



‘It makes me my own person’

## The impact of assistive technologies on the lives of people living with a disability in Ireland

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### Note on language use

In this report, the terms 'person with a disability/persons with disabilities' and 'disabled person/s' are used interchangeably, in line with National Disability Authority (NDA) guidelines on language and terminology (NDA 2022). The term 'disabled people' aligns with the social and human rights model of disability highlighting that people with an impairment are disabled by barriers in society and the environment. However, some prefer the term 'persons with disabilities' recognising that, first and foremost persons are human beings entitled to human rights. Person-first language is used in the UN Convention on the Rights of People with Disabilities (UNCRPD) (UN 2006) . For ease of reading, the abbreviation PwD is used to represent both terms throughout this report. Nonetheless, the authors recognise that individuals may choose one, both, or neither of these terms as representing part of their personal identity. The term 'students' is also used as a preferred term by those attending Rehab Group educational programmes through the National Learning Network. National Learning Network is the Education and Training Division of Rehab Group. Students attend National Learning Network. RehabCare is the Health and Social Care Division of Rehab Group. People use RehabCare Services.

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# Foreword

Rehab Group is a person-focused organisation. In our strategy, Delivering our Future, we committed to embracing technology to maximise our effectiveness at both organisational and individual levels. While the in-person, social nature of our care and learning remains essential, we also recognise the transformative potential of technology. With the right supports, assistive technologies (ATs) can empower people with disabilities to achieve greater independence.

In 2022, through the Health Service Executive's CREATE initiative, we launched DAT Central, Rehab Group's Digital and Assistive Technology Service. By 2024, over 400 individuals had benefitted from DAT Central. To guide future service delivery, we commissioned a research study to explore AT's impact on the lives of people with disabilities and their Circles of Support.

This study by NetwellCASALA, Dundalk Institute of Technology, highlights AT's transformative potential and aligns with global recommendations in the WHO and UNICEF Global Report on Assistive Technology (GReAT) report. The GReAT report recommends integrating AT provision into education, health, social care, and employment, supported by robust national policies. The study echoes this need, calling for a national AT database, increased awareness, and cost-benefit analyses to inform strategic decisions.

Rehab Group is acting on these recommendations. We will invest in staff training, strengthen technical support, and continue sharing the many case studies we have that demonstrate AT's impact on people's lives. These stories best illustrate the life-changing potential of AT when implemented using person-centred thinking, person-centred planning and innovative practices.

As we look to the future, we call on all stakeholders to amplify the voices of disabled people and advocate for a rights-based approach to provision of AT. Together, we can ensure equitable access to assistive technologies for all, across the lifespan.

**Barry McGinn,**  
CEO, Rehab Group



# Introduction



Assistive technology (AT) can be defined as “any product whose primary purpose is to maintain or improve an individual’s functioning and independence and thereby promote their wellbeing” (Khasnabis et al., 2015). The spectrum of AT is broad, ranging from simple, low-tech solutions (e.g., digital magnifier) to complex, high-tech solutions (e.g., brain-computer interface). However, in general, two dimensions to AT are recognised; one being AT devices and the other being AT services.

An *assistive technology device* is “any item, piece of equipment, or product system, whether acquired commercially, modified, or customised, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.” (Alper & Raharinirina, 2006). An *assistive technology service* is used to describe “any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device” (Alper & Raharinirina, 2006).

Significant technological advancements in recent years have resulted in rapid developments in information and communications technology (ICT) based ATs. While some ATs currently available are expensive and complex, many others are low tech and relatively inexpensive, while still offering much potential for people with disabilities (PwD). Some examples of low-tech ATs include magnifying lenses, adapted utensils, eyeglasses and Velcro fasteners. Usually, low-tech solutions are simple devices that don’t require a power source. More high-tech ATs include electric wheelchairs, speech generating devices or computer-based technologies.

The World Health Organization (WHO) estimates that 2.5 billion people currently need one or more ATs (World Health Organization, 2022). This includes PwD, older persons, and people with chronic conditions. However, despite the positive impact ATs can have, access to them is limited in many countries. In some countries, as few as 3% of people requiring ATs have access to them (World Health Organization, 2022).

For PwD, AT has enormous potential to improve quality of life, enabling better functioning and greater independence in activities of daily living (Baldassin et al., 2018; Nam & Kim, 2018). In addition to benefits in the areas of physical functioning, AT usage can also help people gain access to education (Erdem, 2017), with ATs linked to higher participation and engagement in higher education (McNicholl et al., 2021). Furthermore, AT usage positively impacts on employment opportunities (Yeager et al., 2006) and can help enhance social interactions for users (Krishna et al., 2010). There is also evidence demonstrating that the provision of AT can decrease the sense of burden on caregivers of PwD (Mortenson et al., 2013).

For some people with disabilities, speaking may not be their primary method of communication. Augmentative and alternative communication (AAC) technology encompasses a diverse range of tools and strategies which can help to compensate for communication impairment and support others to communicate more effectively. AAC devices are critically important in the context of the Assisted Decision-Making (Capacity) Act 2015 (Government of Ireland, 2015). This Act is about supporting decision-making and maximising a person’s capacity to make decisions. AAC devices are a tool that can enable people with communication challenges to actively participate in decision-making processes. It is estimated that 0.5% of the United Kingdom (UK) population need AAC resources since they cannot achieve their everyday communication demands through natural speech (Creer et al., 2016). The field of AAC incorporates various methods such as speech-generating devices, symbol-based communication systems, and computer-based applications to facilitate expression and comprehension for people who have difficulty with verbal communication. AAC technology is highly customisable, allowing users to select modalities that best suit their needs and preferences, whether through touchscreens, switches, eye-tracking systems, or other input methods. By providing alternative means of communication, AAC technology empowers individuals with disabilities to engage more fully in social interactions (Mcnaughton & Bryen, 2007), and participate actively in education (Mophosho & Masuku, 2021), employment (Isakson et al., 2006), and everyday life, ultimately enhancing quality of life and fostering greater inclusion within society (Krüger & Berberian, 2015).



## **Problem Statement and Study Purpose**

## Problem Statement

Despite the benefits of AT and the progress made in terms of technological development, there is still underutilisation of ATs (World Health Organization, 2022). Barriers for PwD in using ATs include the cost and the lack of technical support (Tanis et al., 2012). Provision of training and support has also been highlighted as a means to increase the utilisation of ATs (Darcy et al., 2017; O'Sullivan et al., 2023). However, a first step towards better uptake and use of AT is to better understand the experiences of those who have engaged with it. Although there is much research examining the potential of AT use to assist PwDs, few studies have examined the impact of using ATs among PwD in an Irish context (O'Neill et al., 2020). In addition, most studies are focused on children or the student population. Since the population of PwD is diverse, and given population ageing, there is a need to examine the impact among PwDs aged 18+ years. In addition to examining the experiences of using ATs among PwD, views are also needed from those in their circle of support (CoS). A CoS refers to a group of people coming together to assist a person with a disability in formulating, promoting, and supporting their goals (HSE, n.d.). The individual with a disability is at the centre of the circle. The CoS helps identify the resources required to make things happen and can play a key role in the person-centred planning process (HSE, n.d.).

## Study Purpose

This work was conducted on behalf of Rehab Group, a charity organisation in Ireland which advocates for, supports, and provides services to people with disabilities (PwD) and their families. Rehab Group, a key participant in the Health Service Executive's (HSE) Cooperative Real Engagement for Assistive Technology Enhancement (CREATE) initiative, commissioned a study on Assistive Technology (AT). The second phase of the initiative launched in January 2024. As one of nine organisations involved in CREATE II, Rehab Group aims to enhance access to Digital and Assistive Technologies (DAT) to significantly improve the daily lives of people with disabilities in Ireland. With funding from CREATE, Rehab Group established DAT Central, a comprehensive resource for those with DAT needs within the organisation. Recognising the importance of external evaluation, Rehab Group engaged researchers to assess the impact of AT on students in the National Learning Network (NLN), services users in RehabCare, and their support networks. The study will provide evidence-based insights to guide service improvements in 2025 and beyond.

First, a review of the current academic literature was undertaken to evaluate the impact of AACs on PwD and members of their Circle of Support (CoS). Secondly, a qualitative research study was undertaken to explore and understand the experiences of PwD, and CoS members, about the adoption of ATs. The findings of this work will inform the development of an Impact Report for Rehab Group's Digital and Assistive Technology, DAT Central. This Impact Report aims to enhance organisational learning and contribute to broader systemic improvements by strengthening interoperability and the sharing of DAT resources among organisations serving people with disabilities in Ireland. Findings from both the literature review and research study are presented below, following a description of the relevant study methodology.





## Methods

Literature Review

The purpose of the literature review was to explore the extant research in the field of AT. A wide range of needs can be met with ATs, the most common AT application areas can be classified into eight categories; Augmentative and alternative communication (AAC), adapted computer access, devices to assist listening and seeing, environmental control, adapted play and recreation, seating and positioning, mobility and powered mobility, and prosthetics. The focus of this literature review was on AAC, due to the high demand for AT to support communication needs including AAC devices amongst students in NLN and service users in RehabCare.

Rapid reviews, also known as scoping reviews, are reviews that generate information quickly by methodically mapping a body of literature. A rapid review was conducted to gather, review, and synthesise the existing evidence concerning the use and impact of AAC by adults with disabilities. This review engaged in a broad search to compile the widest breadth of documents as possible concerning the subject of interest.

Research Question

The purpose of this literature review was to investigate the following research question:

*What is the impact of AAC on the lives of PwD?*

Literature Search Strategy

A systematic search for relevant literature was conducted in various electronic databases. The SPIDER framework was used to develop the search strategy (Cooke et al., 2012). To be considered for inclusion in the present review, articles needed to meet the inclusion criteria listed in Table 1.

Table 1 SPIDER framework for literature search strategy

Sample:	Include studies involving individuals with disabilities aged 18 or above.
Phenomenon of Interest:	Include studies examining the use of Augmentative and Alternative Communication (AAC) devices.
Design:	Include randomised controlled trials (RCTs), non-randomised controlled trials, cohort studies, and descriptive studies (e.g., surveys and incidence reports), as well as qualitative studies (e.g., focus groups, interviews) and mixed-methods studies.
Evaluation:	Include studies that assess the effectiveness in terms of quality of life, well-being, and satisfaction in the lives of people with disabilities. Include studies that explore the experiences and perceptions of people with disabilities regarding the use of AAC devices.
Research type:	Include quantitative, qualitative, and mixed method studies. Studies included were published in a peer-reviewed journal before January 2024 and were published or translated into English.

Research Study Design

To explore the lived experiences of PwD and CoS members, a qualitative exploratory approach was adopted. Qualitative methods, such as interviews and focus groups facilitated by trained researchers, are effective in providing appropriate, comfortable, and flexible environments where participants can explore and express views and lived experiences in a manner that is personally meaningful. To ensure the perspectives and voices of all stakeholders were included from the initial research design stage, a multi-stakeholder Research Advisory Committee (RAC) was formed to include an academic researcher, living lab practitioner, service provider and a disabled person with disability advocacy experience. The RAC guided the research process by providing input to the research design, consent process, participant forms and information documents, and ethics application development, as well as providing feedback following data analysis where contextual clarification was required. Inclusion of an RAC in the project is in line with national patient and public involvement in research (PPI) guidelines.

## Interview and Focus Group

In collaboration with members of the RAC, guide documents were developed for semi-structured interviews with AT users, as well as focus groups or interviews with CoS members. Since the ATs adopted differed across users, the objective of the interviews was not to evaluate specific ATs but rather to explore (1) the lived experience of using an AT intervention for the user and (2) views of CoS members about the impact of engagement by AT users. Study information and invitations to participate were circulated to CoS actors and current AT users aged 18+ years, by a co-researcher at Rehab Group. Interested persons were contacted by the academic research team who coordinated study participation. Written informed consent was obtained from those taking part, prior to scheduling interviews and focus groups.

## Participants

NLN students and people accessing services within Rehab Group, who were aged 18 years of age or over were invited by the Rehab Group AT Officer to participate in the study. A purposive sampling approach was employed to ensure those participating had relevant experience using their AT. Those with a significant cognitive impairment, or those unable to understand or communicate in the English language, or provide informed consent, were excluded from participating.

## One-to-One Interviews

Interviews were guided by a topic list and conducted online at a time convenient for the participant. An online format for data collection was deemed suitable by Rehab Group as students in NLN and people accessing services in RehabCare have experience, at times with supporters, with online collaboration. Online interviews, while convenient and cost-effective, have several limitations as a method for data collection (Janghorban et al., 2014; Salmons, 2014). One drawback is the potential for technical issues, such as poor internet connectivity or software malfunctions, which can disrupt the flow of conversation and impact the quality of data. Also, the absence of physical presence may hinder reading non-verbal cues, limiting the depth of interaction and understanding. To ensure comfortable engagement by participants some interviews were co-facilitated by a support worker in an advocacy or translation capacity. Co-facilitation of such interviews was based on the needs and preferences identified by individual participants.

## Focus groups

Focus groups were conducted with people within the CoS of AT users. Comprised of Rehab Group staff across a range of roles, these key support personnel provided a perspective on the impact of AT on the lives of a range of PwD and on their own experiences in a support capacity. Focus group interviews took place online and the conversation was led by an academic researcher as facilitator, who asked questions and stimulated the discussion. Interviews and focus groups were audio-recorded, and a verbatim transcript produced from the recording. All transcripts and audio files were deleted or destroyed following data analysis and submission of the final report to Rehab Group.

## Data Analysis

A qualitative thematic analysis was conducted on interview and focus group data, supported by NVivo software. The data analysis method, described by Viasmordi et al. (2013, 2016), was used and included the specific stages of:

- **Familiarisation with Data:** This involved thoroughly reading the data to get an overall sense of the content, helping the academic researchers become acquainted with key themes and ideas.
- **Generating Initial Codes:** The data was segmented into meaningful groups through coding. This process involved identifying patterns or recurring ideas in the data.
- **Searching for Themes:** Codes were grouped into broader categories or themes that represented significant patterns. Themes reflect larger concepts that were identified in the coded data.
- **Reviewing Themes:** The academic researchers revisited and refined the identified themes. This stage ensures themes are coherent and accurately represent the data.
- **Defining and Naming Themes:** Themes were clearly defined and named to capture their essence, providing a structured framework for interpretation of the data.

These stages were followed to ensure a systematic approach to identifying and interpreting patterns within the qualitative data (Vaismoradi et al., 2013, 2016).

### Ethical and Data Protection Considerations

Ethical approval to conduct this study was provided by the School of Health and Science Ethics Committee in Dundalk Institute of Technology and the Research and Ethics Committee of Rehab Group. In line with Rehab Group policies and NetwellCASALA protocols, all researchers working on the study had completed garda vetting as well as safeguarding vulnerable adults and data protection training prior to initiation of the study. Data processing and management was undertaken in line with the policies in place by Rehab Group (available at <https://rehab.ie/wp-content/uploads/2023/04/NLN-Data-Protection-Notice-3.pdf>) and NetwellCASALA at Dundalk Institute of Technology (available at [Data Protection FAQs / Frequently Asked Questions / DkIT - Dundalk Institute of Technology](#)). Data protection measures included completion of a data processing impact assessment and data-flow mapping in line with NetwellCASALA's standard research protocols.





## Literature Review



Augmentative and Alternative Communication is a diverse field encompassing various strategies and technologies designed to support individuals with communication impairments. It can involve adding to (augmenting) natural speech or writing.

AAC technology can also support users communicate by providing an alternative to speech. AAC solutions can be categorised as high-tech, low-tech or no-tech. High-tech options include using an app on an iPad/tablet device to communicate, or using voice technology, sometimes called a speech generating device or a voice output communication aid (VOCA). These devices, also known as 'Talkers' produce speech through computer technology for PwD who find it difficult or impossible to produce understandable speech on their own. Other aided options can be low-tech or no-tech, including communication books or boards (non-powered), written words on paper, photographs, or pictures (i.e. Picture Exchange Communication System (PECS)). The field of AAC also encompasses unaided modes that rely solely on a user's body to convey messages, such gestures and facial expressions.

AAC technology has a profound impact on individuals' lives across a number of domains. This literature review presents a synthesis of research examining the range of AACs and the impact they have on the lives of PwD, namely on; communication, social participation, well-being, and educational and vocational attainment.

## Communication Impact

Numerous studies have demonstrated the positive impact of AAC on communication abilities. AAC technology significantly improves individuals' ability to express themselves and understand others, leading to increased participation in social interactions and improved quality of life (Beukelman & Mirenda, 2013). Millar and colleagues conducted a review to examine the impact of AAC on the speech production of individuals with development disabilities (Millar et al., 2006). This review included 23 studies, involving 67 individuals and found that the majority of individuals demonstrated gains in speech after an AAC intervention. The findings of another review by Baxter and colleagues showed that high-tech AAC aids may be beneficial to enhance communication across a broad range of diagnoses and age ranges (Baxter et al., 2012b). Rispoli et al. (2010) conducted a systematic review addressing the use of speech-generating devices with persons experiencing developmental disabilities and reported positive outcomes in communication skills in 86% of the 35 studies included (Rispoli et al., 2010). A more recent scoping review provides evidence that individuals (children and young adults) with multiple disabilities can also learn to use AAC devices to enhance communication (Brittlebank et al., 2024).

## Social Participation

AAC technology promotes social inclusion by enabling individuals to establish and maintain relationships based on improved communication. McNaughton and Light explored the implications of using the iPad and other mobile technologies, by individuals who rely on AAC systems, and highlighted the potential of these portable technologies in enhancing communication accessibility and consequently participation in various contexts (McNaughton & Light, 2013). Using the iPad and other mobile technologies has brought AAC into the mainstream. The harnessing of such ubiquitous technology has resulted in increased social acceptance and less social stigma attached to using AAC (ibid).

Lancioni and colleagues conducted a literature review to explore the effectiveness of technology-aided pictorial cues in supporting the performance of daily activities among adults with intellectual disabilities, including those who rely on AAC systems (Lancioni et al., 2012). Their work highlighted the potential of AAC technology to enhance the quality of life for individuals with intellectual disabilities by promoting autonomy, self-determination, and social inclusion. Further, AAC has been found to have a positive impact, assisting adults with cerebral palsy and complex communication needs to be in contact with their siblings over the course of their lives (Dew et al., 2011).

## Well-being Enhancement

Research suggests that AAC interventions positively impact psychological well-being. It has been shown that AAC aids can improve quality of life and mood in people with speech disorders in progressive neurological conditions (Londral et al., 2015). Other research has also shown positive impacts on measures of psychological well-being and quality of life, not only in people with physical disabilities but also for their caregivers (Corallo et al., 2017; Maresca et al., 2019).

## Educational and Vocational Attainment

AAC technology has been found to facilitate access to education and employment opportunities. For example, several qualitative studies have demonstrated that people who use AAC can achieve positive educational and employment outcomes (McNaughton et al., 2002; McNaughton & Bryen, 2002). In educational settings, AAC technology can enable students to participate actively in classroom discussions, complete assignments, and engage in collaborative learning, fostering inclusivity (Lacono et al., 2016). Similarly, in the workplace, AAC technology supports employees in communicating with colleagues, clients, and supervisors, thereby increasing productivity and integration into professional environments (Bryen, 2008). Studies have shown that AAC not only improves communication but also enhances self-esteem and independence, leading to greater social participation and professional success (Light & McNaughton, 2014).

## Limitations of Assistive Technologies

Despite the beneficial impacts AACs can yield for many, the effectiveness of AAC can be compromised in conditions where multiple body systems are affected. For example, in conditions such as Friedreich Ataxia, physical limitations and visual disturbance can constrain the use of AAC (Gibilisco & Vogel, 2013). These limitations make it challenging to efficiently use or see a cursor on screen, or manipulate buttons on a device (e.g., phone/ tablet). Speech-to-text algorithms have limited capacity to recognise unclear target words, eye gaze technology has difficulty accurately tracking jerky eye movements and all approaches require training, patience, content expertise from clinicians or support workers. Furthermore, use of ATs is often fatiguing for the AT user, thereby limiting the extent to which it can effectively be utilised.

Other issues influencing uptake include the quality of voice in AACs. While significant work has been conducted to improve computer voices, research has highlighted the limitations of systems in terms of the appropriateness of the voice generated (Wickenden, 2011). Appropriateness can include concerns about comprehension or of the acceptability of the voice by the AT user, as a reflection of their identity. Others have reported limited vocabularies of the technologies as presenting an obstacle to effective usage of AT functionality (Bailey et al., 2006).

Finally, it has been reported that disability support practitioners face a variety of challenges in successfully implementing AAC tools, such as the lack of technical support, lack of availability of local AAC services, and need for training (Baxter et al., 2012a). Research has highlighted the significance of family members in the successful implementation of an AAC system, with the perception that family attitudes such as high levels of specialist or technical information is required to use the AAC technology, could act as a barrier to implementation (Iacono & Cameron, 2009; Lund & Light, 2006).



## Research Study Findings

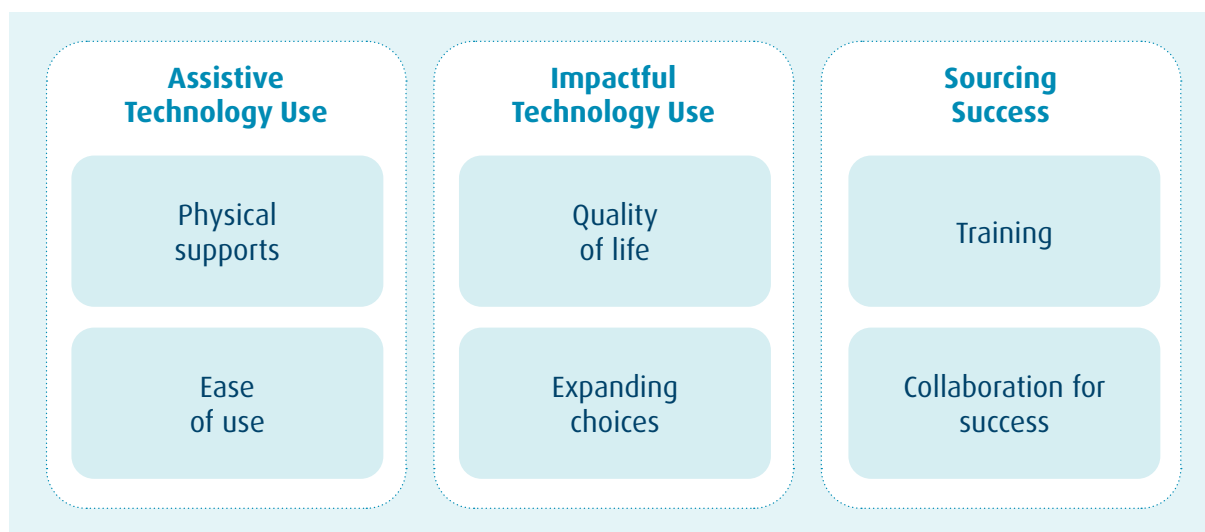
## Participants

Circle of Support (CoS) members (n = 6) participated across two focus groups. Individual interviews were conducted with (n = 2) CoS members who were unable to attend the scheduled focus group. Interviews were conducted with AT users (ATUs) who were students or users of RehabCare services (n = 5). All focus groups and interviews were conducted using videoconferencing (Microsoft Teams/Zoom), as this is one method of communication used by Rehab Group when engaging with students in NLN and users of RehabCare services if they are not physically present at a Rehab Group location. In the following text, quotes are attributed to participants using a pseudonym to replace their name or trial identification code, sex, and their role (CoS or ATU) for example, (Martha, ATU, female) - See Table 2 for a list of participants. Where examples or personal experiences were recounted, that could result in personal identification despite pseudo-anonymisation, such examples have not been used in the report.

**Table 2. Participant Pseudonyms**

Circle of Support (CoS) Participants		
Pseudonym	Gender	Role
Joe	Male	Instructor
Mary	Female	Instructor
Alice	Female	Community Support worker
Geraldine	Female	Instructor
Tony	Male	Senior project executive
Peggy	Female	Instructor
Lily	Female	Behavioural therapist
Marian	Female	Residential service manager
Assistive Technology User Participants		
Sheila	Female	
John	Male	
Martha	Female	
Rose	Female	
Cathy	Female	

From the interviews and focus groups conducted, three themes were identified across the dataset: AT use, Impactful ATs, and Sourcing Success. Two sub-themes were identified within each theme, as presented in Figure 1.



**Figure 1 Themes and sub-themes**

## Assistive Technology Use

*'It's a really cool piece of kit!'* (Tony, Male, Senior Project Executive)

When asked to consider the purpose of ATs, CoS participants identified several reasons for employing ATs. Most prominent was the position that ATs should enable people with disabilities by removing barriers and enabling full participation in all aspects of life, *'it is something in place that makes life that little bit easier or makes things accessible to students,'* (Geraldine, female, instructor). ATs don't have to be computer-based or digital but rather any tool that meets the objective of supporting greater autonomy, independence, participation, or engagement would be considered an AT. Tools that enable integration with the wider community, as well as providing both choice and control, were considered relevant,

*'... anything we can do to support them, in their ability to self-manage and you know be independent adults, making choices and decisions for themselves that's all going to be for the good,'* (Alice, female, community support worker).

The importance of agency and choice were further highlighted by CoS members who recognised that service users have dreams and goals and that ATs can play a role in achieving these, *'the use of technology to assist a person to achieve a goal or... a target that they set out for themselves'* (Joe, male, instructor). Participants had direct experience of using, or were aware of others using, a variety of ATs. Considering this broad definition of what constitutes an AT, participants described not only AACs but also other forms of ATs and provided accounts of how these were used, sourced, and integrated into routines. The devices described in the interviews or focus groups are listed in Appendix A along with a short description of the AT. This is not an exhaustive list of ATs available but represents a range of options already in use across Rehab Group network of services. In summary, the ATs identified were used to assist with reading, hearing, speech or communication, learning, literacy, and independent living.

## Physical (visual, hearing, speech etc.) supports

*'the hearing aids make a huge difference, and to her [AT user's] speech as well.'* (Geraldine, female, instructor)

Communication ATs, or AACs, make it easier to communicate with a wider number of people. Irish Sign language, (ISL) and its derivative, Lámh, is not widely understood in society. Even for those who have received the training, CoS participants noted that unless being used regularly it is easy to forget. By contrast, words or images generated by an AT can be more widely understood. This means the social contact and interaction possibilities for AT users are greatly broadened, *'you don't want, guys in their 20s and 30s to be fully reliant on a staff member to ask for a cup of tea when*



*they go out or order something or just be part of their community'* (Marian, female, residential services manager). Being able to communicate with more people and using a mobile phone or tablet device to do so is also more socially acceptable allowing AT users to 'blend in' to society, *'you're not standing out because it's not unusual to use it [phone or tablet]'* (Lily, female, behavioural therapist).

Inability to communicate causes high levels of stress, which can have health consequences over time. Where ATs can assist service users to communicate, key workers expected the resulting reduction in stress levels could have longer-term health benefits, *'if you're reducing personal stress, you're reducing the cascade effect that happens with stress'* (Lily, female, behavioural therapist). The benefit of enhanced communication ability is especially pertinent in the case of PwD who may be in pain or distress. Communication ATs can facilitate faster reactions to pain or physical distress by enhancing understanding by those in the circle of support, enabling rapid responses, *'rather than kind of trying to guess what's going on'* (Lily, female, behavioural therapist). Even if what is being communicated, through the use of ATs, is to *'go away and leave me alone'*, CoS members identified this was preferable to the worry of trying to guess if the person is in pain, is worried about something, or has something else causing distress. For the AT user the ability to express themselves using the AT was considered to also reduce stress and frustration.

CoS participants noted that the effort of masking challenges being experienced can be difficult for users of their services. Being better understood and supported to learn using ATs, while also being themselves, reduces performance stress and can also mean being less exhausted after a day in the classroom,

*'what happens is they go home in the evening and because they have spent 6 hours here, you know being perceived as neurotypical and then they go home and you know you might get a message from parents the following day, they are tired, they are not able to come in today because, maybe something was too much or there was a centre outing or something like that and they just need to... time to relax and catch up.'* (Geraldine, female, instructor)

CoS participants noted that ATs can be used to diffuse communication frustration, *'if we could identify an appropriate form of communication, for our residents, it would definitely reduce anxieties, frustrations which would reduce behaviours of concern'* (Marian, female, residential services manager). Inability to communicate due to limited vocabulary or language ability can, over time, result in the development of personal or idiosyncratic ways of asking for things that are understood by family or close acquaintances but not by others. ATs that can facilitate expression can play a role in mitigating behaviours borne out of frustration,

*'there's definitely people where if they could press the button or if they could like use a tap to talk, it would reduce the need for them to use behaviour to get what they want, or you know they could just say I don't want to, or no or stop instead of maybe having an outburst.'* (Lily, female, behavioural therapist)

For some users, other physical benefits of ATs were identified, for example for those with autism who need to stim, the use of resistance bands, or fidgets were considered assistive. For example, devices described in a quiet room for de-escalating agitation and encouraging relaxation in one centre, includes music playing and a colour-coded timer to assist with calming and returning to the classroom. In one centre, physical benefits reported from using a driving simulator included upper body exercise, from the motion of using the steering. In addition, concentration and hand-eye coordination were observed as developed and improved from using this technology.

## Ease of use

The AT users interviewed largely spoke about finding the technologies they engaged with as 'easy to use'. For one user this was partly because only one of the available features of the AT was being used, to meet their identified needs, *'I don't need to worry about the other functions on it, they're not really relevant,'* (Sheila, female, ATU). Indeed, the ability to use individual features of ATs to meet specific needs was seen as a benefit especially if learning to use more complex aspects of the AT was not required. One commonly available digital tool is the QR menu in restaurants. The ability to use this widespread feature with a mobile phone app has the potential to be life-altering for some disabled people,

*'I remember the first time I saw one of the people that I work with use it and his face like, it was just amazing because, I suppose for the vast majority of his life, he would have had someone support him with his grub, and I wouldn't say feed him, but he wouldn't have the ability to make his own dinner. So, for him to walk into a restaurant, pick up his phone, order his food and for it to be put down in front of him, all of his own accord is massive' (Alice, female, community support worker).*

Some assistive technologies designed for use by people with physical or cognitive disabilities are modifiable, such as options for textured buttons, magnification, or addition of grips or handles, making them useful for a broad range of users. However, modification options may be limited to magnification, lighting, volume, or text-speech features in technologies designed for wide consumer use. Unless designed specifically as a modifiable AT, issues with grip or coordination can render some ATs inaccessible for end-users, *'where somebody's disability won't allow them to avail of something that could be potentially beneficial for them'* (Alice, female, community support worker). Nonetheless, the increasing portability of ATs was highlighted as a welcome development in the design of ATs. In particular, the potential benefits of a rapidly expanding range of in-phone apps were highlighted, *'that would be one of the benefits... something that's portable. That, you know... you could use it on your phone, it could be an app, you know, something like that'* (Marian, female, residential services manager).

## Limitations and challenges

Despite an overall positive report on ATs, participants identified a range of challenges and barriers when using ATs. Power outages were highlighted as problematic where ATs were used for assisting independent daily living functions such as door openers. Similarly, the need to ensure devices are charged before use presents an ongoing challenge in training centres, to ensure students and instructors are not delayed while waiting for ATs to be ready for use in the classroom. Likewise, CoS members noted that users can be unaware or forget to top-up their phone credit for wi-fi access or to charge their device at home.

Linked with this, frustration was identified as users encountered regular software update requirements and password or authenticator security features for which support is required, *'They have to log in. We've authenticators and every time, "Alice this is my number can you let me in", and you're doing that by 33 students!'* (Alice, female, community support worker). Firewalls and cybersecurity measures were also reported as presenting significant accessibility challenges for AT users and those supporting them. This was identified as a particular issue arising when technology is provided by a service. Necessary security protocols can result in limiting the functionality of ATs rendering them of reduced value to users, such as by limiting access to online platforms or resources.

It was noted that the rate at which the software is being developed can quickly outpace the capabilities of the hardware being used. Difficulties in sustaining use of a software-based AT without upgrading costly hardware. The constant need to update software and hardware can also be problematic for AT users, often requiring support to trouble-shoot technical issues as they arise. Initial set-up of some tools can be time-consuming and resource heavy, such as setting up the necessary selection of words and pictures in the Kahoots software or PECS systems. It was suggested by CoS members that this could result in inefficient or minimal use of a resource with more to offer the user.

Web design features were identified as posing challenges for those using screen readers, with website layouts making it difficult to negotiate and locate the content sought. Multiple links, header layouts, and other design features can present barriers that screen-readers are unable to overcome. Environmental challenges reported included ambient noise and conversation in the classroom, such as when transcribing using the speech to text function on Microsoft Office Word. For one student using a microphone linked to their hearing aid, the ability to hear conversations, even outside the classroom, was recognised by her CoS member who noted, *'it must be very off-putting for her!'* (Tony, Male, Senior project executive). Continued research and work on accessible design is required to overcome such challenges.

## Impactful Assistive Technologies

*'it [AT] can be life changing for the guys we support' (Marian, female, residential services manager)*

Several supportive roles ATs were deemed to play for PwD were identified. Specifically, participants credited ATs with supporting learning and self-actualisation. Furthermore, ATs can help with physical disabilities such as vision, hearing or speech impairment, thereby increasing physical function for more autonomous engagement in daily living. Finally, ATs were deemed effective in expanding the choices and agency potential of those using them.

## Quality of life

*'...confidence, self-esteem, independence, you know these are all things that everybody is entitled to and has their right to...' (Geraldine, female, instructor)*

Benefits of ATs include greater independence, confidence, autonomy, and a sense of control over their lives. For AT users, the result is often a greater sense of calmness, happiness, and control *'because they can communicate about their choices'* (Lily, female, behavioural therapist). Before using an AT, some students would not have the ability to speak and struggled to communicate their needs, for example one AT user had not been able to access the toilet when they needed to. Using an AAC tool enabled the user to request assistance to use the bathroom, thereby returning autonomy to be able to do something many people take for granted, *'It's hugely empowering'* (Alice, female, community support worker). One AT identified as 'a game-changer' for students who struggle with or are unable to read, is the C-Pen. A pen-shaped device that converts text to speech, it supports students with reading difficulties both inside and outside of the classroom. For example, for some the C-Pen has been instrumental in them becoming more independent, by enabling them to open and read their own letters and correspondences, such as doctor appointments etc. Others reported enhanced quality of life such as being able to pick up the newspaper or a magazine and read it independently, without having to wait for someone to read to them. Confidence was another recurring theme across the study, that was identified as a secondary but critical impact of using various ATs,

*'it's kind of stating the obvious, that for her, physically it's great that she can hear me, but even more importantly, that the social gain and the confidence that she is getting by being able to have conversations with, you know the other students in the room and stuff like that' (Geraldine, female, instructor)*

It can be assumed that some ATs are only useful for completing a specific task or activity, *'what's written on the box'* (Joe, male, instructor) but other skills developed are significant for NLN's cohort of students. Road safety awareness is one of these skills, which means students can be more confident going outside in the knowledge that they can safely cross the road. The driving simulator was identified as beneficial in this regard – offering experiential learning. In addition to new skills learned, social benefits are linked to improved confidence and quality of life. It was noted that the driving simulator also provided considerable pleasure and fun for some students who appreciated this would be the only circumstance in which they would be able to drive. Indeed, CoS members were keen to point out that having fun is also an important aspect of ensuring a good quality of life and that the value of pleasure and fun should not be dismissed as trivial.

The life-quality impact of ATs could not be overstated by participants in this study,

*'it [AT] changed her life ...She just felt like she could just be herself. Sit down, relax and be able to take part in class without having to feel like she was something different, you know?' (Marian, female, residential service manager)*

Reduced reliance on others was linked with personal freedom, independence, and self-determination,

*'I don't have to rely on someone to make me hot chocolate. I have a talking weighing scales as well. I can just weigh out the ingredients [to bake] independently. I don't have to rely on someone to come and help me' (Rose, female, ATU).*

At the same time, it was recognised that ATs also offer benefits to those in the CoS of the AT users. For one student, using the Looky Book means no longer needing the instructor to print out class materials in larger print size because the device means being able to read the same materials as classmates,

*'it makes my life easier I guess. When I didn't have it from the start, it was harder because before, do you know I'd have to ask my instructor to print ... work-out modules and all that, but now it is just way easier because now I can use it [class workbook] fine like everyone else...' (Martha, female, ATU).*

From a service delivery perspective, this also means costly photocopying of classroom resources is no longer required, saving both paper and instructor time. Benefits to family members and those in circles of support was also highlighted as liberating, *'it frees them up because they don't have to be sitting down with me and helping me'* (Rose, female, ATU). Indeed, ATs have been of such significant benefit to this student that they are now able to travel by train independently across the country once weekly for computer classes, *'if I didn't have it, so I wouldn't be able to use my laptop or my phone and I'd have to rely on a sighted person to help me.'* (Rose, female, ATU). Indeed, another AT user summarised the impact of the technology on their quality of life in a way that echoes other experiences recounted, *"It makes me, like, my own person"* (Martha, female, ATU).

## Expanding choices

In addition to the psychological benefits of improved confidence, gaining independence, and boosting morale, ATs were credited with helping users feel able to get a job or pursue education. As noted earlier, ATs can help create inclusive learning environments for a range of PwD. In the first instance, ATs are being used to remove excessive stimulation in the environment so for those with sensory overload, sensitivities are more comfortable. Creating quiet spaces with ATs to support sensory de-escalation is a helpful resource employed in some training centres. A significant impact of these resources is that they help students to self-regulate challenging behaviours such as stimming or other behavioural responses to stimuli such as anxiety and to be proactive and independent in seeking out the resources when they are needed,

*'a lot of my students have come to me and have said that they are having a nicer experience here at NLN because they feel more understood and they don't feel that they have to mask as much, that was really touching when they said that to me' (Geraldine, female, instructor).*

It was noted that available AT resources can expand the options and opportunities for both students and instructors. For example, ATs can help students to access coursework using the method that works best for them (e.g. verbal or typing). For one student, microphone linked-hearing aids are helping her speech to be more understandable, as well as helping her to feel part of the class. The result is increasing engagement and interaction in the class and fellow students, thereby enhancing learning as well as social opportunities and choices.

For a student with literacy challenges who may also have an inability to grip a pencil, ATs were reported as enabling participation in literacy activities and learning. More importantly, to be able to participate without 'standing out' (ability to blend-in) due to their physical limitation, was considered as an additional significant benefit. Further benefits of the technology reported were that errors are visible on the screen (Word highlights or underlines what needs to be corrected) which means it is not necessary for the instructor to point out required corrections to the student, thereby reducing negative reinforcement and increasing independent learning.

## Sourcing Success

Rehab Group employees noted that there are a wide range of ATs available but not all are universally suited to the needs of all PwD, *'Definitely you don't want to give someone something that's too challenging and that they would be frustrated with'* (Lily, female, behavioural therapist). Each student and service user is an individual with their own specific needs and objectives. Ensuring that ATs are exactly suited to an individual, and how it would be beneficial, was identified as requiring in-depth knowledge of both the individual and the AT. Securing an AT was identified as a process of several steps. First, time is spent identifying the needs of the PwD, either in the classroom setting or at home (or

both). However, awareness of what ATs are available or which options would best meet the identified needs, was reported to be low across all stakeholders,

*'I wouldn't say that I am knowledgeable enough to know exactly which one would suit each person's identity, that they could do with this technology and that there will be clear benefits to it. But in terms of which one in particular, I wouldn't have the knowledge at the moment to, to make that determination.'* (Lily, female, behavioural therapist).

DAT Central as well as outreach to other organisations, such as CHIME, Vision Ireland (formerly National Council of the Blind in Ireland (NCBI)), Enable Ireland, and the HSE, were reported as supports used when exploring possible AT solutions to address identified needs. Ensuring the proposed AT is 'the right fit' can take some time before the procurement process can begin. Then, funding for the AT must be secured and the purchase completed. Finally, the student/service user and relevant members of their CoS usually receive training and ongoing support needs and resources are identified. However, it was suggested that PwD using the service should also be kept up to date with what ATs are available so they can source what they need themselves,

*'you know, they need to be able to identify it for themselves, identify their own needs. And if we're seen to be delivering that from the beginning, they will see that it's there for them to look for themselves, so you're, kind of, empowering them and educating them at the same time into the benefits'* (Alice, female, community support worker).

Poor awareness among parents, students/service users, or CoS about the ATs available or how they might be used to enhance the lives of those with disabilities. Key workers often don't know how ATs are procured once requested. Knowing what is available is primarily based on word-of-mouth. Parents of a student or a colleague might mention an AT they had come across, seen used, or heard about and this is the main way information about available ATs has been generated within the system to date. Rehab Group currently have an AT Officer which has made it easier for trainers, students, and key workers to access ATs as the AT Officer will identify and assist in acquisition, testing, training, and AT troubleshooting.

CoS members noted that they have rarely requested an AT that was not provided, through fundraising or family members purchasing the item. However, recognition of funding limitations was reported as constraining requests for AT resources. Awareness that resources are finite means those in CoS are selective about what ATs they request. Funding challenges also result in reluctance to actively seek out AT resources for classrooms or centres that may have the potential for supporting a broad range of students and service users. Instead, the search for ATs is currently limited and driven by specific needs and challenges identified for individual service users. However, commentary by CoS participants suggested that the return on investment of ATs acquired may, to date, have been subjectively evaluated in terms of how effectively students utilise them,

*'in fairness to [AT user], she has embraced the technology no end and uses it every day in training and then, she said a while ago and it's really helped her to fit in within the training room and, you know, get involved in classes and projects and all of that. So, and I would say money well spent. Yeah.'* (community support worker of Martha, female, ATU).

The extent to which such evaluations inform ongoing AT acquisition decisions was not addressed but warrants further exploration.

As noted above, a range of sources were identified as either funding or providing ATs for adult students and service users. Some came to adult services with ATs they had already been provided and were using since participation in children's services. For some, family members provided some or all the cost of ATs, while others undertook fundraising activities to pay for these resources. Technology grant funding availability from the HSE was identified as challenging for adults (over 18 years) to access because requests require the signature of a speech therapist, physiotherapist, or other healthcare professional, not always accessible to students in National Learning Network or users of RehabCare services.



Often an expected barrier, broadband/Wi-Fi access was not considered a barrier to use of ATs in classrooms or support facilities, as internet connections are available. However, it was suggested that this may not be the case in the homes of all PwDs. In residential settings, it was noted that residents often have some computer or digital literacy skills. Nonetheless, as some PwD may reject proposed ATs, the way ATs would be introduced or promoted, and the support provided during initial familiarisation and use, were considered important for adoption. For example, some students or service users might not engage with AT if the results were not immediately apparent. This would require an investment of time from staff, to encourage and support the person as they become familiar with the AT, how to use it, and how it could benefit them.

## Training for AT use

*‘there is definitely some training that’s needed around ... using the assistive technology that we use but. And you know it goes the same with the students that are using it, sometimes there are barriers at the start, can be quite large with the learning curve that is needed to get passed’*  
(Joe, male, instructor)

Learning how to use ATs varied for students, service users, and CoS members. Some students had received their AT, such as Lightwriters, while engaged with children’s services and were already familiar with using the technology. For those with cognitive processing difficulties, difficulties with working memory means instructions need to be given repeatedly, especially where literacy challenges mean written instructions are unsuitable. Trainers try to devise their own way to provide prompts, such as creating icons for stepped instructions, but guided repetition is often required in the classroom to enable access to ATs. Identifying workarounds for the challenges identified was experienced as usually falling under the remit of instructors, and community support workers,

*‘we’re always open to trying something and then reviewing it and seeing how it goes, and you know, tweaking or editing wherever needs to be, but the heart and centre of it is, it’s the student’*  
(Geraldine, female, instructor).

For some students, identifying and learning how to negotiate and use ATs by themselves represented an important aspect of their personal autonomy. One student got her own iPhone and had the accessibility settings placed on ‘voiceover’ to the text-to-speech functionality. She also got the voice assistant working by herself and now these two features make interacting with her phone possible, *‘I’ve never had real difficulty when I first started using an app. I just take my time and play around with it before I have to actually go out and use it’* (Rose, female, ATU). For others, a period of training, observation, and gradual autonomous use can be necessary. Others still are content to explore and learn how to use ATs by themselves after initial training on basic functions, knowing support and assistance is available if needed.

While the AT users interviewed expressed relative confidence with their ATs, CoS members represented a wider group of less confident current and potential AT users. Setting up and understanding how to use ATs, especially more complex ones, can be challenging for key workers. It was noted that workers with experience of technology may find learning the skills to set up and use ATs more manageable. For instructors, trainers and community support workers, training was deemed necessary to support wider use and implementation of ATs within the service. Training for AT users was identified as required on an ongoing basis, particularly for those needing repeated instruction. For service support workers often called upon to act in a technical support capacity, training was considered essential, on how to use the wide range of ATs available. Indeed, given the rapid pace of technological change, training for staff and students was considered imperative to be able to keep abreast of AT developments. Such training was seen to support empowering support workers, trainers, and students alike to become more empowered to find ATs for themselves and more confident in their ability to use them.

## Collaboration for success

AT users and CoS members alike identified the importance of working collaboratively for successful use and integration of ATs, both in service provision as well as in the daily lives of PwD. Group training days, especially training that can also be fun and team building (e.g. Mondello Park training to use driving simulator) was seen as offering the added value of building a community of practice among staff who are supporting AT users. Progress towards greater collaboration around integrating AT learning and use was noted,

*'We're approaching it from a different way where we're all involved. Rather than, I suppose, the children's team coming with an OT and a speech language therapist and giving us this piece of kit and saying, 'best of luck now work away with it,' which would have been 15 years ago' (Marian, female, residential service manager).*

A collaborative approach was highlighted as part of a person-centred ethos. The importance of looking at available ATs as a MDT team was considered essential to ensure the student or service user's needs, priorities, and abilities are all considered when evaluating potential ATs for trial or use.

The centrality of a collaborative working ethos was also noted in how CoS members referred to themselves as a collective 'we' while recognising the PwD as part of that collective,

*'It's all about promoting independent living skills...and having control, and choice and anything that we can do...to promote that or support that, it means that the stress, the anxiety, the depression that goes along with some of the challenges, the stigma. So, anything that we can do to support that, reduces that because they have enough of it coming from inside without feeling like they are just not good enough and they're less, because that's the messages that have always come out, you know, from society' (Alice, female, community support worker).*



## Discussion

The findings from this Irish study echo those found elsewhere. Key reasons for considering the use of ATs were to assist PwD in managing the complexities of daily living but also to enhance overall quality of life by supporting greater independence, autonomy and self-actualisation.

Indeed, whether an AT helps open a window, use the bathroom, engage in work or education, or communicate with others, the impact on quality of life should not be underestimated. The increasing proliferation of digital and other assistive technologies means more options are on the horizon. Development of more portable devices as well as apps using technologies in common usage, such as smartphones and tablets, may also be set to expand choices and opportunities. However, more is not always better. The findings of this study indicate that keeping up with what is available and how to use emerging technologies can be challenging. Rapid software and hardware development means ATs can become obsolete at a faster pace than ever before. As identified by participants in this study and elsewhere, constant software upgrades require constant (re)learning and makes the availability of ongoing technical support a necessity for users.

Sustainability of AT use will require management of a web of resources and supports from the technical and educational to the financial and (potentially) clinical. Resources can be costly, and ATs may be out of reach for many unable to self-fund such supportive tools. However, collaboration among CoS members and AT users is a means of promoting increased uptake of ATs. Barriers remain relevant when considering the suitability of ATs for individuals. Cognitive processing or physical limitations may require careful consideration of the usability of an AT. However, as evidenced in the findings, modifications are often possible to adapt ATs to meet specific user needs where necessary. Indeed, CoS members highlighted the value of keeping an open mind, exploring options, and experimenting to find an AT that works and is 'the right fit'.

A challenge for services remains meeting the resource requirements not only to invest in exploring options and evaluating usability, but also for procurement, orchestrating AT set-up, providing training, and supporting ongoing use. The need to provide such resources for users of Rehab Group services, and for those in CoS, can be expected to increase as demand for ATs grows along with awareness of their benefits. An underutilised resource may be those in CoS who work within the health and social care services and the education sector. Evidence from this study suggests an enthusiasm and good will may be harnessed within this cohort who seek a collaborative approach to the identification of resources and to learning how to best use ATs to support disabled people. There is an opportunity for coordination of a national directory of AT resources and regional communities of practice to be developed in response to the findings of this study. Indeed, the foundations may already be in place in some areas and the AT coordination efforts of Rehab Group thus far suggests the work has already begun.

Returning to a key question: is committing resources to the identification and deployment of assistive technologies for adults with disabilities worthwhile? Emphatically, the findings suggest that despite the challenges encountered, the impact of successful, sustained engagement with ATs can have life-enhancing, if not life-changing, benefits for many AT users. Some of the practical or objective benefits include reduced dependence on others for support with daily living tasks, though increased AT use comes with increased need for technical support arrangements. Nonetheless, increased autonomy, independence, and confidence were directly related to use of ATs, such as being able to read using a C-Pen device. Moreover, initial benefits translated into further self-actualisation, such as the new ability to read translating into being able to participate in education, which in turn may have resulted in improved social interactions. Thus, use of ATs can have a multiplier effect for some people.

For adults who are not yet ready for employment, there is potential for communication ATs, such as text to speech readers, to eventually play a role in improving the possibility of employment in some roles. However, more work is necessary to explore these possibilities. Using ATs to enhance communication skills goes beyond the ability to communicate and enhance personal independence. CoS also recognised that improved communication ability could open up a range of educational and skill development opportunities for students and service users. Furthermore, the ability to more effectively articulate personal choices and preferences was seen as being able to direct one's own personal learning journey in a manner that aligns with self-defined personal identity.

From being able to directly place an order at the local coffee shop or buy a bus ticket without help from a third party, being able to participate with autonomy in one's local community is a significant contributor to a positive quality of life. Previous research found that adults with learning disabilities, unable to communicate verbally, wanted professionals to try a variety of methods and tools other than verbal speech when seeking to communicate (Badcock & Sakellariou, 2022). By incorporating alternative communication methods, PwD have the opportunity to express themselves and engage more fully in interactions with others. ATs that support PwD to make more choices, 'blend in', not stand out in social contexts, and to be themselves (as self-defined) are tools that make life less stressful for PwD.

The variety of ATs currently used across the Rehab Group suggests openness to harnessing emerging technologies to support service users and students to achieve greater independence and participation in daily life. However, AT use remains at an early stage and greater collaboration and integration is being sought by those in circles of support. ATs are sometimes being used by students or service users in one setting but not being used or translated into other settings. For example, students may avail of ATs in the classroom but not at home, or with some support services but not with others. This can hinder the overall effectiveness of the technology and limit the benefits that individuals might gain from it. These findings are consistent with those of others who have identified challenges associated with consistent AT use across various settings. Inadequate training and professional development, resource limitations, and the ATs not being customised to meet the specific needs of individuals, have all been highlighted to limit the effectiveness of ATs across different settings (Edyburn, 2000; Hasselbring & Williams Glaser, 2000; Patterson & Cavanaugh, 2020; Zabala, 2020). Further exploration may be useful to identify effective strategies to expand the integration of ATs into all facets of life for students in NLN and users of RehabCare services Rehab Group services.

Awareness is crucial for effective adoption and utilisation of ATs. However, limited awareness and familiarity with ATs were identified among CoS members but this belies the interest in exploring AT options. Previous research from the US has highlighted the gaps in knowledge about how informed PwD, educators and CoS members are about the range of ATs available to them and their potential applications (Edyburn, 2000). When considering what ATs are worth investing in (both time and money) it is necessary to be able to see and interact with the AT. A features list on a website advertisement is insufficient to understand the potential benefits for individual service users. This may be especially so for key service workers with limited experience with or knowledge of ATs. Opportunities for potential AT users and staff to touch, see, and try ATs would allow for investigation of how a particular AT might address the specific need/s of an individual student.

Working collaboratively for the successful use and integration of ATs was seen to be essential to enhancing accessibility and independence for PwD. In this context, collaboration among the various stakeholders is required to ensure that ATs are effectively tailored to meet the specific needs of the individual. Interdisciplinary collaboration helps in identifying the right AT solutions, ensuring that the technology is seamlessly integrated into the daily routine of a PwD.

It has already been identified in the research that professionals working with PwD continue to lack sufficient training to confidently work with everyone presenting with a learning disability (Badcock & Sakellariou 2022). Training in AT for PwD is crucial to ensuring that they can fully utilise these tools to enhance their independence, communication, and daily functioning. Without proper training, users may struggle to maximise the benefits of the technology, leading to frustration or abandonment of the devices. Regarding training, there is wide heterogeneity across the spectrum of PwD. It is therefore not feasible to provide a single training programme to encompass all the possible strategies, approaches and tools available to support communication and other support needs. However, training and support needs to be ongoing, especially as technologies evolve and user needs change.



## Key Recommendations

Recommendation	Reason
A review of all ATs being used within Rehab Group - description of the AT including its intended purpose, what each user is using the specific AT for (including non-intended purposes), how they are experiencing it (pros and cons of use), the benefits (and negative consequences) of the AT use for the user, modifications made to the AT or the manner in which it is used, issues arising during use.	To track the way ATs are being used, challenges experienced, and opportunities for transferability of learning and replication of AT deployment.
Prepare a list or database of possible ATs or collaborate with other organisations who may already have such lists, to formulate a national directory of ATs for disabled people.	To increase awareness among CoS about what ATs are available and have been used to date. To distribute/ provide access to users of the services, family members, staff, and others in circles of support.
Establishment of a database/platform to gather data on ATs used, effectiveness, cost, benefits etc.	Would allow the data to be extracted to generate cost/ benefit, progress evaluation, and strategic planning reports.
Develop use-case scenarios. Create opportunities for CoS members to share AT experiences with each other, for example in regular cases study conferences or meetings.	To expand and promote information about potential uses, challenges, and benefits of ATs.
Establishment of technical support structures that are accessible by all service centres.	The pace of software updates can exceed the updating of hardware by users. Over time, this can diminish the gains experienced by AT users while also requiring support to troubleshoot technical issues. Rapid technical support response can mitigate abandonment of ATs by users.
Regular training for staff involved in identifying and supporting AT use on emerging and existing ATs, how to adapt them for different people's needs and abilities. Staff and peer training on how to use and set up ATs, how to engage students in NLN and service users of RehabCare services as well as how to encourage families to support students and service users to use ATs.	Enhance the base of skills across the Rehab Group network and expand the stakeholders who can identify potential value scenarios for AT use.
Identification of experts who can support customisation of existing ATs.	To support modification of ATs to meet individual needs.
Engagement with AT and digital technology designers and developers.	Even with screen readers such as JAWS and NVDA, the layout of websites can make it difficult to negotiate and find the content sought. Multiple links, header layouts and other design features can present challenges that the screen-readers are unable to overcome. Engagement with designers and developers (including third level students and researchers) can influence future designs.

## Limitations

Although the results provide valuable insights, this study has several limitations. The sample size was small, limiting the generalisability of the findings. Participants for this study were self-selected. Future research should aim to replicate these results with larger, more diverse samples. Nonetheless, this study offers a useful starting point for further exploration on the topic.



## Conclusion

*'there's a huge focus on assistive technology and I think it's just going to be powerful ... if we do it right.'* (Marian, female, residential services manager)

When it comes to independent living, the main goal of AT is to support PwD to lead an autonomous life. This research provides examples of how ATs have empowered individuals to perform tasks that would otherwise be challenging, such as communication, mobility and self-care, thereby enabling participation and improving quality of life in users. ATs have also been shown to have played a crucial role in helping individuals with disabilities gain employment by reducing barriers and creating more inclusive work environments. However, the findings of this work highlight that there are still many barriers to adoption. Knowing what is available and how to access an AT appear to be one of the challenges to uptake. Effective AT training is essential for ensuring that PwD can harness the full potential of the technology, thereby improving accessibility and promoting inclusivity in society.

To conclude, ATs enhance the quality of life for individuals with disabilities by fostering independence, improving communication, and enabling participation in various aspects of life, from education and work to social and recreational activities. This not only empowers individuals but also promotes greater social inclusion and equity.

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## References

- Alper, S., & Raharinirina, S. (2006). Assistive Technology for Individuals with Disabilities: A Review and Synthesis of the Literature. *Journal of Special Education Technology*, 21(2), 47–64. <https://doi.org/10.1177/016264340602100204>
- Badcock, E., & Sakellariou, D. (2022). “Treating him...like a piece of meat”: Poor communication as a barrier to care for people with learning disabilities. *Disability Studies Quarterly*, 42(1). <https://doi.org/10.18061/dsq.v42i1.7408>
- Bailey, R. L., Parette, H. P., Stoner, J. B., Angell, M. E., & Carroll, K. (2006). Family Members’ Perceptions of Augmentative and Alternative Communication Device Use. *Language, Speech, and Hearing Services in Schools*, 37(1), 50–60. [https://doi.org/10.1044/0161-1461\(2006/006\)](https://doi.org/10.1044/0161-1461(2006/006))
- Baldassin, V., Shimizu, H. E., & Fachin-Martins, E. (2018). Computer assistive technology and associations with quality of life for individuals with spinal cord injury: a systematic review. *Quality of Life Research*, 27(3), 597–607. <https://doi.org/10.1007/s11136-018-1804-9>
- Baxter, S., Enderby, P., Evans, P., & Judge, S. (2012a). Barriers and facilitators to the use of high-technology augmentative and alternative communication devices: a systematic review and qualitative synthesis. *International Journal of Language & Communication Disorders*, 47(2), 115–129. <https://doi.org/10.1111/j.1460-6984.2011.00090.x>
- Baxter, S., Enderby, P., Evans, P., & Judge, S. (2012b). Interventions Using High-Technology Communication Devices: A State of the Art Review. *Folia Phoniatrica et Logopaedica*, 64(3), 137–144. <https://doi.org/10.1159/000338250>
- Beukelman, D. R., & Mirenda, P. (2013). *Augmentative & Alternative Communication: Supporting Children and Adults with Complex Communication Needs*. Paul H. Brookes Pub. <https://books.google.ie/books?id=Re7poAEACAAJ>
- Brittlebank, S., Light, J. C., & Pope, L. (2024). A scoping review of AAC interventions for children and young adults with simultaneous visual and motor impairments: Clinical and research Implications. *Augmentative and Alternative Communication*, 40(3), 219–237. <https://doi.org/10.1080/07434618.2024.2327044>
- Bryen, D. N. (2008). AAC for all: Supporting access to employment. . *Perspectives on Augmentative and Alternative Communication*, 17(1), 20–24.
- Corallo, F., Bonanno, L., Lo Buono, V., De Salvo, S., Rifici, C., Pollicino, P., Allone, C., Palmeri, R., Todaro, A., Alagna, A., Bramanti, A., Bramanti, P., & Marino, S. (2017). Augmentative and Alternative Communication Effects on Quality of Life in Patients with Locked-in Syndrome and Their Caregivers. *Journal of Stroke and Cerebrovascular Diseases*, 26(9), 1929–1933. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2017.06.026>
- Creer, S., Enderby, P., Judge, S., & John, A. (2016). Prevalence of people who could benefit from augmentative and alternative communication (AAC) in the UK: determining the need. *International Journal of Language & Communication Disorders*, 51(6), 639–653. <https://doi.org/10.1111/1460-6984.12235>
- Darcy, S., Green, J., & Maxwell, H. (2017). I’ve got a mobile phone too! Hard and soft assistive technology customisation and supportive call centres for people with disability. *Disability and Rehabilitation: Assistive Technology*, 12(4), 341–351. <https://doi.org/10.3109/17483107.2016.1167260>
- Dew, A., Balandin, S., & Llewellyn, G. (2011). Using a Life Course Approach to Explore How the Use of AAC Impacts on Adult Sibling Relationships. *Augmentative and Alternative Communication*, 27(4), 245–255. <https://doi.org/10.3109/07434618.2011.630020>
- Edyburn, D. L. (2000). Assistive technology and students with mild disabilities. *Focus on Exceptional Children*, 32(9).
- Erdem, R. (2017). Students with special educational needs and assistive technologies: A literature review. *Turkish Online Journal of Educational Technology-TOJET*, 16(1), 128–146.
- Gibilisco, P., & Vogel, A. P. (2013). Friedreich ataxia. *BMJ*, 347(dec03 1), f7062–f7062. <https://doi.org/10.1136/bmj.f7062>
- Government of Ireland (2015). *Assisted Decision-Making Capacity Act*. Office of the Attorney General. <https://www.irishstatutebook.ie/eli/2015/act/64/enacted/en/html>



Hasselbring, T. S., & Williams Glaser, C. H. (2000). Use of Computer Technology to Help Students with Special Needs. In *The Future of Children CHILDREN AND COMPUTER TECHNOLOGY* (Vol. 10, Issue 2). <http://www.futureofchildren.org>

HSE. (n.d.). *A guide to circles of support*.

Iacono, T., & Cameron, M. (2009). Australian Speech-Language Pathologists' Perceptions and Experiences of Augmentative and Alternative Communication in Early Childhood Intervention. *Augmentative and Alternative Communication*, 25(4), 236–249. <https://doi.org/10.3109/07434610903322151>

Iacono, T., Trembath, D., & Erickson, S. (2016). The role of augmentative and alternative communication for children with intellectual disabilities. *Pediatrics and Child Health*, 26(12), 526–531.

Isakson, C. L., Burghstahler, S., & Arnold, A. (2006). AAC, Employment, and Independent Living: A Success Story. *Assistive Technology Outcomes and Benefits*, 3(1), 67–79.

Janghorban, R., Roudsari, R. L., & Taghipour, A. (2014). Skype interviewing: The new generation of online synchronous interview in qualitative research. *International Journal of Qualitative Studies on Health and Well-Being*, 9(1), 24152. <https://doi.org/10.3402/qhw.v9.24152>

Khasnabis, C., Mirza, Z., & MacLachlan, M. (2015). Opening the GATE to inclusion for people with disabilities. *The Lancet*, 386(10010), 2229–2230. [https://doi.org/https://doi.org/10.1016/S0140-6736\(15\)01093-4](https://doi.org/https://doi.org/10.1016/S0140-6736(15)01093-4)

Krishna, S., Bala, S., McDaniel, T., McGuire, S., & Panchanathan, S. (2010). VibroGlove: an assistive technology aid for conveying facial expressions. In *CHI'10 Extended Abstracts on Human Factors in Computing Systems* (pp. 3637–3642).

Krüger, S., & Berberian, A. P. (2015). Augmentative and alternative communication system (AAC) for social inclusion of people with complex communication needs in the industry. *Assistive Technology*, 27(2), 101–111.

Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Sigafoos, J., Cassano, G., Pinto, K., Minervini, M. G., & Oliva, D. (2012). Technology-aided pictorial cues to support the performance of daily activities by persons with moderate Alzheimer's disease. *Research in Developmental Disabilities*, 33(1), 265–273.

Londral, A., Pinto, A., Pinto, S., Azevedo, L., & De Carvalho, M. (2015). Quality of life in amyotrophic lateral sclerosis patients and caregivers: Impact of assistive communication from early stages. *Muscle & Nerve*, 52(6), 933–941. <https://doi.org/10.1002/mus.24659>

Lund, S. K., & Light, J. (2006). Long-term outcomes for individuals who use augmentative and alternative communication: Part I – what is a “good” outcome? *Augmentative and Alternative Communication*, 22(4), 284–299. <https://doi.org/10.1080/07434610600718693>

Maresca, G., Pranio, F., Naro, A., Luca, R., Maggio, M., Scarcella, I., De Domenico, C., Bramanti, A., Nibali, V., Portaro, S., & Calabrò, R. (2019). Augmentative and alternative communication improves quality of life in the early stages of amyotrophic lateral sclerosis. *Functional Neurology*, 34, 35–43.

McNaughton, D., & Bryen, D. N. (2002). Enhancing participation in employment through AAC technologies. *Assistive Technology*, 14(1), 58–70.

Mcnaughton, D., & Bryen, D. N. (2007). AAC technologies to enhance participation and access to meaningful societal roles for adolescents and adults with developmental disabilities who require AAC. *Augmentative and Alternative Communication*, 23(3), 217–229. <https://doi.org/10.1080/07434610701573856>

McNaughton, D., & Light, J. (2013). The iPad and Mobile Technology Revolution: Benefits and Challenges for Individuals who require Augmentative and Alternative Communication. *Augmentative and Alternative Communication*, 29(2), 107–116. <https://doi.org/10.3109/07434618.2013.784930>

McNaughton, D., Light, J., & Arnold, K. (2002). ‘Getting your wheel in the door’: Successful full-time employment experiences of individuals with cerebral palsy who use augmentative and alternative communication. *Augmentative and Alternative Communication*, 18(2), 59–76.

- McNicholl, A., Casey, H., Desmond, D., & Gallagher, P. (2021). The impact of assistive technology use for students with disabilities in higher education: a systematic review. *Disability and Rehabilitation: Assistive Technology*, 16(2), 130–143. <https://doi.org/10.1080/17483107.2019.1642395>
- Millar, D. C., Light, J. C., & Schlosser, R. W. (2006). The Impact of Augmentative and Alternative Communication Intervention on the Speech Production of Individuals With Developmental Disabilities: A Research Review. *Journal of Speech, Language, and Hearing Research*, 49(2), 248–264. [https://doi.org/10.1044/1092-4388\(2006/021\)](https://doi.org/10.1044/1092-4388(2006/021))
- Mophosho, M., & Masuku, K. (2021). The uses of augmentative and alternative communication technology in empowering learners overcome communication barriers to learning. In *Empowering students and maximising inclusiveness and equality through ICT* (pp. 203–222). Brill.
- Mortenson, W. Ben, Demers, L., Fuhrer, M. J., Jutai, J. W., Lenker, J., & DeRuyter, F. (2013). Effects of an Assistive Technology Intervention on Older Adults with Disabilities and Their Informal Caregivers. *American Journal of Physical Medicine & Rehabilitation*, 92(4), 297–306. <https://doi.org/10.1097/PHM.0b013e31827d65bf>
- Nam, J.-H., & Kim, H. (2018). How assistive devices affect activities of daily living and cognitive functions of people with brain injury: a meta-analysis. *Disability and Rehabilitation: Assistive Technology*, 13(3), 305–311. <https://doi.org/10.1080/17483107.2017.1358304>
- National Disability Authority (2022) NDA Advice Paper on Disability Language and Terminology. Available at: <https://nda.ie/about/engaging-with-disabled-people/language-and-disability>
- O'Neill, S. J., Smyth, S., Smeaton, A., & O'Connor, N. E. (2020). Assistive technology: Understanding the needs and experiences of individuals with autism spectrum disorder and/or intellectual disability in Ireland and the UK. *Assistive Technology*, 32(5), 251–259. <https://doi.org/10.1080/10400435.2018.1535526>
- O'Sullivan, K., McGrane, A., Long, S., Marshall, K., & Maclachlan, M. (2023). Using a systems thinking approach to understand teachers perceptions and use of assistive technology in the republic of Ireland. *Disability and Rehabilitation: Assistive Technology*, 18(5), 502–510. <https://doi.org/10.1080/17483107.2021.1878297>
- Patterson, K. B., & Cavanaugh, T. (2020). Assistive technology in the transition education process. In *Handbook of Adolescent Transition Education for Youth with Disabilities* (pp. 236–248). Routledge.
- Rispoli, M. J., Franco, J. H., van der Meer, L., Lang, R., & Camargo, S. P. H. (2010). The use of speech generating devices in communication interventions for individuals with developmental disabilities: A review of the literature. *Developmental Neurorehabilitation*, 13(4), 276–293.
- Salmons, J. (2014). *Qualitative Online Interviews: Strategies, Design, and Skills*. SAGE Publications Ltd. <https://doi.org/10.4135/9781071878880>
- Tanis, E. S., Palmer, S., Wehmeyer, M., Davies, D. K., Stock, S. E., Lobb, K., & Bishop, B. (2012). Self-Report Computer-Based Survey of Technology Use by People With Intellectual and Developmental Disabilities. *Intellectual and Developmental Disabilities*, 50(1), 53–68. <https://doi.org/10.1352/1934-9556-50.1.53>
- United Nations (UN) (2006). *Convention on the rights of persons with disabilities*. <https://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>
- Vaismoradi, M., Jones, J., Turunen, H., & Snelgrove, S. (2016). *Theme development in qualitative content analysis and thematic analysis*.
- Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences*, 15(3), 398–405.
- Wickenden, M. (2011). Whose Voice is That?: Issues of Identity, Voice and Representation Arising in an Ethnographic Study of the Lives of Disabled Teenagers who use Augmentative and Alternative Communication (AAC). *Disability Studies Quarterly*, 31(4). <https://doi.org/10.18061/dsq.v31i4.1724>

World Health Organization. (2022). *Global report on assistive technology*. <https://www.who.int/publications/i/item/9789240049451>

Yeager, P., Kaye, H. S., Reed, M., & Doe, T. M. (2006). Assistive technology and employment: Experiences of Californians with disabilities. *Work*, 27(4), 333–344.

Zabala, J. S. (2020). The SETT framework: A model for selection and use of assistive technology tools and more. In *Assistive technology to support inclusive education* (pp. 17–36). Emerald Publishing Limited.

## Appendix A. Assistive Technologies referred to by study participants

Assistive Technology	Description
<b>Cognitive</b>	
C-Pen	The C-PEN Reader Pen is a portable, pocket-sized reading pen that reads text out loud with a human-like digital voice.
Kahoot! application	Kahoot! is a game-based learning platform that makes it easy to create, share and play learning games or trivia quizzes in minutes.
Microsoft Word Immersive Reader with Dictate	Immersive reader helps to improve reading skills by using the Read Aloud function (hear the text being read aloud), or formatting the document so that words are divided into syllables, font size and spacing and background colour can be adjusted. Distractions are also minimised using immersive reader. The Dictate function is a speech-to-text function where you can dictate content instead of typing it manually.
Vocaroo	Online voice recorder that can share audio messages and be used for creating podcasts to support learning.
<b>Vision</b>	
Be My Eyes/Be My AI application on phone	Be My Eyes connects blind and low-vision users who want sighted assistance with volunteers and companies anywhere in the world, through live video and artificial intelligence.
JAWS screen reader (JAWS® – Freedom Scientific) on the laptop	JAWS, Job Access With Speech, is the world's most popular screen reader, developed for computer users whose vision loss prevents them from seeing screen content or navigating with a mouse. JAWS provides speech and Braille output for the most popular computer applications on your PC. You will be able to navigate the Internet, write a document, read an email and create presentations from your office, remote desktop, or from home.
Liquid level indicator	Place the device on the side of a cup and it will let you know when the liquid has reached the top through a series of audible beeps or vibrations.
Looky Book	A portable video magnifier with close up and distance/self-view cameras that assist with independent reading for persons with a visual impairment.
NVDA screen reader application	NVDA (NonVisual Desktop Access) is a free "screen reader" which enables blind and vision impaired people to use computers. It reads the text on the screen in a computerised voice. You can control what is read to you by moving the cursor to the relevant area of text with a mouse or the arrows on your keyboard. NVDA can also convert the text into braille if the computer user owns a device called a "braille display".
Seeing AI app	Phone app developed to narrate the world around you. It has the ability to describe environments, read food labels, scan and read documents.
Talking scales	A modern kitchen scales with an easy-to-see jug, that measures wet or dry ingredients and speaks in a clear male voice.
Talking watch	The one-button model simply speaks day, date, and time. This talking watch is easy to hear, with the option of either a male or female speaking voice.
<b>Communication</b>	
Grace app	A simple picture exchange communication system developed for people with Autism to communicate their needs independently.
Grid 3 software	A type of assistive software that enables the use of symbols to represent words and phrases for choosing what to communicate.

Assistive Technology	Description
Lightwriter	Lightwriters are a type of speech-generating device. The person who cannot speak types a message on the keyboard, and this message is displayed on one display facing the user and on a second, outfacing display for the communication partner or partners. A <a href="#">speech synthesiser</a> is also used to provide speech output, and some models offer the facility to connect to a printer to provide printed output. For people who are unable to use a keyboard, some models of Lightwriter offer the option of an on-screen keyboard with selection made by a switch using a scanning technique. Word prediction is included to make a significant reduction in the number of keystrokes.
Proloquo	Proloquo is a comprehensive AAC app available for iPad and iPhone. Proloquo offers an extensive vocabulary that can support the growth of language skills at any age.
Siri function on iPhone	Siri is Apple's virtual assistant for iOS, macOS, tvOS and watchOS devices that uses voice recognition and is powered by artificial intelligence (AI).
Speech Assistant	This is a text-based application available on iOS and Android devices that enables people to communicate effectively.
Voice-over function on phone	VoiceOver will describe images in apps and on the web. When using the Camera app to take a photo, VoiceOver will also describe what's visible in the viewfinder.
<b>Hearing</b>	
Microphone linked with student's hearing aid.	Enhances range of hearing aid, for those with a hearing impairment.
<b>Mobility and Self-care</b>	
Driving simulator	Driving simulators are virtual environments that simulate the point of view of the driver. The driver uses real input devices such as steering and pedal controls to operate the simulated vehicle in the virtual environment. The experience is similar to that of driving a real vehicle.
Eyegaze	This is also known as eye tracking and is a way of controlling a device e.g. a tablet with your eyes instead of using your hands or a mouse to navigate the screen.
One cup maker	One Cup tea or coffee makers allows you to easily make a single serving of tea/coffee with the press of a button.
Physical adjustable devices such as a larger keyboard or 'chunky' mouse	Enables a person to use computer technology with ease. Some examples include hi-vis keyboard, hi-contrast keyboard, joystick mouse, upright mouse, compact keyboard and large screen.
Tilt-to-pour kettle	A device that makes pouring a kettle easier. It features a raised tilting platform that allows you to pour hot water safely and steadily without lifting the kettle from its cradle.
Various living aids	Adjustable countertop, remote controlled windows, doors that open with the press of a button.







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