptions based on their prior knowledge of the concept, the quantitative data lacked this explicit inquiry, relying instead on assumed understanding from a research information leaflet. This methodological difference, while explained, presents a valuable opportunity. The quantitative data, uninfluenced by prior exposure, might reveal more fundamental perceptions and needs related to the AT Passport concept, potentially highlighting the necessity of such a tool in a way that the qualitative data cannot.

Another divergence arises when examining the role of educators. The quantitative data suggests a potential gap between the prevalence of AT usage in educational settings and the uneven distribution of AT knowledge among educators, raising concerns about their capacity to support students' AT needs. Conversely, the qualitative data does not capture the educators' role, focusing primarily on individual experiences. This absence hinders a comprehensive understanding of how educators can contribute to and potentially hinder AT accessibility and usage.

Finally, a potential divergence exists concerning AT usage across different educational stages. The quantitative data suggests a possible disparity in AT usage, with a higher prevalence in tertiary education compared to primary education. However, this observation is not mirrored in the qualitative data, which lacks direct discussion about AT usage across educational levels. This lack of alignment

could obscure a nuanced understanding of how AT usage evolves throughout an individual's educational journey.

Instead of viewing these divergences as flaws, we can embrace them as catalysts for generating creative insights. Perhaps the increased awareness highlighted by the quantitative data lays the groundwork for building confidence. However, other factors, such as practical training or peer support, are essential for users to feel truly empowered in their AT utilisation. These points of divergence invite us to investigate these additional factors and consider how they can be integrated into interventions promoting AT usage.

9.3   Discussion of Findings

By combining quantitative and qualitative findings from this sequential, mixed-methods study, we highlight how Assistive Technology significantly improves experiences in education, communication, and employment. This is especially important given the diverse group of users represented in this research and aligns with insights gathered from participant experiences and existing literature. AT offers its users an expanded arena of engaging abilities, opening doors to improved quality of life(7, 254, 255, 257). Nevertheless, the realisation of AT's potential is not without challenges that need addressing. Chief among these include the variations in users' knowledge and perception of AT — influenced by an interplay of personal experiences and environmental factors, as well as the disparities in educators' AT knowledge in different educational settings. These barriers seriously impede AT technologies' effective usage and leverage (261-263). The research affirms that recognising and documenting AT needs fundamentally enhances participants' understanding and attitude towards AT, consequently optimising their experience of AT usage. However, it also draws attention to the fact that the mere act of documenting AT needs does not unequivocally result in increased user confidence, illuminating a need for further initiatives beyond the act of recording needs, which include strategies such as the provision of user training and comprehensive informational resources on AT(59, 290).

Furthermore, this study's findings underscore a broader social framework of barriers to AT accessibility, necessitating a deeper understanding of the broader

social, policy, and systemic contexts(19, 21, 23, 151, 291). In addressing these barriers, a multi-sectoral approach that brings stakeholders from across sectors to work collaboratively towards improving accessibility is strongly recommended(4, 21, 23, 24). This approach would underscore the urgency of achieving individual agency in accessing and using AT, set against systemic requirements for such access. Accounting for socioeconomic, cultural, and systemic barriers alongside personal challenges will provide a comprehensive approach to overcoming obstacles to AT access, offering a valuable tool that guarantees enhanced user experiences, better accessibility, and wider acceptance of AT(81, 264, 265).

Given the multi-dimensional parameters, the design approach for the AT Passport should concentrate on addressing these challenges. This can be achieved by incorporating strategies that boost AT awareness, ensuring the recording of AT needs is effectively communicated to enhance people's sense of agency. Specifically, implementing detailed recording mechanisms in the AT Passport could play a pivotal role in enhancing users' comprehension of their needs and outlining efficient strategies to address them. This could considerably elevate the individual's well-being. Besides, incorporating the principles of human diversity and systems thinking into the AT Passport's development is paramount(3, 4, 292).

Recognising and incorporating human diversity will ensure that the AT Passport is designed to cater to a broad range of needs and uses. On the other hand, systems thinking will facilitate a holistic understanding of the multifaceted interactions between users and AT within a larger context(23). This will guide the development of the AT Passport, improve access to AT, and enhance its usability and acceptance among users.

In continuation of these exploratory findings, a Delphi study is recommended. This structured method, designed to systematically solicit expert opinion to achieve a consensus on a specific topic, could contribute significantly to honing the AT Passport concept. Expert input from such a study could shed light on key functionalities, design priorities, and crucial security aspects of the AT Passport. Notably, the study could also guide the smooth integration of the AT Passport into users' lives, ensuring that this tool effectively enhances the accessibility and usability of AT

9.4 Conclusion and Recommendations

In conclusion, this study underscores that Assistive Technology is pivotal in empowering individuals to engage in societal, economic, cultural, and political pursuits. However, challenges exist which impede its effective utilisation. To address these obstacles, the study recommends:

1. Implementing a multi-sectoral approach involving collaboration from stakeholders across sectors to improve AT accessibility.
2. Incorporating strategies into the AT Passport design to increase AT awareness and ensure improved access to Assistive Technology
3. Incorporate principles of human diversity and systems thinking into the development of the AT Passport to accommodate various needs and facilitate an understanding of the complex interactions between users and AT.

Given these findings, a Delphi study is suggested to obtain expert opinions that could refine the AT Passport concept and guide its seamless integration into users' lives, thus improving AT's accessibility and usability.

9.5 Chapter Summary

This chapter synthesises quantitative and qualitative findings from the initial phases of this research, exploring the potential of the Assistive Technology Passport to enhance assistive technology access. By analysing participant experiences, the chapter identifies key barriers and facilitators to access, underscoring the need for design improvements. Essential functionalities and design attributes are outlined, leading to a proposed schema for the continuous development and widespread implementation of the AT Passport.

Importantly, data for a Delphi study, discussed in Chapter 10, was collected concurrently with the quantitative data. Findings from all research components, including this Delphi study, will be integrated to develop a comprehensive AT Passport framework in Chapter 11.

Chapter 10:   The Delphi Study

10.1 Introduction

This chapter details the methodology and findings of a research study employing a modified Delphi method. The study utilised a structured questionnaire to gather data, driven by insights gleaned from a comprehensive literature review (chapter 3) and an exploratory qualitative study (Chapters 5 & 6). The chapter outlines the study's purpose, rationale, design, and results, providing a comprehensive overview of the research process and its key outcomes.

The Delphi study aims to gain consensus on a core set of AT Passport functionalities and design features from a convenience sample of expert participants chosen because of their experience accessing and using AT. The chapter introduces the Delphi method and the reasons for its adoption in this research study, as well as specific objectives, processes, results, and implications for refining the concept of the AT Passport.

10.2 The Delphi Method

The Delphi method has generated popularity in collecting data and developing consensus among experts with knowledge and experience on a particular subject matter(215, 293). This Delphi technique elicits reliable agreement from an expert group through an iterative series of questionnaires interspersed with controlled participant feedback(215, 219). The Delphi method, based on the philosophical thinking of John Dewey, is described as the pragmatic approach best suited to informing real-world problems and facilitating decision-making(294) The technique initially developed by the Rand Corporation in the 1950s by Dalkey and Helmer utilises structured anonymous interactions between research participants and experts on the topic of interest to arrive at a consensus to support decision-making, policy and practice directions(295). One could argue that focus group discussion also facilitates interactions between participants; however, the comparison of outcomes of Delphi and focus groups can be different. Delphi offers an opportunity for a structured consensus to solve specific problems. In contrast, the focus group discussion provides an in-depth insight into a problem and identifies issues of relevance(221). Additionally, compared to a focus group, the

Delphi method balances the power dynamics and the influence of dominant participants in the consensus-building process.

A review of the literature suggests that Delphi is a standard consensus-building method and the most appropriate technique; therefore, this study to refine the functionalities and design features of the AT Passport(221, 296, 297).

10.3 Delphi Process

The traditional Delphi process follows some core steps. Its characteristics include ensuring participant anonymity and eliciting participant feedback at every round. The researcher controls the process by presenting feedback and soliciting further participants' modification or affirmation of views(296, 298). Delphi studies are completed in rounds; however, there is no agreement on the number of rounds required to reach a consensus, with variabilities reported in several studies with a majority ranging between 2 and 5 rounds(215, 221, 298). Two rounds are reported to be sufficient, especially if the expert forms a homogenous group(298)**.** Nevertheless, increasing the number of rounds has been associated with a decreased response rate(299, 300)**.** Consensus generation is, however, dependent on the purpose of the research(298, 300).

10.4 Purpose and Rationale of Delphi

I selected the Delphi method to help build a consensus on the core AT Passport functionalities and design features for several reasons. Firstly, Delphi's pragmatic foundations in its design offer this study a structured way of deriving agreements among the expert AT users in establishing the most critical components of an AT Passport. Secondly, the Delphi studies' anonymity ensures all participants' views and opinions are equally valuable, offering an opportunity for a credible consensus-building process, eliminating decisions based on, for instance, the perspective of a dominant participant. Thirdly, considering this study was completed at the height of the Covid-19 pandemic and government-imposed restrictions, the Delphi method provided an opportunity to use an online survey, which is more convenient, timesaving, ideal for geographically dispersed participants and adapts well to society's contextual realities at the time. Finally, the findings from the literature review and the qualitative phase of this research's

exploratory sequential mixed method approach provide a framework to seek specific decisions which the Delphi method could uniquely support.

The purpose of the Delphi was, therefore, to,

- To identify what an AT Passport would allow people to do (its main functionalities).

- To identify the features necessary to make the AT Passport work regarding:

  o What are its vital usability and performance features?

  o What are the broader systems requirements necessary for it to work?

  o How it would be designed to withstand the pace of technological and systemic changes.

- To identify the critical security and privacy considerations when designing the AT Passport

10.5 Designing a Delphi Study

Delphi study has been gaining popularity in recent years; however, there needs to be more methodological agreement on the core elements that constitute a Delphi(297). To ensure this study provides adequate instruction and rigour in implementing Delphi, I referenced a reporting standard for Conducting and Reporting Delphi Studies, CREDES(301). CREDES guidelines were proposed following a systematic literature review to appraise the quality and reliability of the recommendations from a Delphi study(221) CREDES guidelines recommend that Delphi studies have the following characteristics;

Define the purpose and rationale of Delphi.

- Information input for participants before the study.

- Expert panel selection

- Choice of questionnaire: Unstructured (classical) or structured (modified) first round.

- Definition of consensus and non-consensus

- The process of proceeding from round to round is a clear and transparent guideline.

- Procedure. The flow chart illustrates the Delphi process stages (see Figure 8 for this study), including a preparatory phase, the actual 'Delphi rounds', interim data processing and analysis, and concluding steps.

- Development of materials/instruments (platform/layout/questions).

- Strategy to improve response rate.

10.5.1 Participants Invitation

Participants of the initial quantitative survey, all of whom were Assistive Technology users, were invited to participate in a Delphi study. Recognising their valuable firsthand experience with AT, aligning with the emphasis on user engagement throughout this research, these participants were invited as experts for the Delphi study. Only those who consented to further participation received a link to the Delphi questionnaires. Before the Delphi study, potential participants received an informational brief detailing the study's focus, rationale, background information, and the AT Passport. This brief also clarified that participation in the Delphi study would remain anonymous. The sole selection criterion for the Delphi study classified participants as 'experts' based on their hands-on experience as AT users(221).
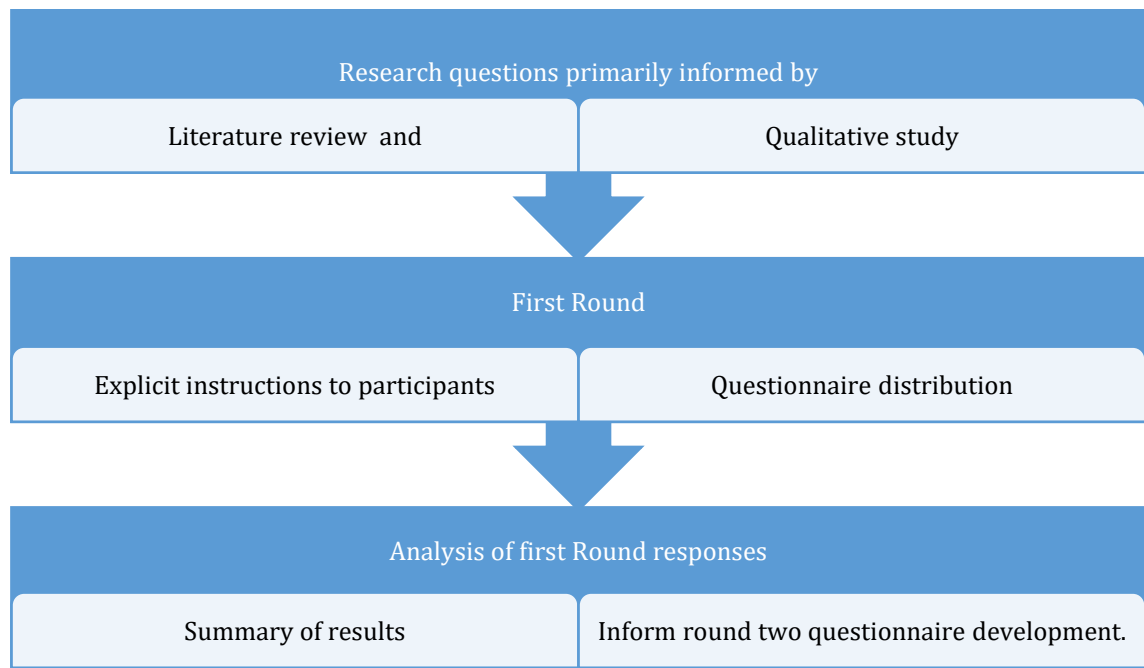
Figure 8: Delphi Process Stages

10.5.2 Expert Panel Selection

Panel selection is a significant process in Delphi research to ensure expert opinions are captured(298). A panellist should have knowledge and experience of the subject matter, be willing to participate, and be prepared to offer appropriate time to the study(300). There is variability in the literature on the sufficient number of experts required in every round of Delphi; nevertheless, a minimum of 8-12 respondents have been mentioned as sufficient to elicit consensus, while more extensive sample sizes are associated with variability in the validity of the findings(302-304). Reaching an agreement is the main factor in determining Delphi sample sizes compared to their statistical power(304, 305).

The Gatekeeper, a member of the Disability Support Office staff, had access to a registry containing the email addresses of potential participants, all of whom were AT users attending the university. They shared a link to an accessible electronic version of the study information sheet (Appendix A4), along with a link to an anonymous survey questionnaire for round 1 (Appendix D2) and round two (Appendix D3), which included a consent form (Appendix A4; round 1 and, A5; round 2). To guarantee participant anonymity, I could not access any contact information, including email addresses.

The potential panellists were identified from a rich selection of participants emerging from a diverse section of student AT users. Moreover, this pool of participants was expected to have some experience receiving services from early childhood through education or other health and social care service providers where relevant, thus offering an expert lived experience. Additionally, considering the access route to the university that the potential participants may have used, there would be an opportunity to survey a wide range of ages and diverse population groups, enhancing the richness of the collected data.

10.5.3 First-Round Questionnaire: A Modified Structured Approach

This Delphi study represents a phase within a broader PhD research project, building upon insights gained from a literature review and qualitative research. Given the study's objective to achieve consensus on the core functionalities and design features of the AT Passport, a structured, modified first-round Delphi was deemed most appropriate. This approach was chosen because the preceding research phases had already provided a preliminary understanding of the AT Passport concept.

While a classic Delphi study often begins with an unstructured, exploratory round, this study bypassed that stage due to the existing knowledge base. Instead, the first round employed a structured questionnaire with 24 statements across three domains: functionalities, design features, and security and privacy. Participants ranked these statements using a 5-point Likert scale (1-Desirable to 5-Absolutely Necessary) and had the option to select "0-Disagree" for any statement. This additional option allowed for greater nuance in participant responses. Free-text response sections were included after each domain to capture additional insights and explanations.

The decision to utilise a structured approach in the first round streamlined the Delphi process and facilitated a more focused exploration of key themes related to the AT Passport. This approach proved effective, as evidenced by the reduced number of rounds required to reach consensus.

10.5.4 Establishing Consensus: Threshold and Rationale

Defining consensus is crucial for a robust Delphi study. While literature suggests various methods like percentage agreement, measures of central tendency (primarily the median), or a combination, using aggregate percentage to determine agreement is a well-established practice in Delphi research(306). The use of aggregate percentage in identifying agreement has appropriately been used in previous Delphi studies(297, 304, 307). Although the specific percentage threshold for consensus varies across studies, a 60% or higher threshold is frequently employed(306). This study adopts a more stringent approach, defining consensus as an aggregate percentage score of 80% or higher. This higher threshold aims to ensure a strong level of agreement among experts regarding the AT Passport's core functionalities and design features.

10.5.5 Processing Results Between Rounds

Data collected via Microsoft Forms was exported to Microsoft Excel for analysis. Results were calculated as aggregate percentages for each statement within each domain. Items achieving the a priori consensus threshold of 80% agreement were considered finalised. All remaining items, failing to reach the 80% threshold, were reintroduced in the second round for panellist review and rescoring. Items again failing to reach consensus in the second round were subsequently excluded from further consideration.

Qualitative data gathered from the open-ended responses in round one underwent thematic analysis. Unique themes not already represented by existing statements were then translated into quantitative statements and included in the second round for scoring. The decision to proceed to a potential third round, incorporating these new statements, hinged upon whether they achieved consensus in round two.

10.5.6 Strategy to Improve Response Rate

Considering this study was targeting students at the height of the COVID-19 pandemic and restrictions, activities to improve the rate of responses to the survey started when the gatekeeper distributed the first email soliciting a panellist. Upon discussion with my supervisor, we were aware of multiple email surveys targeting

students since COVID-19 was discovered, seeking students' opinions on various issues. Based on this factor and due to the iterative nature of the Delphi study and the need to maintain a steady pool of motivated participants, an incentive to participate and continue participation was offered. This incentive is a financial donation to MAP if more than 200 participants sign up for the study. This information is contained in the participant's information sheet (Appendix A2).

Additional strategies to improve the response rate included a clear explanation of the purpose of the study through the information sheets before the study commenced and prompting through email reminders from the gatekeeper a week before or after the commencement of the study (Appendix E3). However, the second round's response rate was highly inhibited because it coincided with the student's academic calendar exam period. Respond rates in Delphi studies are nevertheless reported to be very low due to the repetitiveness and time commitments required to complete.

10.6 Ethics

The Maynooth University Research Ethics Committee granted ethical approval for this study (Appendix B2). At the beginning of the process, informed consent was sought from all participants to take part in the online survey. The data collection was anonymous, and neither the researcher nor the research supervisor could access identifiable information from the participants.

10.7 Analysis and Results

In this study, descriptive statistics were sufficient to identify consensus from the participants. Considering that the data was collected anonymously and that the sample population is university students across all levels of studies responding anonymously to the survey, no demographic information was collected due to the risk of identifiable information. I analysed the responses to the Delphi statements on   Microsoft Excel from data collected and downloaded from Microsoft Forms. All quantitative data were descriptively analysed to derive each statement's average aggregate percentage score. I analysed the qualitative data from the Delphi study's open-ended questions using a content analysis approach focused on identifying new insights(308). To ensure the analysis prioritised novel concepts, I removed

comments similar to statements from the original survey. New comments highlighted by at least one participant were included in round 2 of the study to seek consensus from the panel. Emerging categories were then triangulated with my supervisor to ensure they represented perspectives not already captured in the initial Delphi questions. This process resulted in the addition of three new statements to the Delphi study for Round 2: "The choice to use or not use a passport," "Facilitate access to AT supports," and "AT passport, not a condition to service provision." Notably, the two statements regarding "Source of information on AT" and "Records of Users AT journey" transitioned from a "no" consensus in Round 1 to a "yes" consensus in Round 2, highlighting the evolving understanding of essential AT Passport components.

I derived consensus in this study by analysing the responses to identify the aggregate percentage score for all statements in each domain. For each round, agreement was reached if the response rate was equal to or higher than the 80% aggregate score. All statements that reached the consensus threshold in Round 1 were highlighted to participants during Round 2 surveys. All items not meeting the agreement threshold were returned for the participants to review and re-score. All additional items from the qualitative analysis were included as survey statements in round two, and aggregate percentage scores were derived. The Likert scales 1 to 5 (level of necessity) were converted to percentage scores in the analysis process. A score of '0' (equivalent to 'Disagree') was not rated. It was excluded from the aggregate group scores to ensure that only respondents who felt the statement was a necessary AT passport functionality or design feature were included. The consensus stability was considered reached if the percentages of 'Disagree' in each statement response varied by ≤10%.

I analysed each statement's average aggregated percentage rating across the specified domains for round 1 and 2 surveys. These findings are presented in Table 22.

Table 22: Delphi Study Results

Domain	Statement of Domain	Round One Score Yes' Consensus or No' consensus	Round Two Scores Yes' Consensus or No' consensus
AT Functionalities (what it will allow people to do)	Facilitates transitions	87%, =YES	N/A
	Enables effective communication	84% = YES	N/A
	Source of information on AT	79% = NO	80%= YES
	Records of Users AT journey	71 % = NO	80%= YES
	Collects aggregate User Data	71 % = NO	76% = NO
	AT Networking platform	65% = NO	69% = NO
	The choice to use or not use a passport	New statement from round I review of open-ended questions	97% =YES
	Facilitate access to AT supports	New statement from round I review of open-ended questions	82%= YES
AT Passport Design Consideration (Features necessary to make the AT Passport work)	Be simple and easy to use	94% = YES	-
	Ensure effective communication	91% =YES	N/A
	Ensure user experience is at the core of design and function	90% =YES	N/A
	Conform to web accessibility standards	89% = YES	N/A
	Ensure user-controlled access	88% =YES	N/A
	Be dynamic and flexible	85% =YES	N/A
	Be digitally accessible: browser and app	84% =YES	N/A
	Have interoperability (interfaces smoothly with existing systems)	83%= YES	N/A
	The user has a unique identifier.	75% = YES	78% =NO

	Machine learning and AI potential	71% = YES	70% = NO
	Connections to a digital system for analysis of aggregated data.	70%	68% =NO
	AT passport, not a condition to service provision	New statement from round I review of open-ended questions	88% =YES
AT Passport Security and Privacy Considerations	Additional security to third-party access	88% =YES	N/A
	GDPR compliant	88% =YES	N/A
	Maintains confidentiality	95% =YES	N/A
	Secure and reliable platform.	95% =YES	N/A
	Secure storage of identifiable information	92%= YES	N/A
	User authentication for access	88% =YES	N/A
	Data verification	82% = YES	N/A
	User controlled access	94% =YES	N/A
	Additional security to third-party access	88% =YES	N/A
	GDPR compliant	88% =YES	N/A
	Maintains confidentiality	95% =YES	N/A
	Secure and reliable platform.	95% =YES	N/A

10.7.1 Panel Participation

The Delphi study experienced a significant drop in participation between rounds. While 37 participants completed the first round, only 12 participated in the second round, representing a 68% attrition rate. This far exceeds the acceptable 15% rate suggested in the literature and constitutes a limitation of this study [342]. Despite sending an average of two reminder emails per round, the response rate did not improve, particularly for the second round.

10.7.2 Statement Output

The Delphi study began with 24 statements, categorised into three domains: AT Passport Functionality (6 statements), AT Passport Design Features (10 statements), and AT Passport Security and Privacy Characteristics (8 statements).

These statements were derived from the literature review and qualitative study findings.

Following the analysis of round one's qualitative data, three additional statements (two related to functionality and one to design) were added, bringing the total number of statements seeking consensus to 27.

Figure 9 illustrates the consensus-building process, culminating in a final agreement after round two. This agreement resulted in 22 items being included in the AT Passport concept and five items being excluded. The 22 items included in the AT Passport concept represent an average agreement of 81% among all surveyed items.

Start

24 Statements from literature review and Qualitative study
•6 *AT Passport Functionality Statements*
•*10 AT Passport design Statements*
•*8 AT Passport security and privacy Statements*

Round 1

24 statements
•17 Consensus
•7 No consensus
•3 Statements identified by Panel *(2 Functionality and 1 design)*

Round 2

10 Statements *(7 non consensus items from round 1 and three additional)*
•**5 Consensus**
•*3 from panel and*
•*2 from non consensus items in round one.*
•**5 No consensus**

End

27 Statements surveyed
•**22** Consensus for inclusion to AT Passport concept *(17 from round one and five from round 2)*
•**5** Non-Consensus for exclusion from AT Passport concept

Figure 9: Delphi Study Consensus Process Flowchart

10.7.3 Consensus Levels Across Delphi Rounds

This section analyses the level of agreement achieved for each statement across the two rounds of the Delphi study.

10.7.3.1 Round One Consensus

The initial round of the Delphi study yielded an average agreement of 84% per item across all three domains. Notably, the security and privacy domain demonstrated the highest level of consensus, with a 90% average agreement and unanimous agreement (100%) on all its statements. The design and functionality domains achieved average agreement percentages of 84% and 76%, respectively. Statements reaching consensus in the first round had an average agreement of 89%, while non-consensus statements had an average agreement of 72%.

Round one of the Delphi study demonstrated a high overall consensus, particularly in security and privacy. This suggests strong agreement among experts on the importance of these features in the AT Passport concept.

10.7.3.2 Round Two Consensus

The second round observed a slight decrease in average agreement, reaching 79% per statement. Items achieving consensus in this round had an average agreement of 85%, while non-consensus items considered for *exclusion* from the AT Passport concept had an average agreement of 72%.

While overall agreement dipped slightly in round two, consensus remained high for items retained in the AT Passport concept. This finding further reinforces the core features deemed essential for the AT Passport's functionality and value.

10.8 Discussion

This study investigated key functionalities, design considerations, and security/privacy factors essential for a successful Assistive Technology Passport. Recognising the project's timeframe and building upon the robust foundation laid by preceding research phases, a modified two-round Delphi method was employed(293, 309). While acknowledging that a traditional multi-round approach might yield a more robust consensus, this decision reflects a pragmatic approach,

balancing ideal solutions with real-world constraints inherent in Assistive Technology development(23, 28, 310).

With its capacity for systematic data collection and consensus building among experts, the Delphi method is particularly well-suited for this research. The Delphi method's iterative nature allows for an agreed understanding to emerge through rounds of controlled feedback, fostering expert collaboration(215, 293). This approach ensures that the final recommendations, specifically the features of the AT Passport, are comprehensive and grounded in expert consensus. Furthermore, the method's foundation in pragmatic philosophy, which emphasises addressing real-world problems and informing decision-making, aligns perfectly with the study's goal of creating a practical and impactful resource(294, 311). While alternative methods like focus group discussions offer valuable insights, the Delphi method's structured approach, coupled with the anonymity it affords participants, mitigates the risk of dominant voices overshadowing valuable perspectives, ensuring a more balanced and representative consensus. This is particularly crucial when addressing complex issues like AT Passport development, which demands specific, actionable solutions.

A key strength of this study lies in its engagement of AT users as active participants, ensuring their lived experiences shaped the findings(312). The study highlighted that a successful AT Passport should facilitate seamless transitions between life stages and service providers, echoing the ICF's focus on addressing environmental and systemic barriers (61) . It should empower users by centralising AT information, aligning with principles of autonomy and self-determination(313).

The AT Passport should track user journeys for personalised support and informed decision-making(9, 48). A user-friendly design, accessible to individuals regardless of technical proficiency, is crucial, reflecting universal design principles(314, 315). Recognising that needs and technologies evolve, the AT Passport must be dynamic and flexible, adapting to the changing landscape of AT and individual user journeys(2, 50, 52, 152, 316). The study emphasised the importance of data security and privacy, advocating for robust measures to safeguard sensitive user information. This reflects the ethical imperative to protect the rights and dignity of

AT users. It aligns with the broader ethical discourse surrounding technology and disability, emphasising the need for responsible innovation that empowers users without compromising their fundamental rights(12, 317-319).

While this study offers valuable insights into the desired features of an Assistive Technology Passport, it is essential to acknowledge its limitations. Even with incentives, the high dropout rate between study stages suggests potential barriers to study design or participant burden. This limitation highlights the need for future research to prioritise understanding and mitigating attrition in similar studies. Additionally, while knowledgeable about Assistive Technology, the participant group represents a homogenous sample from a single institution. This lack of diversity in backgrounds and experiences might limit the generalizability of findings to the broader and diverse AT user community. Future research should prioritise recruiting a more heterogeneous participant group with varying disabilities, ages, and cultural backgrounds to ensure the development of a truly inclusive AT Passport that effectively caters to a broader range of needs.

10.9 Conclusion

The Delphi study explores the Assistive Technology Passport's critical functionalities, design considerations, and security or privacy factors. This was achieved through structured questionnaires, iterative feedback, and a consensus from respondents on 22 key points.

The study highlighted the potential of an Assistive Technology Passport to empower individuals who use Assistive Technology. By prioritising user-centred design, data security, and adaptability, the AT Passport aims to break down barriers and foster a more inclusive and accessible world. The Delphi method, emphasising expert consensus and real-world problem-solving, proved invaluable in identifying the key functionalities, design considerations, and security/privacy factors crucial for a successful AT Passport.

These insights will be pivotal in the next chapter for establishing a framework for the AT Passport. Key features agreed upon encompass:

- **Functionalities:** The AT Passport should facilitate transitions and effective communication, provide AT information, track the user's AT journey, and streamline access to AT support.

- **Design:** It should be user-friendly and ensure that user experience is central. It should also be dynamic, flexible, digitally accessible, and interoperable with existing systems.

- **Security and Privacy:** The AT Passport should be GDPR compliant, guarantee confidentiality, provide secure storage, require user authentication, and maintain extra safeguards for third-party access.

However, it is crucial to acknowledge the study's limitations. The high dropout rate and homogenous participant group highlight the need for future research to prioritise participant retention and recruit a more diverse sample. This will ensure the development of a truly inclusive AT Passport that effectively caters to the diverse needs of individuals with disabilities.

10.10 Chapter Summary

This chapter utilises a modified Delphi method, engaging AT users in defining the core features and functionalities of the Assistive Technology Passport. The study achieved robust consensus on several critical aspects, including facilitating seamless transitions between life stages and service providers; providing a centralised hub for comprehensive AT information; tracking user journeys to inform personalised support; prioritising user-friendly design; ensuring adaptability to evolving AT landscapes; and upholding stringent data security and privacy measures. These insights lay a foundation for developing an empowering and inclusive AT Passport, which will be further detailed in the subsequent chapter. Chapter 11 will then integrate findings from all research components, including this Delphi study, to present a comprehensive AT Passport framework.

Chapter 11: Proposed Framework for Design and Development of AT Passport

11.1 Introduction

This chapter encapsulates the culmination of my PhD research. This study segment addresses the primary objective: to devise a structured framework promoting an Assistive Technology Passport's progression and broad adoption. This systemic framework incorporates critical functionalities and design features previously established through explorative sequential mixed-method and Delphi studies. It is crafted to underpin the successful, more comprehensive application and development of the AT Passport, addressing the distinctive needs of people with disabilities. The subsequent sections provide a detailed exploration of this framework. It elucidates how it integrates the AT Passport's functionalities and design features, which were identified in prior studies and prepared for practical application and aims to enhance users' fundamental experiences.

11.2 Overview of the AT Passport System

The AT Passport is a concept that refers to a personalised and comprehensive record or tool that documents an individual's Assistive Technology needs and usage history. It promotes interaction between the AT user and various support systems, facilitating better service delivery. The AT Passport also aids in tracing an individual's AT journey, thus supporting effective management of their AT needs. It includes essential information like the user's unique requirements, preferences, abilities, current AT devices, and previous experiences with AT. By fostering communication and collaboration among users, healthcare providers, and relevant stakeholders, the AT Passport aims to enhance AT access and usability.

The AT Passport is envisaged as a crucial tool in addressing the identified gap in effective Assistive Technology access among those with disabilities and older persons. This conclusion is based on several research steps: Firstly, our comprehensive literature review demonstrated that personalised, user-centred tools such as the 'passport' model improve service provision in multiple sectors,

suggesting potential benefits for AT access. Next, our mixed-methods analysis highlighted the demand and suitability of an AT Passport for our target demographics. Participants identified personalised documentation of AT needs and history as a significant factor that could enhance their access to AT. By promoting individual customisation, allowing care continuity, and facilitating focused conversations between users and service providers, the AT Passport could alleviate many difficulties participants reported accessing AT. Using Delphi methodologies, we have also identified key features for any effective AT Passport, including user-friendly design, real-time updating, and comprehensive data recording. All these design aspects directly target user needs, further suggesting that a well-implemented AT Passport could improve AT access. Thus, drawing from these research steps, it stands evident that the AT Passport offers a targeted solution to improving AT access for individuals with disabilities. By providing a personalised, comprehensive, and user-friendly tool, implementing the AT Passport could notably ease many of the difficulties users currently face when accessing and utilising AT.

11.3 Key Characteristics of the AT Passport

The characteristics of the AT Passport, as explored in the Delphi study, literature review, and mixed-methods study, make it an effective tool for enhancing access to Assistive Technology.

The results of the Delphi consensus advocate for the AT Passport as an essential tool which enhances efficient transitions and communication for users of Assistive Technology. It documents the individual AT journey by serving as a comprehensive repository of AT-related information and facilitates effective access to necessary supports. The design of the AT Passport emphasises intuitive and simple usage coupled with dynamism to fit various contexts. User-controlled access is integral to the design, optimising privacy. Moreover, the passport's interoperability allows it to interface seamlessly with existing systems. It is crucial, however, that the decision to utilise an AT Passport is solely the user's choice, and access to services should not hinge on its possession.

11.3.1 Key AT Passport Functionalities

In this instance, we draw upon the principles of inclusive design. This approach utilises the diverse spectrum of human experiences and perspectives as a resource. This aids in developing products, services, and environments that align with and cater to individuals from different backgrounds and abilities(77).

According to the Delphi consensus items, the principles of inclusive design factor into the functionalities of the AT Passport in the following ways:

1. **Facilitating transitions:** Applying the principle of flexibility and efficiency encompasses the capacity for the AT Passport to adjust and modify over time, mirroring the evolving needs and circumstances of the user. Thus, it efficiently mediates transitions, navigating changes in health status, environment, or technology preferences with finesse.

2. **Enables effective communication:** The AT Passport can ensure clear and comprehensible information delivery by adopting the perceptible information and inclusive communication principle. Consequently, this bolsters the communication dynamics between users and service providers.

3. **Source of Information on AT:** The AT Passport, illuminated by the principle of diversity and uniqueness, becomes a reservoir of information on an array of assistive technologies, reflecting and respecting users' heterogeneous needs and preferences.

4. **Records of Users' AT journey:** Drawing from the principle of 'tolerance for error', the AT Passport maintains an exhaustive account of users' AT journey. This preservation of history aids in circumventing errors or miscommunications, vastly enhancing the personalisation and relevance of AT intervention strategies over time.

5. **Facilitate access to AT supports:** The principle of 'equitable use' underpins the core of this function. According to inclusive design doctrines, the AT Passport must be free of access barriers, thus empowering users of any ability, context, or technological literacy to reach necessary AT support quickly and conveniently.

11.3.2 Design Features for Effective Implementation:

According to the Delphi consensus items, the principles of inclusive design factor into AT Passport's design features in the following ways:

1. Simplicity and Ease of Use: The principle of 'equitable use', key to inclusive design, guides the AT Passport design to emphasise simplicity, thereby reducing complexities and promoting ease of use for all users, regardless of their technological literacy.

2. Effective Communication: The AT Passport ensures clear and concise communication under the guiding banner of 'perceptible information', another significant principle of inclusive design.

3. User Experience at Core: The AT Passport prioritises individual user experience in its function and design, aligning with the inclusive design principle of 'flexibility in use', which tailors design to meet unique user needs.

4. Web Accessibility Standards: With 'simple and intuitive use' as a guiding principle, the AT Passport conforms to web accessibility standards, ensuring straightforward and predictable user interactions.

5. User-Controlled Access: Respecting user autonomy and personal preferences, the inclusive design principle of 'equitable use' ensures that the AT Passport provides users with control and access to their information.

6. Dynamic and Flexible Design: The 'flexibility in use' principle of inclusive design ensures that the AT Passport is dynamic and adaptable to users' diverse and evolving needs.

7. Digital Accessibility: The AT Passport, based on the principle of 'all-size fit use,' offers digital accessibility across various platforms, including browsers and applications.

8. Interoperability: In line with the inclusive design principle of 'tolerance for error', the AT Passport seamlessly interfaces with existing systems, enhancing user experience by minimising system conflicts.

9. User Discretion in Usage: Respecting individual decisions and autonomy, the inclusive design principle of 'choice of use' ensures that using the AT Passport remains discretionary to the user.

10. Non-Mandatory for Service Provision: The AT Passport aligns with the 'equitable use' principle of inclusive design by not mandating access to services and promoting impartial access to all users.

11.3.3 Security and Privacy Considerations:

The AT Passport prioritises security and privacy in its design, ensuring user trust and data protection. This commitment is evident in four key areas:

1. **Preventing Unauthorized Access:** The AT Passport implements additional security layers to prevent unauthorised third-party access, adhering to the inclusive design principle of 'tolerance for error' to anticipate and mitigate potential vulnerabilities.

2. **Complying with GDPR:** The AT Passport ensures GDPR compliance under the 'all size fit use' principle, providing robust protection for users' private information regardless of the scale of data being handled.

3. **Maintaining User Confidentiality:** Guided by the 'simple and intuitive use' principle, the AT Passport prioritises confidentiality by restricting unauthorized information sharing. This user-centric approach ensures that data remains secure and accessible only to authorised individuals.

4. **Providing a Secure and Reliable Platform:** The AT Passport guarantees its users a secure and reliable platform by adhering to the' tolerance for error' principle. This commitment to robustness ensures that the platform remains stable and dependable, even in unexpected issues.

Inclusive design provides a robust framework for developing the AT Passport. The core principles of 'equitable use', 'perceptible information', 'flexibility in use', 'simple and intuitive use', 'tolerance for error', and 'all size fit use', when applied collectively, serve to enhance the AT Passport's usability, accessibility, and user satisfaction. They ensure that the AT Passport is intuitive, user-friendly, secure, and comprehensive, making it an effective tool for individuals to manage their Assistive Technology needs.

11.4 Assistive Technology Passport Conceptual Framework

The Assistive Technology Passport framework has been strategically designed to enhance access to Assistive Technology for those with unique abilities and distinct challenges. It places the individual, or the person with needs, at its epicentre and further explores the interrelationship between personal, contextual barriers and the solution provided by the AT Passport.

Beginning with the individual's specific needs and personal contextual barriers, the framework acknowledges limited awareness, insufficient training, and socioeconomic factors as potential hindrances to appropriate AT access. However, it counters these with an innovative solution- the AT Passport, designed to abide by inclusive and universal principles. The AT Passport seeks to alleviate the impact of these barriers, providing a reliable and effective tool for the individual to navigate their AT access. Security is an essential consideration within the framework, and robust measures are in place to handle sensitive data, thus bolstering an individual's trust and confidence in the system. Theoretical concepts such as human rights and capability also enrich this framework, guiding the AT Passport's design and implementation to respect individual rights and utilise AT as a conduit to unlock potential.

Acknowledging the complexity of the individual and system dynamics, the framework adheres to system thinking principles and inclusive design, ensuring the AT Passport's adaptability amidst changing circumstances. In essence, this framework highlights the centrality of the individual user in determining AT needs and access while simultaneously addressing potential barriers and endorsing innovative and reliable solutions such as the AT Passport. In summary, the AT Passport framework recognises the individual at the centre, using the flexible AT Passport to address both personal and system-wide needs effectively. This leads to better individual control and improved access to Assistive Technology.
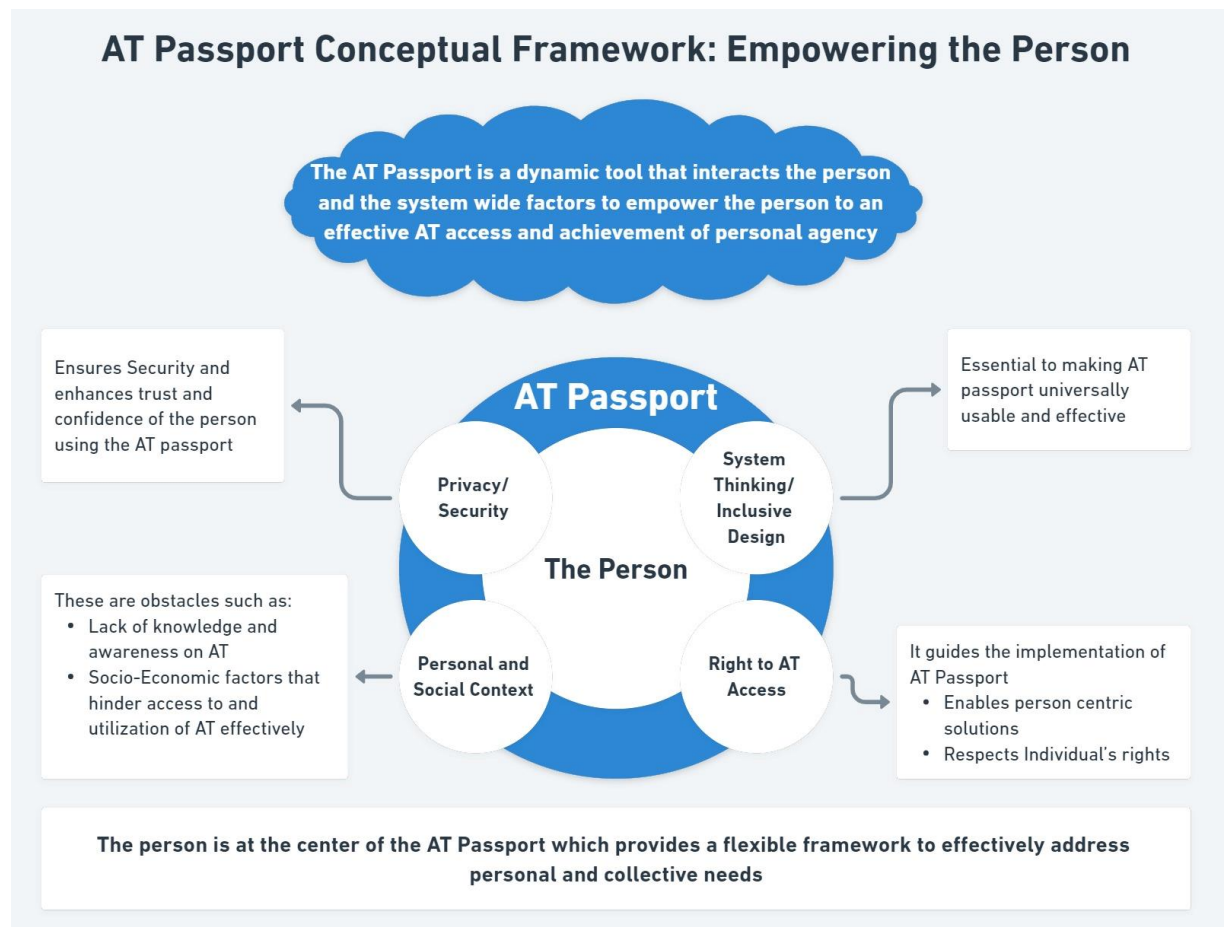
Figure 10: AT Passport Conceptual Framework

The conceptual framework diagram can be viewed similarly to a well-functioning ecosystem. At its core, the central feature, or the 'sun', is the individual and their expressed needs and values. The AT Passport functions like the earth, revolving around and directly interacting with this 'sun', considering its desires and requirements. The interlinked factors can be considered as the 'weather elements' that greatly influence the 'earth':

1. The right to AT and person-centric solutions, alongside personal, contextual considerations for AT access, could be seen as the 'soil', providing a grounded, firm base for development and growth.
2. Security, systems thinking, and inclusive design considerations operate somewhat like the 'wind', facilitating movement and adaptation and carrying seeds of innovation throughout the system.

The framework is, therefore, a dynamic and thriving ecosystem, with the AT Passport ensuring the individual's needs are met. The focus is on enhancing AT

access by prioritising the individual at its core and progressing from individual to holistic facilitators of AT access.

11.5 Theoretical Frameworks and Gaps in AT Passport Design

Several existing studies, theories, and models inform the design and development of the AT Passport. For instance, the User-Centred Design model propounded by Vredenburg et al. (2000) offers a systematic approach to designing technologies by involving users from the initial stages(320). This approach applies to the AT Passport as users actively participate during the tool's creation to ensure their needs are met. Another helpful model is the System Usability Scale, which John Brooke developed(321). This model provides a reliable tool for measuring usability. It can be instrumental in evaluating the AT Passport's ease of use, effectiveness, and intuitiveness. However, despite these well-studied models, several gaps in research exist that the proposed framework aims to address. Most notably, while existing models provide methods to assess AT on its broad characteristics, no specific model caters to the unique context and multi-wheeled nature of AT Passport.

The proposed framework incorporates distinct features, including interoperability, real-time updating, and customizability. Additionally, current literature does not adequately address how to encourage widespread adoption among various stakeholders: AT users, caregivers, professionals, etc. The proposed system aims to fill this gap by implementing inclusive design principles for all users and comprehensive training programs for different stakeholders. Finally, the proposed framework addresses privacy and security concerns under-discussed in the AT Passport literature. This approach incorporates robust security measures, adheres to data protection laws and encourages user trust. In conclusion, while existing models and theories provide a solid base, there is a clear need for a more comprehensive, user-centred, and secure model tailored to the unique needs of the AT Passport's design and deployment.

11.6 The Proposed AT Passport Development Framework

The proposed framework for the design and development of the AT Passport builds upon established theories and seeks to address the identified gaps in the existing literature. It integrates the principles of User-Centred Design, together with the inclusivity and versatility of AT, while also addressing unique aspects related to security and engagement. Central to the proposed framework are five key components:

1. Stakeholder Engagement: This component involves all key stakeholders, including end-users, caretakers, and professionals, from the early stages of design and development, encouraging active participation, feedback, and co-creation.

2. Interoperability and Real-Time Updating: This aspect ensures the AT Passport's seamless integration into existing systems, supporting real-time updates and comprehensive overviews of user needs and records.

3. Usability Focus: This element aims to create an intuitive, user-friendly interface and easy-to-navigate functionalities to maximise ease of use regardless of the user's technical savviness.

4. Customizability: This feature allows individual tailoring of the AT Passport to meet specific user needs, offering the flexibility to modify and update information as necessary.

5. Robust Security and Privacy Measures: This essential component ensures adherence to data protection laws and regulations to instil user confidence in the system.

These interrelated components work in synergy to achieve the proposed framework's overall functioning. Stakeholder engagement provides a solid base that informs the other areas, as user feedback influences usability, customizability, interoperability, and security. Interoperability and real-time updating likewise influence usability and customizability, providing a dynamic and responsive platform.

Finally, each facet enhances the security and privacy measures: proactive stakeholder engagement creates a security-aware culture, usability features

promote secure practices, and customizability allows for user-specific access controls. In essence, the proposed framework offers a holistic and comprehensive solution for the design and development of the AT Passport. It envisions an intuitive, user-centric, secure, easily adaptable, and inclusively designed AT Passport poised for wide acceptance and successful implementation.

11.6.1 AT Passport Design Principles

The AT Passport framework's foundation is primarily based on the principles of User-centred Design, accessibility, customisation, and interoperability.

1. User-centred Design: This approach insists on the meaningful involvement of end-users throughout the design process, thereby ensuring that their needs and preferences are holistically incorporated into the final product(322).
2. Accessibility: Grounded on universal design, this principle ensures that the AT Passport is designed to be usable across a wide range of users, regardless of their abilities or disabilities. It highlights the necessity of creating an interface that is easy to navigate, compatible across a variety of devices and platforms, and supportive of users with varying abilities(323).
3. Customization: This principle emphasises adapting the AT Passport's functionality to meet each user's specific needs and preferences. This includes the capacity to adjust system settings, such as access controls, language preferences, and display settings(324).
4. Interoperability: This principle outlines the importance of data exchange between the AT Passport and other existing systems. It encourages seamless communication with other healthcare and social care systems, providing a comprehensive view of the user's needs and history(325).

11.6.2 AT Passport Development Strategy

Studying the development of Assistive Technology passports in line with the proposed framework necessitates a stepwise methodology starting from extensive user research and culminating in deploying a user-centred technology. The process follows:

1. User Research: An empirical understanding of potential users is a focal element of User-Centered design. Techniques such as questionnaires, interviews, or observational studies can be employed to compile a detailed picture of user needs, preferences, and potential challenges (322, 326).

2. Design Requirements Formulation: The AT passport's design requirements should be established grounded in the user data obtained from the initial research phase. These requirements should reflect accessibility, interoperability, and customizability(327).

3. Prototyping Phase: Abstract requirements must be transformed into tangible design iterations. Creating these prototypes, either digital or paper-based mockups, will enable the examination of the user interface and overall design(328, 329).

4. Iterative Design and Evaluation: In pursuing an optimal design solution, iterative cycles of design amendments, underpinned by constant user feedback, are necessitated. This iterative process ensures the gradual improvement of the prototype(330).

5. User Acceptance Testing (UAT): The revised prototype should undergo UAT following this iterative process. During this phase, end-users will evaluate the system's functionality, allowing acceptance data collection before the product's launch(331).

6. Implementation and Continuous Improvement: Post-UAT, the AT passport can be deployed for use. Nevertheless, improvement is continuous; the system must be updated and maintained based on ongoing user feedback(332).

This stepwise strategy for developing an AT Passport embodies a comprehensive User-centred Design framework; it further encapsulates the final stages of release, post-deployment evaluation, and maintenance, ensuring end-product efficiency and user satisfaction.

7. Release and Documentation: Upon assuring a satisfactory UAT outcome, the AT Passport can be set for distribution among the users. Along with the system, complementary user guides and quick help resources are imperative, ensuring a smooth transition for the end-users during the initial

navigation phase. This phase also acknowledges the importance of documenting adaptations and managing modifications via a well-plotted change management plan(333).

8. Post-Deployment Appraisal: After the system's integration, any remnant issues must be identified and rectified, assuring the continual enhancement of AT Passport based on user feedback. Post-deployment also includes evaluating the application using key performance indicators to determine the system's effectiveness and identify any unmet objectives(334, 335).

9. Maintenance and Evolution: Carried beyond the initial deployment phase, the UCD framework includes maintaining and updating the system according to evolving user needs and advancing tech innovations. This step confirms that the AT Passport remains updated and state-of-the-art and maintains its ability to cater to users' requirements appropriately(336).

By comprehensively considering each stage from inception to implementation and beyond, this UCD structured methodology ensures that the AT Passport is an effective tool designed and refined in sync with its users' needs and contexts.

11.6.3 AT Passport Implementation Strategy

Executing the AT Passport Plan requires an application strategy reflective of its extensive developmental design.

1. User Education: Post-debut of the AT Passport system, developing a diverse portfolio of educational materials and informative sessions to familiarise users with the system's functionalities becomes indispensable. This step should guarantee the presence of accessible learning modules, each targeting a distinct skill set and aptitude level, hence espousing inclusivity(337).

2. Pilot Phase: A preliminary trial phase presents an opportunity. Concentrating on a specific user group allows them hands-on experience operating the system under practical conditions. This controlled approach meets two-fold goals: acquiring a representative cohort of users and providing the technical team a chance to detect and mend immediate system gaps before a widespread rollout(338).

3. Broad-based Implementation: A comprehensive scale deployment can be initialised following a successful pilot stage. This launch should remain malleable— accounting for diverse user needs and constraints— endorsing a universally mutable implementation(339).

4. Performance Assessment: The post-implementation phase encompasses a vital performance observation. Maintaining a steady eye on chosen performance metrics enables a practical analysis of the system's efficacy. Data derived, in turn, illuminates both system strengths and underpins the potential for enhancement(340).

5. Recursive Refinement: As reflected in the development strategy, the implementation strategy must exhibit recursiveness. A robust user feedback mechanism should perpetually fuel refinement, ensuring the AT Passport system's constant alignment with its user base(341).

6. Continual Support: A prominent post-deployment support structure is pivotal for handling user queries, troubleshooting problems, and guiding users— its immediate availability fortifies user assurance, catalysing higher system adoption rates. The crux here remains inclusivity— making broad-based user representation. This enables the improved implementation strategy for the project to echo its all-embracing and inclusive developmental blueprint(342).

11.7 Factors that may Influence the Adoption of the AT Passport

The facilitators and barriers to implementing Assistive Technology touch on salient areas of user engagement, training, interoperability, security and privacy, customisation, and accessibility. User Engagement, described as a mechanism to promote usability, presents a strategical argument that continuous and meaningful inclusion of end-users in implementing the AT Passport can lead to heightened ownership and uptake of the system(343, 344). The emphasis on training enhances the argument for institutionalising well-structured educational programs surrounding the AT Passport. Providing comprehensive training on Assistive Technology has been shown to increase user adoption and satisfaction(51). These programs would equip users with the knowledge and skills to confidently navigate the AT Passport, understand its features and benefits, and use it securely and

effectively (53) . This training would cover areas such as basic functionality (navigating the system, inputting information, and accessing features), a detailed understanding of the AT Passport's capabilities and how it can benefit users, training on data protection measures and best practices for maintaining confidentiality, and guidance on resolving common issues and accessing support resources(25).

In the scope of Interoperability, the AT Passport's need to interact with existing health systems effectively has been accentuated(345). This establishes a case for creating bridges between old and new systems, thus refining the possibilities for a seamless health information exchange. Regarding Security and Privacy, data protection in healthcare systems is important because robust data privacy measures within the AT Passport will bolster trust and adoption among users(346). Customisation enhances personalisation and postulates an argument that personalised AT sparks greater adoption, reinforcing the need for the AT Passport System to offer flexibility and customisation(322).

Touching on Accessibility, making technology universally acceptable benefits adoption, tipping the scale toward the necessity to make the AT passport universally accessible(347). However, barriers such as Technology Literacy, Resistance to Change, and Integration Concerns may pose significant challenges to implementing and adopting the AT Passport. A Study revealed that users' technology competence profoundly impacts AT adoption, arguing that implementing AT Passport might hit a snag if it overlooks users with limited tech skills(348, 349). Resistance to change can negatively influence tech adoption, hinting at the probability of possible resistance from users accustomed to existing systems. Integration concerns highlight the potential challenges of assimilating new systems into existing ones. These foreseeable barriers to adopting the AT Passport underscore the need for a carefully planned and executed integration strategy to ensure its successful incorporation into the existing ecosystem.

11.8 AT Passport Evaluation Strategy

To gauge the framework's effectiveness, including the design and development process and the end product, a systematic evaluation strategy could be implemented:

1. Developmental Review: Developmental review is a potent tool to assess the design and development process. This involves a time-bound assessment at multiple design and development stages, drawing qualitative and quantitative insights from stakeholders, primarily the designers, creators, and prospective users(350).

2. Outcome Analysis: The final product, the AT Passport, can be evaluated through outcome analysis. This approach gauges the product's feasibility in real-life applications, centring on elements like speed of task completion, error frequency, and user satisfaction levels(351).

3. Impact Study: The lasting or significant influence of the AT Passport on the lives of the users constitutes the crux of the evaluation process. Here, longitudinal studies assessing the prolonged efficacy and impact of the Passport could offer meaningful data(352).

4. Continual Evaluation: The process does not halt with deployment. An ongoing evaluation, which includes iterative reviews and refinements, is equally pivotal. This necessitates leveraging performance tracking tools to amass data for such continuous evaluations(353).

11.9 Proposed Steps Towards Broad Adoption

In this section, we shall provide evidence-based recommendations and strategies to ensure a successful rollout of the AT Passport, drawing from an array of scholarly findings in user-centred design principles, training, interoperability, security, privacy, customisation, and accessibility.

1. Promoting User Engagement: To enhance the successful application of the AT Passport, active user engagement necessitates being a central focus; strategies could include initiating workshops and pilot programs and setting up feedback channels to foster ongoing communication between all stakeholders(344).

2. Comprehensive Training: To augment comprehension and adoption amongst users, formulating comprehensive training materials is paramount. Modes of training manuals, online tutorials, and hands-on demonstrations should be explored to cater to a broad range of learning preferences(354).

3. Emphasizing Interoperability: Integration and interoperability are critical to the successful rollout of the AT Passport, with the significance of enabling seamless interaction with pre-existing healthcare systems. Strict standard protocols and thorough testing before deployment should be executed to ensure compatibility(345).

4. Ensuring Security and Privacy: Adherence to rigorous security measures and data protection regulations is critical to fostering user trust. Applying state-of-the-art encryption measures can safeguard user data while enhancing acceptability and adoption(48, 319).

5. Fostering Customization: The AT Passport should model its design flexibly to cater to diverse user needs. Strategies might encapsulate personalised interfaces, user-modified information, and adjustable usability, thus fostering an optimum user experience(355).

6. Universal Accessibility: To ensure broad access to the AT Passport across different stakeholders, applying universal design principles is crucial to enhance user-friendliness and inclusivity. Universally accessible systems available across a spectrum of devices and locations should be realised(28, 314).

Proactive strategies should be devised to address potential barriers, such as technology literacy, resistance to change, and integration concerns.

1. Addressing Technology Literacy: Simplified and streamlined user-friendly designs could help users with varying tech skills navigate the system. Introducing features such as tutorials and help sections can provide additional user support(153, 349, 355).

2. Resistance to Change: Transition can often be met with resistance. Therefore, communicating the advantages of the AT Passport can help

ensure that all users understand the value and potential of this new tool(9, 354, 355).

11.10 Conclusion

This chapter details a plan for creating an Assistive Technology Passport, a personalised tool recording an individual's AT needs and usage history to improve access and usability. Grounded in user-centric and inclusive design principles, the proposed framework emphasises user involvement throughout development and implementation. The chapter outlines a systematic approach encompassing user engagement, usability, interoperability, customisation, and robust security and privacy measures. It also explores factors driving adoption, potential barriers, and a comprehensive evaluation strategy to ensure the AT Passport's effectiveness and sustainability as a valuable tool for managing individual AT needs.

11.11 Chapter Summary

The chapter presents a completed framework for promoting the creation and widespread adoption of an Assistive Technology Passport. This framework, shaped through careful mixed-method and Delphi studies, includes essential functionalities and design features tailored to older people and people with disabilities. It is designed to facilitate the successful expansion and development of the AT Passport, addressing distinct user needs. The chapter further elaborates on how these functionalities and design attributes, discovered through earlier research, have been integrated into a ready-to-apply format, aiming to enrich user experiences significantly.

Chapter 12: Conclusions and Reflections

12.1 Introduction

This chapter recounts the significant findings from the research and reflects on them, linking to the application and framework of an Assistive Technology Passport. It explores considerations for future research, acknowledges limitations, and concludes with personal reflections and a summary, showcasing the potential of the Assistive Technology Passport in transforming Assistive Technology access.

12.2 Summary of Findings

This research project underscores the critical need for an Assistive Technology Passport. A comprehensive and robust combination of quantitative and qualitative methodologies was utilised to understand the experiences of individuals with disabilities with assistive technologies. The culmination of this research is the proposal of an AT Passport conceptual framework. Created with an emphasis on enhancing access to Assistive Technology, it stands as an innovative approach to support accessibility for those individuals who greatly need it.

12.3 Implication of the AT Passport Conceptual Framework

The Assistive Technology Passport, as conceptualised in this study, is designed to address the exact issues raised by individuals with disabilities. It is a personalised digital document that maps each user's Assistive Technology requirements and usage history. It provides a new method to navigate, manage, and optimise the Assistive Technology service system to improve user experience.

Our analysis of the framework suggests holistic and operational opportunities. Its strength lies in its person-centric design and adaptability, allowing it to be universally applicable. The primary motifs of the right to AT access, person-centric solutions, personal, contextual considerations for AT access, security, systems thinking, and inclusive design considerations make it resilient and versatile. Further, the model's dynamic nature mirrors a healthy ecosystem, seamlessly integrating individual needs with broader system-wide factors. The framework can facilitate the enhancement of AT access, starting from the individual and scaling up to macro-level facilitators of AT access.

The framework's focus on the AT Passport does not limit its application. It can be recontextualised for any innovative concept to operationalise system-wide AT access. This reimagining may give rise to the "Maalim and MacLachlan Ecosystem Model for Improving AT Access," emphasising the enduring principle of placing the individual at the heart of service provision, policymaking, and the community fabric. Its inherent adaptability makes it a suitable and impactful tool across different contexts.

12.4 Framework Recommendation

We propose a blueprint for the Assistive Technology Passport, encapsulating:

- Principles of User-Centrism and Inclusivity: Emphasizing active user engagement, secure data management, easy usage, and personal customisation to cater to individual needs.

- Encouragement of Continuous User Feedback: Promoting inclusiveness and stimulating continuous improvement during the Passport's development phase.

- Recognition of Adoption Drivers and Barriers: Identify key factors such as users' technical literacy, reluctance to change, and apprehensions about integrating with existing systems.

- An Evaluation Strategy: Incorporating continuous outcome analysis, impact assessment, and developmental review.

12.5 Implications for Future Research

Future research must move beyond the conceptual stage and delve into the practicalities of the Assistive Technology Passport's design, implementation, and impact to realise its full potential.

First, we must ensure the AT Passport is designed with its end users in mind. This demands a user-centred approach, where researchers actively engage with people with disabilities to understand their specific needs and preferences regarding an AT Passport. What format would be most helpful – digital, physical, or a combination? What accessibility features are crucial? What functionalities would

be most valuable in their daily lives?(356). This user feedback should then be used to develop and refine prototypes of the AT Passport through iterative testing and pilot studies, ensuring the final design is user-friendly, accessible, and meets the diverse needs of its target audience(357, 358).

Once we have a well-designed AT Passport, the next hurdle is its successful integration into existing healthcare, education and social support systems. This will require careful consideration of potential barriers related to data sharing, interoperability with existing systems, and training for professionals who will be using the AT Passport(359).

Finally, rigorous evaluation is essential to determine the effectiveness of the AT Passport in achieving its intended goals. This includes measuring its impact on key outcomes such as:

- **Increased access to Assistive Technology:** Can more people acquire the Assistive Technology they need after implementing the AT Passport?

- **Improved user satisfaction:** Are users finding the AT Passport helpful and easy to use? Are they satisfied with the process of acquiring Assistive Technology?

- **Reduced abandonment of Assistive Technology:** Is the AT Passport helping people continue using Assistive Technology effectively over time?

- **Enhanced participation and quality of life:** Is the AT Passport contributing to greater social inclusion and improved quality of life for people with disabilities?(360).

It is crucial to address ethical and social considerations throughout this research process. This includes implementing robust data protection measures to safeguard user information and build trust in the AT Passport system(361). Additionally, researchers must be mindful of potential biases in the design and implementation of the AT Passport and actively work to ensure equitable access and benefit for all users, regardless of their background or disability(362, 363).

12.6 The Influence of COVID-19 on the Course of the Research

Undertaking research during the COVID-19 pandemic required substantial adjustments. Restrictions resulted in lost time and a shift from in-person to online data collection. This transition posed challenges with accessibility and established a new requirement for digital literacy among participants. Additionally, logistical issues emerged due to limited physical interactions and equipment availability due to supply chain disruptions. The pandemic's social realities also required a sensitive participant recruitment and engagement approach. Despite hurdles to our sampling technique and timeline, the transition to remote participation broadened our geographical coverage, enhancing the diversity of our study. Thus, while it imposed significant barriers, the pandemic also underscored the importance of adaptability in research, ultimately enhancing the robustness of the ATP study.

12.7 Limitations

While illuminating the potential of an Assistive Technology Passport, this research operates within certain limitations inherent to its mixed-methods, exploratory sequential design.

Our journey began with a deep dive into the qualitative data, gathering rich insights from a service-providing organisation. However, this singular perspective, while valuable, may not fully encapsulate the diverse experiences of individuals with disabilities, their families, and other stakeholders. Additionally, the absence of individuals with higher support needs in this phase limits the transferability of findings to this crucial population.

Moving to the quantitative phase, we encountered limitations regarding generalizability. The single institution setting and unvalidated survey instrument, coupled with an over-representation of younger female students with specific learning difficulties, restrict the applicability of findings to a broader, more diverse population. Furthermore, the lack of detailed information on disability severity hinders a nuanced understanding of its impact on AT needs.

The subsequent Delphi study, while informed by the preceding qualitative findings and literature review, faced challenges with a high dropout rate, potentially

impacting the representativeness of the expert panel's consensus. Additionally, the need for more diversity among participants necessitates caution in generalising findings to a wider range of stakeholders.

While the sequential design allowed qualitative findings to shape the subsequent phases, quantitative and qualitative data would ideally have informed the Delphi study for a richer, more comprehensive understanding. Furthermore, the reliance on a single researcher, mitigated by rigorous oversight and consultation, raises potential concerns regarding researcher bias and workload inherent to complex mixed methods research.

Despite these limitations, this study provides a valuable foundation for the AT Passport framework. However, it is crucial to acknowledge that these limitations may impact the framework's generalizability and applicability to diverse populations and contexts. Future research should prioritise multi-site studies with diverse samples, validated instruments, robust retention strategies, and a multi-researcher approach to strengthen the evidence base and ensure an inclusive and effective AT Passport for all.

12.8 Personal Reflections

Reflecting on the AT Passport research study, I realise that my experiences in a low- to middle-income region have undeniably influenced the entire process. Transitioning from an Occupational Therapist to a researcher, I realised that the challenges I encountered were not exclusive to a single region but were prevalent globally. Initially, I believed that AT challenges in Ireland would be less severe compared to my home region. However, the research presented many social and contextual factors that impact AT access, broadening my perspective. These realities underscore the idea that comparisons between different regions might not necessarily yield precise results given the influence of these factors on individual agency. My roles as an Occupational Therapist and a researcher inevitably intersected throughout this journey. When faced with the disheartening experiences of participants relating to Occupational Therapy services, I felt an intense sense of responsibility. Rather than discouraging me, this sense further motivated me to address the issues and use my research to raise awareness and

act as a catalyst for change. The potential implications of the study on a broader scale stirs excitement within me as the impact could extend beyond local regions and spur improvements in AT access globally. The research outcomes brought the realities of AT access to light and facilitated global understanding. Scott, a participant in our qualitative study, reflected on a quote initially stated by Mary Pat Radabaugh, former director of the IBM National Support Centre for Persons with Disabilities: "While technology makes things easier for most people, it makes things possible for persons with disabilities." This quote profoundly captures the essence of our research and the immense potential of assistive technologies. As I move forward, I am driven to actualise these words through our findings - seeking to make AT access easier and possible for all.

12.9 Conclusions

This research emphasises the capacity of the Assistive Technology Passport to improve AT access for people who need it fundamentally. Ensuring comprehensive accessibility mandates a strategic approach that embraces individual diversity and systemic conditions in the design, execution, and continuous refinement of the Assistive Technology Passport.

12.10 Final Summary

This final chapter distils the critical discoveries from the investigation and ponders upon them, corresponding to the practical usage and the structure of an Assistive Technology Passport. It anticipates prospects for subsequent exploration, concedes limitations, and brings closure with personal introspection and a summary.

Findings affirm the urgent requirement for an Assistive Technology Passport, drawn from quantitative and qualitative methods to understand disabled people's rapport with assistive technologies. Reflections highlight the amplified need to transform the current practice through a passport. The proposed Passport, an individualised digital document, is devised to tackle the obstacles raised by disabled and older individuals by managing and optimising the Assistive Technology service mechanism.

Recommendations for the Passport encompass principles of user-centeredness, continuous user feedback, identification of adoption factors, and an evaluative strategy. Future work should focus on the hands-on utilisation of the Passport and evaluate its usefulness in resolving accessibility hindrances. Limitations include possible inaccuracies in self-reported data. Finally, personal reflections reveal the profound impact of this research on understanding assistive technologies and the experiences of the targeted individuals. Overall, the Passport shows promise in revolutionising access for disabled and older people, necessitating careful design, implementation, and iterative refinement.

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Appendices

Appendix A: INFORMATION LEAFLET AND CONSENT FORM

1. A1: Qualitative Study Information leaflet and consent forms
2. A2: Quantitative and Delphi Study Information Leaflet and Consent Forms
3. A3: Quantitative Study online consent page
4. A4: Delphi Study online consent page
5. B1: Ethics Approval, Qualitative study
6. B2: Ethics Approval, Quantitative study
7. C: Semi-structured interview guide
8. D1: Qualitative survey Questionnaires
9. D2: Delphi study Questionnaires
10. E1: Qualitative study: Call to participate.
11. E2: Quantitative study and Delphi round: call to participate.
12. E3: Delphi round 2 call to participate.

A1: Qualitative Study Information leaflet and consent forms

INFORMATION AND CONSENT FORM FOR RESEARCH PARTICIPANTS

Information Sheet

Purpose of the Study.

I am Mohamed Maalim, a doctoral student, in the Assisting Living & Learning institute (ALL), Department of Psychology, Maynooth University.

As part of the requirements for PhD, I am undertaking a research study` under the supervision of Prof. Malcolm MacLachlan.

The study is concerned with establishing the need and Informing the design and development of an Assistive Technology (AT) Passport. An AT Passport is proposed as a user focussed tool that aims to facilitate access to technology for a person with disability by taking into consideration the person's own needs and the system's requirements to support their need. The AT passport is envisioned to have the potential of placing an   AT user at the centre of service provision and innovations by effectively coordinating the needs of an individual with the required supports and services.

What will the study involve? *The study will involve participation in a semi-structured interview that will take up-to a maximum of one hour. The interview conversation will be audio taped, transcribed and kept confidential.*

Who has approved this study?

This study has been reviewed and received ethical approval from Maynooth University Research Ethics committee and Enable Ireland Research Ethics & Quality Committee. You may have a copy of this approval if you request it.

Why have you been asked to take part?

You have been asked because you are an Assistive Technology (AT) user accessing services at Enable Ireland

Do you have to take part?

No, you are under no obligation whatsoever to take part in this research. It is entirely up to you to decide whether or not you would like to take part. If you decide to do so, you will be asked to sign a consent form and given a copy and the information sheet for your own records. If you decide to take part, you are still free to withdraw at any time without giving a reason and/or to withdraw your information up until such time as the research findings are analysed. A decision to withdraw at any time, or a decision not to take part, will not affect your relationships with enable Ireland services and that there is no obligation to participate, and no penalty whatsoever for nonparticipation

What information will be collected?

This study seeks your participation to gather:

Your experiences of Assistive Technology (AT) use?

Your experiences of accessing AT services including your perceived relationship with the AT service provision processes?

Your opinion on how and in what form an AT passport could contribute towards improving access to AT services and related supports?

Will your participation in the study be kept confidential?

Yes, all information that is collected about you during the course of the research will be kept confidential. No names will be identified at any time, however we acknowledge that some information you provide may be sensitive and as such you will be provided

with an opportunity to read back your contributions and remove any other personal identifiers before you agree to any of your direct quotations to be used in any subsequent presentations or publications.

All hard copy information will be held in a locked cabinet at the researchers' place of work, electronic information will be encrypted and held securely on MU PC or servers and will be accessed only by the researcher, Mohamed Maalim and Supervisor, Prof. Malcolm MacLachlan. No information will be distributed to any other unauthorised individual or third party. If you so wish, the data that you provide can also be made available to you at your own discretion.

'It must be recognised that, in some circumstances, confidentiality of research data and records may be overridden by courts in the event of litigation or in the course of investigation by lawful authority. In such circumstances, the University will take all reasonable steps within law to ensure that confidentiality is maintained to the greatest possible extent.'

Additionally, the researcher is also a designated health care professional and is required to report disclosures about child abuse or any form of neglect if it arises. In the event of such disclosures, procedures outlined in 'Children's First' guidelines will be followed and reported to the relevant authorities.

What will happen to the information which you give?

All the information you provide will be kept at Maynooth University in such a way that it will not be possible to identify you. On completion of the research, the data will be retained on the MU server. After 10 years, all data will be destroyed by PI (Mohamed Maalim). Manual data will be shredded confidentially and electronic data will be reformatted or overwritten by the PI in Maynooth University.

What will happen to the results?

The research will be written up and presented at local Assistive Technology forums such as CHAT (Community Hub for Assistive Technology). Additionally, the findings will be published in peer review journals and presented at relevant National and international

Assistive Technology conferences and forums. A copy of the research findings will be made available to you upon request.

What are the possible disadvantages of taking part?

There is a possibility your participation in this study my cause psychological distress or physical fatigue.

What if there is a problem?

If you are distressed during the interview, this the researcher will offer you an opportunity to terminate the interview and remind you your right to withdrew at any time without any impact to your current service provision. Within the session, this researcher will use his training and experience in communication and empathy skills from his clinical background as an Occupational Therapist to minimise the stress. Should you nonetheless be distressed, you may be referred, by the gatekeeper (Siobhan Long), to counselling and psychological support structures within Enable Ireland. If during your participation in this study you feel the information and guidelines that you were given have been neglected or disregarded in any way, or if you are unhappy about the process, please contact the Secretary of the National University of Ireland Maynooth Ethics Committee at research.ethics@nuim.ie or +353 (0)1 708 6019. Please be assured that your concerns will be dealt with in a sensitive manner.

Any further queries?

 *If you need any further information, you can contact me (Researcher): **Mohamed Maalim on 0877958095 or at** mohamed.maalim.2020@mumail.ie**. or my research Supervisor, Prof. Malcom MacLachlan at** Mac.MacLachlan@mu.ie*

If you agree to take part in the study, please complete and sign the consent form overleaf.

Thank you for taking the time to read this

Maynooth University
National University
of Ireland Maynooth

Consent Form

I……………………………………agree to participate in *Mohamed Maalim's* research study titled **Access to Assistive Technology (AT): A qualitative study to explore the need for an AT passport and identify its potential characteristics**.

Please tick each statement below:

The purpose and nature of the study has been explained to me verbally & in writing. I've been able to ask questions, which were answered satisfactorily.

☐

I am participating voluntarily.

☐

I give permission for my interview with to be *audio-recorded*

☐

I understand that I can withdraw from the study, without repercussions, at any time, whether that is before it starts or while I am participating.

☐

I understand that I can withdraw permission to use the data right up to *anonymization of data* ☐

It has been explained to me how my data will be managed and that I may access a draft report of the study findings for further comment if I wish to do so

☐

I understand the limits of confidentiality as described in the information sheet

☐

I understand that my data, in an anonymous format, may be used in further research projects and any subsequent publications if I give permission below:

☐

I agree to quotation/publication of extracts from my interview

☐

I do not agree to quotation/publication of extracts from my interview

☐

I agree for my data to be used for further research projects

☐

I do not agree for my data to be used for further research projects

☐

Signed…………………………………….   Date……………….

Participant Name in block capitals ………………………………………...

I the undersigned have taken the time to fully explain to the above participant the nature and purpose of this study in a manner that they could understand. I have explained the risks involved as well as the possible benefits. I have invited them to ask questions on any aspect of the study that concerned them.

Signed…………………………………….   Date……………….

Researcher Name: *MOHAMED MAALIM*

Researcher contact details: mohamed.maalim@2020.mu.ie

Superviors Name: Prof. MALCOM MACLACHLAN

Supervisors contact details: Mac.MacLachlan@mu.ie

If during your participation in this study you feel the information and guidelines that you were given have been neglected or disregarded in any way, or if you are unhappy about the process, please contact the Secretary of the Maynooth University Ethics Committee at research.ethics@mu.ie or +353 (0)1 708 6019. Please be assured that your concerns will be dealt with in a sensitive manner.

For your information, the Data Controller for this research project is Maynooth University, Maynooth, Co. Kildare. Maynooth University Data Protection officer is Ann McKeon in Humanity house, room 17, who can be contacted at ann.mckeon@mu.ie. Maynooth University Data Privacy policies can be found at

[*https://www.maynoothuniversity.ie/data-protection*](https://www.maynoothuniversity.ie/data-protection)*.*

Two copies to be made: 1 for participant, 1 for PI

Enable Ireland REQC Consent Form

Psychology Department

ALL Institute,

Maynooth University

Maynooth

Co. Kildare

Subject Information and Informed Consent Form

Date:	_____ _	**Name:**	_____ _

Projec t Title:	Access to Assistive Technology (AT): A qualitative study to explore the need for an AT passport and identify its potential characteristics	**Principle Investigator :**	Mohamed Maalim

The research project and procedures associated with it have been fully explained to me. I have read the information letter and have had time to consider whether to take part in this study. I have had the opportunity to ask questions concerning any and all aspects of the project and any procedures involved. I am aware that participation is voluntary. I am aware that my decision not to participate or withdraw will not restrict my access to Enable Ireland services normally available to me. Confidentially of records concerning my involvement in this project will be maintained in an appropriate manner. I agree that the data can be used in the publication of higher degrees, presentations and academic publications.

I, the undersigned, hereby consent to participate as a subject in the above described project conducted at my local Enable Ireland location. I have received a copy of this consent form for my records. If I have any queries or about the study procedure or questions concerning my rights as a participant, I can contact Mr. Mohamed Maalim on **0877958095**, email address: **mohamed.maalim.2020@mumail.ie**.

After reading the consent form, if you have no further questions about giving consent, please sign where indicated.

Signatur
e of
Subject: _____   Date :   _____

Witness: _____   Date :   _____

Research Ethics & Quality Committee Policy & Procedure. Issued by Human Resources: 02.07.2018

Thes Investigating the Potential of Assistive Technology Passports for Enhanced Access to Assistive Technology and the Development of an Implementation and Adoption Framework

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Appendix A2: Quantitative and Delphi Information leaflet and Consent Forms

Maynooth University
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of Ireland Maynooth

INFORMATION SHEET FOR RESEARCH PARTICIPANTS

INFORMATION SHEET

Purpose of the Study.

I am **Mohamed Maalim, a doctoral student,** in the Assisting Living & Learning institute (ALL), Department of Psychology, Maynooth University.

As part of the requirements for a PhD., I am undertaking a research study under the supervision of **Prof. Malcolm MacLachlan**.

The overall purpose of my PhD. project is to research the concept of an Assistive Technology (AT) Passport*, identify its core characteristic and design attributes, and recommend a framework for its development and scalability. This current study is concerned with establishing the need and informing the design and development of an Assistive Technology (AT) Passport.

*An Assistive Technology Passport is proposed as a user-focused and user-driven tool that aims to facilitate access to technology for a person with a disability by taking into consideration the person's own needs and the system's requirements to support their need. The AT passport is envisioned to have the potential of placing an AT user at the centre of service provision and innovations by effectively

coordinating the needs of an individual with the required AT supports and services.

Figure 1 below represents the proposed conceptual framework of the AT Passport that places the person at the centre to facilitate access to AT purposely for enabling participation in the community while operating within the wider system.

Figure1: AT Passport concept diagram
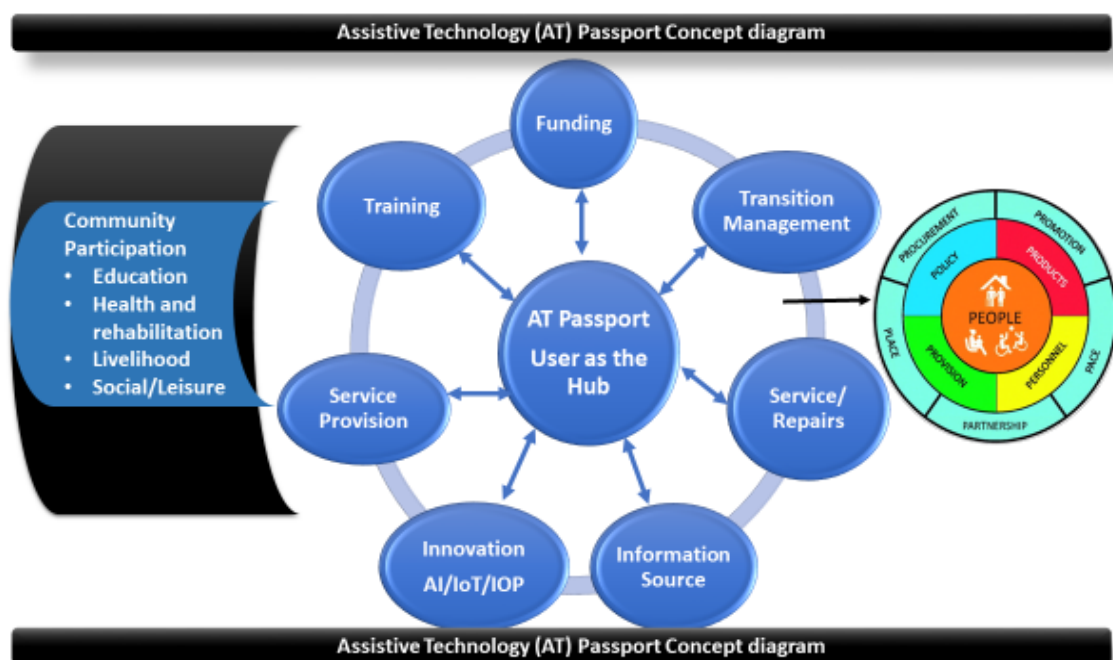
What will the study involve?

The study involves completing a 2-part online survey with part one of the survey about your knowledge and experience of using Assistive and Accessible Technology throughout your journey in education. The subsequent, part two of the study would consist of 3 phases of survey questions aimed at gaining the

participants' consensus on the core considerations in the design and development of an Assistive Technology Passport.

You will be invited by the study gatekeeper (Educational Technology Officer) at Maynooth University Access Programme (MAP) to participate through an anonymised group email with a link to the survey. Overall throughout the study, you will be contacted three times at approximately one-month intervals including up to 2 reminders over the two months.

In the initial call to participate, you will be offered an opportunity to consent and voluntarily complete part one of the study. You will at this stage offered an opportunity to indicate your consent to continue to part two of the study to complete its first phase. You may, however, voluntarily choose not to participate in part two of the study. If you choose to continue to part two and complete it, you'll be invited again after approximately one month to complete phase two and subsequently, after another month for phase three. Please note that to enhance the anonymity of participation at all times, the gatekeeper will send out the link to the survey across the three times to all the MAP registered participants in an anonymised email. You will receive notification to remind that only the participants who completed the preceding survey would be requested to continue. A question would be inserted at the beginning of all the phases in part two of the study to allow you to indicate whether you've completed the preceding phase to be allowed to continue or to be dropped out of the study if you answered no.

Who has approved this study?

This study has been reviewed and received ethical approval from the Maynooth University Research Ethics committee and Enable Ireland Research Ethics & Quality Committee. You may have a copy of this approval if you request it.

Why have you been asked to take part?

You are invited to participate in this research study because you are a user of Assistive Accessible Technology are registered with a disability and avail of Maynooth University Access Programme (MAP) services.

Do you have to take part?

No, you are under no obligation whatsoever to take part in this research. It is entirely up to you to decide whether you would like to take part. If you decide to do so, you will be asked to indicate your consent at the beginning of the survey and given a copy and the information sheet for your records. If you decide to take part, you are still free to withdraw at any time without giving a reason and/or to withdraw your information before submission. A decision to withdraw at any time, or a decision not to take part, will not affect your relationships with MAP services, and that there is no obligation to participate, and no penalty whatsoever for nonparticipation that participation is not required to receive the services.

What information will be collected?

The study would seek to gather your non-identifiable demographic information such as gender, age range, disability, AT used, location of residence (e.g Dublin 2,3, Maynooth, etc, and not exact address). Additionally, the following category of questions would be explored in this study.

Part 1:

What is your current level of knowledge and perception of Assistive Technology use?.

How did you access Assistive Technology during your Journey through education?.

Part 2:

What are its key AT Passport usability and performance features?

What are the wider systems requirements necessary for AT Passport to work?

How it would be designed to withstand the pace of technological and systemic changes.

What type and levels of security and privacy standards are to be integrated into the design of the Assistive Technology Passport?

Will your participation in the study be kept confidential?

No personally identifiable information would be collected from you and the principal researcher would not have access to your contact information including emails

Your responses and all data are stored in a password-protected electronic format. The results of this study will be used for scholarly purposes only and may be shared with research supervisors and shared with ALL Institute members and disseminated publicly.

All hard copy information will be held in a locked cabinet at the researchers' place of work, electronic information will be encrypted and held securely on MU PC or servers and will be accessed only by the researcher, Mohamed Maalim, and Supervisor, Prof. Malcolm MacLachlan. No information will be distributed to any other unauthorised individual or third party.

'It must be recognized that, in some circumstances, the confidentiality of research data and records may be overridden by courts in the event of litigation or the course of investigation by lawful authority. In such circumstances, the University will take all reasonable steps within the law to ensure that confidentiality is maintained to the greatest possible extent.'

What will happen to the information which you give?

All the information you provide will be kept at Maynooth University in such a way that it will not be possible to identify you. On completion of the research, the data will be retained on the MU server. After 10 years, all data will be destroyed by PI (Mohamed Maalim). Manual data will be shredded confidentially, and electronic data will be reformatted or overwritten by the PI at Maynooth University.

What will happen to the results?

The research will be written up and presented at local and international Assistive Technology forums and conferences. Additionally, the findings will be published in peer-review journals and presented at relevant National and International Assistive Technology conferences and forums. A copy of the research findings will be made available to all registered to MAP.

What are the possible disadvantages of taking part?

No psychological or physical impact is anticipated for participating in this research. However, due to the iterative nature of the study, the participants may opt to discontinue participating if the time commitment to the study is felt to be too burdensome.

What if there is a problem?

If you find the commitment to this study to be too cumbersome you may drop out of the study at any time, or opt not to submit their responses If during your participation in this study you feel the information and guidelines that you were given have been neglected or disregarded in any way, or if you are unhappy about the process, please contact the Secretary of the National University of Ireland Maynooth Ethics Committee at research.ethics@nuim.ie or +353 (0)1 708 6019. Please be assured that your concerns will be dealt with sensitively.

Any further queries?

 If you need any further information, you can contact me (Researcher): Mohamed Maalim on 0877958095 or at mohamed.maalim.2020@mumail.ie. or my research Supervisor, Prof. Malcolm MacLachlan at Mac.MacLachlan@mu.ie

Thank you for taking the time to read this

A3: Quantitative Study online consent page

Survey of Students' Assistive Technology Experiences. (2) - Saved ∨

Section 1   ...

Part 1

Electronic Consent.

1. Clicking on the "agree" button below indicates that:

• you have read the above information
• you voluntarily agree to participate
• you are at least 18 years of age

If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

○ AGREE

○ DISAGREE

A4: Delphi Study online consent page

Survey of Students' Assistive Technology Experiences. (2) - Saved ∨

Consent to participate in part 2 of the study.

20. Please indicate your agreement with the following statements

☐ I understand the time commitments to the study

☐ I am at liberty to withdraw from participation at any time

☐ I am willing to answer another round of questions

☐ I understand the incentive provided does not in any way represent an inducement to participate

☐ I provide consent to participate

A5: Round 2 Delphi Consent Page

Assistive Technology Passport Research study: The Delphi 'Round 2'

This research study aims to improve the experience of *Assistive Technology users by creating a more joined-up approach to assistive technology use in Ireland. This study is part of a PhD research project conducted by Mr. Mohamed Maalim of the Assisting Living and Learning Institute (ALL) Institute, Psychology Department of Maynooth University. The PhD project aims to research the concept of Assistive Technology (AT) passport*, identify its core characteristic and design attributes, and recommend a framework for its development and scalability. * The AT Passport is a platform envisioned to effectively coordinate the needs of an individual with the required AT supports and services.

Thank you for participating in the first round of this three-round Delphi survey study. We are inviting you again to complete round two of the survey, which will take approximately 5 minutes to complete. In this round, we present the statements that reached a consensus. For those statements that did not reach an agreement, we request you consider your previous ratings to help identify additional consensus items.

* Required

Part 1

Electronic consent

1. Clicking on the "agree" button below indicates that:

• you have read the above information
• you voluntarily agree to continue your participation
• you are at least 18 years of age

If you do not wish to continue to participate in this round , please decline participation by clicking on the "disagree" button.

○ AGREE

○ DECLINE

B1: Ethics Approval, Qualitative study

Enable Ireland Research, Ethics and Quality Committee

Research Proposal Approval Form

Date: 10ᵗʰ March 2020

Reference Number: RA 66 MM

Applicant Name: Mohamed Maalim

Proposal Title: Access to Assistive Technology: A Qualitative Study to explore the need for an AT passport and identify its potential characteristice

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REQC Feedback

Approved:

You may proceed with the research as outlined in the research proposal submitted to the REQC. The REQC Co-ordinator will contact you for an Interim Progress Report which you must complete at a later

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date. A final copy of the study must be submitted to the REQC Co-ordinator after completion to the following address:

Lisa Lingwood

HR & Corporate Affairs

Enable Ireland

Lavanagh Centre

Curraheen

Co. Cork

Lisa Lingwood – Research, Training & Quality Officer

B2: Ethics Approval, Quantitative and Delphi study

MAYNOOTH UNIVERSITY RESEARCH ETHICS COMMITTEE

MAYNOOTH UNIVERSITY,

MAYNOOTH, CO. KILDARE, IRELAND

Dr Carol Barrett

Secretary to Maynooth University Research Ethics Committee

29 September 2021

Mohamed Isaack Maalim

Department of Psychology Maynooth University

Re: Application for ethical approval for a Project entitled: Assistive Technology (AT)

Passport design and development; A Delphi study to identify the core Assistive

Technology Passport's functionalities, usability and, privacy and, security considerations.
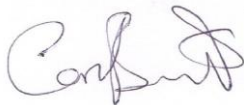
Dear Mohamed,

The above project has been evaluated under Tier 2 expedited review and we would like to inform you that ethical approval has been granted.

Any deviations from the project details submitted to the ethics committee will require further evaluation. This ethical approval will expire on 31/12/2021.

Kind Regards,

Dr Carol Barrett

Secretary,

Maynooth University Research Ethics Committee

C.c.   Prof Mac MacLachlan, Department of Psychology

Reference Number

SRESC-2021-2447398

C: Semi structured interview guide

Can you please tell me why you use AT?
Can you tell me how access to your AT makes you feel?
Can you tell me how you would feel if you no longer had your AT?
How would you describe the process of obtaining your AT?
Based on your experience, what is your view on obtaining AT in your context?
Can you tell me how you would like AT to be provided?
How would you describe the current proposed AT Passport concept?
Can you tell me how AT Passport may or not be relevant to you?
In your opinion, how would an AT Passport resemble

D1: Quantitative survey Questionnaires

Survey of Students' Assistive Technology Experiences. (2) ⅋

The purpose of this research study is to understand the participant's Assistive Technology experiences as part of a PhD research project being conducted by Mr. Mohamed Maalim of the Assisting Living and Learning Institute (ALL) Institute, Psychology Department Maynooth University. This research is trying to improve the experience of *Assistive Technology users by creating a more joined-up approach to Assistive Technology use in Ireland. The PhD project aims to research the concept of an Assistive Technology (AT) passport*, identify its core characteristic and design attributes, and recommend a framework for its development and scalability.

An *Assistive Technology Passport is proposed as a user-focused and user-driven information hub that aims to facilitate access to technology for a person with a disability by taking into consideration the person's own needs and the system requirements to support their need. The AT passport is envisioned to have the potential of placing an AT user at the centre of service provision and innovations by effectively coordinating the needs of an individual with the required AT supports and services.

You are invited to participate in this research study because you are a user or potential user of Assistive Technology. Your participation in this research study is voluntary. You may choose not to participate. If you decide to participate in this research survey, you may withdraw at any time before submitting your responses. If you decide not to participate in this study or if you withdraw from participating at any time before submitting your responses, you will not be penalized.

The procedure involves completing a 2 part online survey that together may take approximately 10-15 minutes to complete. Part one of the survey questions will be about your knowledge and experience of using Assistive Technology throughout your journey in education. Part two will use the Delphi method consisting of 3

rounds of responses to survey questionnaires aimed at gaining consensus on topics of interest to the AT Passport design and development. At the end of part 1 of the study additional information regarding participation for part 2 of the study will be provided to give you an opportunity to continue to part 2 or opt not to continue. if you opt not to continue you will be prompted to submit your responses for part 1 before finishing the survey.

Your responses will be kept confidential at all times and all data is stored in a password-protected electronic format. To help protect your confidentiality, the surveys will not contain information that will personally identify you. The results of this study will be used for scholarly purposes only and may be shared with research supervisors and the findings will be shared with ALL Institute members and disseminated publicly

If you need any further information, you can contact me (Researcher): Mohamed Maalim on 0877958095 or at mohamed.maalim.2020@mumail.ie. or my research Supervisor, Prof. Malcolm MacLachlan at Mac.MacLachlan@mu.ie. This research has been granted ethical approval by the Maynooth University ethics committee.

Assistive Technology is an umbrella term, which encompasses systems and services related to the delivery of assistive products and services. Assistive products are defined by the World Health Organization as any product (including devices, equipment, instruments, and software) either specially designed or produced or generally available, whose primary purpose is to maintain or improve an individual's functioning and independence and thereby promote their wellbeing.

* Required

Part 1

Electronic Consent.

1. Clicking on the "agree" button below indicates that:

you have read the above information

you voluntarily agree to participate

you are at least 18 years of age

If you do not wish to participate in the research study, please decline participation by clicking on the "disagree" button.

- ○ AGREE
- ○ DISAGREE

Thes Investigating the Potential of Assistive Technology Passports for Enhanced Access to Assistive Technology and the Development of an Implementation and Adoption Framework

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Demographic information

Please check your age range

○ 18-23 Years old

○ 23-30 Years old

○ 31-40 Years old

○ 41 and 50

○

51 and Over

Gender

○ Female

○ Male

○ Non-binary

○ Prefer not to say

○

Other

Year of Study/Level of Study *

○ First Year

○ Second Year

○ Third Year

○ Fourth Year

○ Postgraduate Masters

○ Postgraduate Doctoral

○ Post Doc

Other

Entry Route to University

Please check all applicable

- ☐ CAO Entry Only

- ☐ The Higher Education Access Route (HEAR)

- ☐ The Disability Access Route to Education (DARE)

- ☐ The Mature Student entry route

- ☐ QQI-FET (Further Entry) Progression

- ☐ Maynooth University Progresssion route e.g. foundation certificate in science and Engineering

- ☐ Postgraduate

Other

Please tick the categories of disability that apply to you

These categories are used in the AHEAD and HEA Fund for Students with Disabilities reports. Multiple answers are permitted.

- ☐ Autism Spectrum Disorder

- ☐ Attention Deficit Disorder/Attention Deficit Hyperactivity Disorder (ADD/ADHD)

- ☐ Blind/Vision Impaired

- ☐ Deaf/Hard of Hearing

- ☐ Developmental Co-ordination Disorder (Dyspraxia/Dysgraphia)

- ☐ Mental Health Condition

- ☐ Neurological Condition

- ☐ Physical/Mobility Disability

- ☐ Significant Ongoing Illness

- ☐ Speech and Language Communication Disorder

- ☐ Specific learning difficulties (dyslexia or dyscalculia)

No Disability

Other

Assistive Technology Experience

Please provide the best answer that accurately reflects your knowledge and experience of using Assistive Technology

How would you rate your current level of knowledge of Assistive Technology? *

	No opinion	Very Low	Low	Average	High	Very Hig
My knowledge on Assistive Technology	○	○	○	○	○	○

How confident do you feel in using your AT effectively? *

	No opinion	Very Low	Low	Average	High	Very
My knowledge on Assistive/Accessible Technology		○	○	○	○	○

Please tick the types of Assistive Technology you regularly use in all settings (Education and daily living)

Multiple answers as are permitted

*

☐ Mobility (wheelchair, scooter, cane, prosthetic, orthotic device etc.)

☐ Hearing (hearing aid, on screen subtitles)

☐ Cognitive support (memory aids, attention, thinking)

☐ Magnification (screen enlargement, handheld magnifiers)

☐ Computer assistance (screen-reader, voice recognition)

☐ Physical tools/ modifications (book holder, smart home enhancements, adaptive switches and utensils)

☐ None of the above

Other

In which educational settings have you used Assistive Technology

(please check all that apply) *

☐ Primary School

☐ Secondary School

☐ University

☐ None of the above

☐

Other

Assistive Technology is an essential support for me to (please check all that apply) *

☐ Live Independently

☐ Access Education

☐ Participate in Employment

☐ Communicate effectively

☐ Participate in Sports and Leisure

☐ Access to Culture (theatre, concerts, Cinema

☐ Access to Justice

☐ Not Applicable/None

Other

How important is Assistive Technology in your life?

(You may skip if you checked 'Not Applicable/None in question 11).

	Not at all Important	Not important	Somewhat Important	Very Important	I don know
Assistive/or Accessible technology is	○	○	○	○	○

(

What is your perception regarding the knowledge and understanding of Assistive Technology by the educators (teachers and lecturers) based on your journey through education? *

	Somewhat No Experience I am not sure of AT use	Not informed	informed	Informed	Very informed
Primary school	○	○	○	○	○ ○
Secondary School	○	○	○	○	○ ○
University	○	○	○	○	○ ○

I have knowledge and awareness of the available Assistive Technology support services at Maynooth University?

I am not Strongly   Strongly sure Disagree Disagree Agree agree

Knowledge and awareness of support services   ○   ○   ○   ○
○

How satisfied are you with the quality of Assistive Technology support services at Maynooth University?

Neither

Very Somewhat satisfied nor Somewhat No Experience dissatisfied dissatisfied dissatisfied satisfied Very satisfied of AT use.

Satisfaction ratings   ○   ○   ○   ○   ○   ○

Transition management

This section seeks to understand your experiences of accessing Assistive/or Accessible Technology during transitions (e.g. Primary school to secondary school or secondary to university)

16. How would you rate your experience of accessing Assistive Technology during the transitions?

	No Experience of AT use	Very Poor	Poor	Fair	Good
From Primary School to Secondary School?	○	○	○	○	○
From Secondary School to University?	○	○	○	○	○

17. How would you rate the process for communication (if any) of your of AT requirements during the transitions from?

	No experience of AT use	Very Poor	Poor	Fair	Good	Very Good
Primary School to Secondary School	○	○	○	○	○	○
	○	○	○	○	○	○

Secondary School to University

18. Did you or any of your educational institutions keep a record of your Assistive Technology requirements?

This may include paper or electronic documents of your current or prospective AT

○ products and service needs. Yes

○ No

○ I do not know

○

Not Applicable (no experience of AT use

D2: Delphi round 2 Questionnaire

⏱ **30 minutes**

Assistive Technology Passport Research study:

The Delphi 'Round 2'

This research study aims to improve the experience of *Assistive Technology users by creating a more joined-up approach to Assistive Technology use in Ireland. This study is part of a PhD research project conducted by Mr. Mohamed Maalim of the Assisting Living and Learning Institute (ALL) Institute, Psychology Department of Maynooth University. The PhD project aims to research the concept of Assistive Technology (AT) passport*, identify its core characteristic and design attributes, and recommend a framework for its development and scalability. * The AT Passport is a platform envisioned to effectively coordinate the needs of an individual with the required AT supports and services.

Thank you for participating in the first round of this three-round Delphi survey study. We are inviting you again to complete round two of the survey, which will take approximately 5 minutes to complete. In this round, we present the statements that reached a consensus. For those statements that did not reach an agreement, we request you consider your previous ratings to help identify additional consensus items.

* Required

Part 1

Electronic consent

1. Clicking on the "agree" button below indicates that:

you have read the above information

you voluntarily agree to continue your participation

you are at least 18 years of age

If you do not wish to continue to participate in this round , please decline participation by clicking on the "disagree" button.

○ AGREE

○ DECLINE

Delphi round two

Thes Investigating the Potential of Assistive Technology Passports for Enhanced Access to Assistive Technology and the Development of an Implementation and Adoption Framework

This section presents the statements that have reached the Consensus and requests you to re-rate those that have not got a

Consensus. Additional items derived from the analysis of the open-ended questions are also included here for your ratings.

2. **AT Passport Functionalities (what it will allow people to do)**

Consensus was reached for the statements that 'The AT Passport should,

Facilitates seamless transitions

Enables effective communication of AT needs

 *

Please reconsider your ratings for the items presented below.

*For each of the statements, please indicate **0** if you disagree or rank on scale of **1 to 5.** if it is necessary (**1**, means "**Desirable but not necessary**" and **5**, means "**Absolutely necessary**").*

The AT Passport should

	0	Disagree	1 Desirable but not Necessary	2	3	
Be a record of a person's (owner) AT use, needs and		○	○	○	○	requirements
Be a source of information on how to access AT including associated supports such as funding sources, local service					○	
○	○	○				
providers, training, maintenance/repair etc.						
Offer anonymous aggregate data of user's AT needs policy and practice		○	○	○	○	to influence AT
Offer a platform for AT users to share information		○	○	○	○	and to network.
Be able to allow a person to have a choice to use or Passport. (New statement)		○	○	○	○	not to use the AT
Facilitate a person's access to AT-related services for example, technical services, assessments, funding, etc., when required.		○	○	○	○	

3. The AT Passport functionalities

Please provide feedback on how the statements you rated in question two above should be changed/framed to be better capture the core AT Passport functionality. *(You may include as many statements as possible)*

AT Passport Design Consideration (Features necessary to make the AT Passport work)

Consensus was reached for the statements that 'The AT Passport should,

Be simple and easy to use

Ensure effective communication

Ensure user experience is at core of design and function

Conform to web accessibility standards

Ensure user controlled access

Be dynamic and flexible

Be digitally accessible: browser and app

Have interoperability (interfaces smoothly with existing systems)

 *

Please reconsider your ratings for the items presented below.

*For each of the statements, please rank on a scale of 0 to 5. (0, means "**Absolutely Unnecessary** " and 5, means "**Absolutely necessary**").*

The AT Passport should

0

	Disagree	1	2	3	4
Have the potential to self learn and offer bespoke recommendations to the user in ◯**order to maximise the use of AT.**		◯	◯	◯	◯
Link to a digital system to capture anonymised data to inform policy and practice	◯	◯	◯	◯	◯ aggregate user
Identify the user by a unique code generated upon registration	◯	◯	◯	◯	◯ first
Not be a condition for a person to access services and should offer a person the choice and control to use or not use it in different contexts.	◯	◯	◯	◯	◯

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5. The AT Passport Design Considerations

Please provide feedback on how the statements you rated in question four above should be changed/framed to be better capture the core AT Passport design considerations. *(You may include as many statements as possible)*

E1: Qualitative study: call to participate.

Call for Participants

Research Title: Access to Assistive Technology (AT): A qualitative study to explore the need for an AT passport and identify its potential characteristics

Principal Researcher: Mohamed Maalim (Maynooth University) at mohamed.maalim.2020@mumail.ie

Research Supervisor: Prof. Malcolm Maclachlan at Mac.MacLachlan@mu.ie

Research Coordinator: xxxxxxxxxxxxxxxxx

Ethical Approvals: Enable Ireland Research Ethics & Quality Committee and Maynooth University's Social Research Ethics Sub-Committee.

Study Overview

The study is concerned with establishing the need and Informing the design and development of an Assistive Technology (AT) Passport. An AT Passport is proposed as a user-focused tool that aims to facilitate access to technology for a person with a disability by considering the person's needs and the system's requirements to support their need. The AT passport is envisioned to have the potential of placing an AT user at the centre of service provision and innovations by effectively coordinating the needs of an individual with the required support and services.

Study Rationale

A recent review of the literature for this project suggested that Assitive Technology (AT) users' participation and ownership in the research, enhanced design and development of an Assistive Technology passport is of paramount importance. This study aims to empirically demonstrate the need for an Assistive Technology passport and inform its design and development.

Study Location

Any Enable Ireland premises where the participants will be located nationally.

Study Design

Participation is in an audio-recorded semi-structured interview not exceeding a maximum of one hour.

Potential Participants

Service users who are currently accessing services /supports at Enable Ireland services.

Maximum of 18 participants; 3 each under the following areas of disability,

Physical disability with primary mobility issues

3 Participants

Over 18

Communication

3 Participants

ASD, speech and language difficulties.

Any age group

Hearing

3 Participants

Age group; over 50

Vision

3 Participants

Any age group

Specific Learning Disability

3 Participants

Under 18

Dyslexia, Dyscalculia, Dysgraphia

Mild Intellectual Disability

3 Participants

Over 18.

Potential Benefits for Partcipation

This study provides the participants, who are themselves users of Assistive Technology (AT,) an opportunity to contribute to shaping the development of a AT passports, which they may subsequently use to enhance their service experience.

Data Protection Issue

Participation in this study is voluntary and data collected will be confidential. All necessary steps will be taken to conform with both Enable Ireland and Maynooth university's ethical standards.

Dissemination of Findings

A final report on the d findings of this study will be made available to Enable Ireland. All Enable Ireland service user's regardless of whether they participated in this study will also be provided with a link to the final report from the study.

In case of a problem

If during your participation in this study you feel the information and guidelines that you were given have been neglected or disregarded in any way, or if you are unhappy about the process, please contact the Secretary of the National University of Ireland Maynooth Ethics Committee at research.ethics@nuim.ie or +353 (0)1 708 6019 or Enable Irelands at research ethics and quality coordinator at llingwood@enableireland.ie Please be assured that your concerns will be dealt with in a sensitive manner.

E2: Quantitative study and Delphi round: call to participate.

As part of his PhD requirements, Mohamed Maalim, a 3rd year doctoral student in the Assisting Living & Learning Institute (ALL), Department of Psychology, Maynooth University is undertaking a research study under the supervision of Prof. Malcolm MacLachlan and he needs your help and input. You are invited to participate in this research study if you are a user or potential user of Assistive Technology.

Take a look at the Information Sheet about this Study including the purpose of the study, the consent details and contact information.

We would be grateful if you could complete this **2-part online AT passport survey about your knowledge and experience of using Assistive Technology throughout your journey in education**. The survey will take about 10-15 minutes to complete.

At the end of part 1 of the study, you have an opportunity to continue to part 2 or to opt not to continue. If you opt not to continue, you will be prompted to submit your responses for part 1. If you do decide to continue your participation to part 2 of the study, the ALL Institute will donate a sum of money to the Maynooth University Access Programme (MAP) based on the following:

- 500 Euro to MAP if more than 200 but less than 400 people participate
- 1000 Euro to MAP if more than 400 but less than 600 people participate
- 1500 Euro to MAP if more than 600 people participate.

Deadline: Monday 13 December at 6pm

URL to Survey: https://forms.office.com/Pages/ResponsePage.aspx?id=zPVUFDW7hUa72YYh_YBVyVqHIGXJGWZIlPrI8jkTlGlUNUpFSzYwNEZERTBIMjQzM0JaSlZIUlk5OS4u

poster call for survey about assistive technology

E3: Call round two Delphi

Re: Current MU students with Assistive Technology contact

MOHAMED ISAACK MAALIM <MOHAMED.MAALIM.2020@MUMAIL.IE>

Wed 09/02/2022 16:32

To: Simon Ahern <Simon.Ahern@mu.ie> Hi Simon

Please see the draft email below for your review and sending out.

Following an earlier call to participate in a [2-part online AT passport survey about your knowledge and experience of using Assis ve Technology throughout your journey in educa on](#), issued towards the end of the last term, Mohamed Maalim (doctoral student in the Assis ng Living & Learning Ins tute (ALL), Department of Psychology, Maynooth University) who is undertaking this research study wishes to register his gra tude for your par cipa on.

If however, you did not get a chance to take part, this call has now been extended further and

Mohamed needs your help and input. please take a look at the [Informa on Sheet about this Study](#) including the purpose of the study, the consent details, and contact informa on. The survey will take less than 10-15 minutes to complete.

At the end of part 1 of the study, you have an opportunity to con nue to part 2 or to opt not to con nue. If you opt not to con nue, you will be prompted to submit your responses for part 1. If you do decide to con nue your par cipa on in part 2 of the study, the ALL Ins tute will donate a sum of money to the Maynooth University Access Programme (MAP) based on the following:

500 ○ **Euro to MAP if more than 200 but less than 400 people par cipate 1000 Euro**
 ○
to ○ **MAP if more than 400 but less than 600 people par cipate 1500 Euro to MAP if more than 600 people par cipate.**

Please note that, if you previously completed part 2 of this study, Mohamed will link up with you again following comple on of this round of the call. Thanks again.

Deadline: Monday 28th February.

Regards

Mohamed

From: Simon Ahern <Simon.Ahern@mu.ie>

Sent: 09 February 2022 15:27

To: MOHAMED ISAACK MAALIM <MOHAMED.MAALIM.2020@MUMAIL.IE>

Subject: Re: Current MU students with assistive technology contact

Hi Mohamed, this is a copy of the call that was issued. Kind regards, Simon

As part of his PhD requirements, Mohamed Maalim, a third-year doctoral student in the Assis ng Living & Learning Institute (ALL), Department of Psychology, Maynooth University, is undertaking a research study under the supervision of Prof. Malcolm MacLachlan. He needs your help and input. You are invited to participate in this research study if you are a user or potential user of Assistive Technology.

Take a look at the information Sheet about this Study, which includes the purpose of the study, the consent details, and the contact information.

We would be grateful if you could complete this **2-part online AT passport survey about your knowledge and experience of using Assis ve Technology throughout your journey in education**. The survey will take about 10-15 minutes to complete.

At the end of part 1 of the study, you have an opportunity to continue to part 2 or to opt not to continue. If you opt not to continue, you will be prompted to submit your responses for part 1. If you do decide to continue your participation to part 2 of the study, the ALL Institute will donate a sum of money to the Maynooth University Access Programme (MAP) based on the following:

500 Euro
- Euro to MAP if more than 200 but less than 400 people participate, 1000
- to MAP if more than 400 but less than 600 people participate, and 1500 Euro to MAP if more than 600 people participate.

Deadline: Monday 13 December at 6 pm

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id=zPVUFDW7hUa72YYh_YBVyVqHIGXJGWZIlPrl8jkTlGlUNUpFSzYwNEZERTBIMjQzM0J

aSlZIUlk5OS4u poster call for survey about assistive technology.