An Investigation of the Assistive Technology Supports and Transition from a Third-Level Environment to the Workplace

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A dissertation submitted in partial fulfilment of the requirements of Dublin Institute of Technology for the degree of M.Sc. in Computing (Universal Design & Assistive Technology)

July 2014

Declaration

I certify that this dissertation which I now submit for examination for the award of MSc in Computing (Assistive Technology and Universal design), is entirely my own work and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the test of my work.

This dissertation was prepared according to the regulations for postgraduate study of the Dublin Institute of Technology and has not been submitted in whole or part for an award in any other Institute or University.

The work reported on in this dissertation conforms to the principles and requirements of the Institute's guidelines for ethics in research.

Andrew Costello

Signed:

Date: 09 July 2014

Acknowledgements

I like to thank first and foremost Damian Gordon I really appreciate the time and guidance given throughout the writing up of this investigation. Without the encouragement and help I think I'm might of never of got to the finish line, thanks again for all the help. Additionally the staff of the School of Computing In DIT, Dr Gerard Craddock and Robert Ross for the great instruction and advice which pointed me in right direction and making the last three years an enjoyable experience.

My wife Yvonne who has been there through tick & thin, kept me motivated and gave the encouragement to keep going and see the bigger picture. My Mum and my late father who I dedicate this work towards. Without them I would not be where I am today and I hope my dad is looking down with a smile as put the final few lines to this piece of work.

Finally my participants who allowed me share their feelings and frustrations in the use of assistive technology and without them I could not of completed this work, I am truly grateful and to my work colleagues especially my study partners Kieran Lewis, Claire Gleeson and Lynn O'Toole for keeping on track and sane when needed

Regards
Andrew Costello

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Abstract

The main focus of this research investigates the service level provision of assistive technology devices and software and its transition or lack of between third level education service providers and the employment sector. Recent national initiatives aimed at increasing the disabled students numbers attending third level has shown significant growth in such students attending and graduating from third level education. Such students have engaged in a range of assistive technology support and services available to them via their educational college or university. However, support mechanisms to enable and improve transition of such technologies into an employment sector, in order to enhance student's ability and employment opportunities, are yet to be explored or developed. The main outcomes from this research will introduce a set transition framework for students transitioning from third level education to the employment sector with the aim to enhance the understanding of assistive technology and benefits of these enabling technologies for perspective employers. Existing research indicates that there are a range of assessment tools for gauging the correct match of such technologies to reduce the high level of assistive technology abandonment. The use of a simplified *Human Activity Assistive Technology* (HAAT) model and the *Quebec User Evaluation of Satisfaction with Assistive Technology* (QUEST) within this investigation explore the barriers and enablers to such transition of assistive technology and highlight a need to develop a closer working relationship between the educational and the employment sector to allow a greater flow of support, knowledge and evaluation to ensure the perspective employee meets his or her potential without fear of discrimination or exclusion.

Keywords: assistive technology, employment, support, assessment, employment law, transition framework.

1. Introduction

1.1 Project Background

Recent studies have shown that the number of students with a disability attending third level education has risen significantly in the past decade (Ahead, 2012). As part of this increase in student population the level of supports and accommodations available to students has also followed an upward curve via funding from the European Social Fund (ESF) for students with disabilities (Ahead, 2012). A significant investment has been made in the use of assistive technology as a service and resource students can avail of to overcome their impairment and enable them to participate fully within a third level education environment without the need of high level human based supports. Assistive technology can be defined as any device or use of software that enables a task to be completed more easily. A more widely accepted definition is provided by the International Standards Organisation: "*Any product (including devices, equipment, instruments and software), especially produced or generally available, used by or for persons with disability: for participation; to protect, support, train, measure or substitute for body functions/structures and activities; or to prevent impairments, activity limitations or participation restrictions.*" (ISO.org)

The service provision of such enabling technologies throughout Ireland is mixed (Figure 1). Historically assistive technology service delivery had been made via a "medical model" of disability. Such technology is used to act on and modify a disabled person in order to overcome their 'limitations' rather than to modify their environment to overcome barriers they might experience (Hersh and Johnson, 2008). This view highlights the disabled user and their disability as reason for their impairment or exclusion. The attainment of such technologies by the end user has traditionally come from a medical role via a hospital or doctor who has very little expertise in the use of such technology. An opposing view of disability comes via the social model which is concerned with how society responds to disability; the emphasis is not on the disability but on the barriers that exist in society that prevents the person from achieving his or her potential. This approach reverses the medical model focus from the disability to the client (Craddock and McCormack, 2002).

In order to understand the problem domain it is necessary to understand the major factor that leads to assistive technology misuse and final abandonment. Abandonment rates of assistive technology range from 8% to 75% (Riemer-Reiss and Wacker, 2000). Furthermore Dooley (2013) states: *"Too many individuals who buy or are given assistive technology have failed to engage with its potential. The most common reason for this is their been provided with technology without the necessary training and the money spent is wasted"* (Dooley, 2013).

To overcome such rates of abandonment and to ensure the process is end user led the use of a structured assistive technology assessment tool is used. Assessment and use structured models can provide a framework within which to classify areas of inquiry; develop predictive models of utilization patterns (Lenker and Paquet, 2003). An example of such a model is the *Human Activity Assistive Technology* model - HAAT (Cook & Hussy (B), 2008) which list four key objectives to aid in the successful adaptation of any proposed assistive technology:

1. **Activity**: How the technology will help the user overcome an issue with a certain daily activity, e.g. per capita doctor's activities of daily living activities.

2. **Human Traits**: Does the user have the necessary physical, cognitive and affective elements to use and overcome the learning curve in the use of their pure curate, assistive devices.

3. **The Assistive Technology**: Is it a high-tech or low-tech device? Is it complicated to use? How does it interact with the environment and feedback to the user? E.g. screen reading software communicates via an audio or Braille output.

4. **The Context (Milieu)**: What setting/environment will the technology be used in? E.g. the physical side of the building, the support levels available to the user.

The assistive domain and its provision within Ireland crosses many fields as highlighted by the below figure (National Disability Authority, 2012). This investigation will primarily look at two field of use (educational and employment) and

will highlight barriers and enablers that promote a successful integration of assistive technology support.

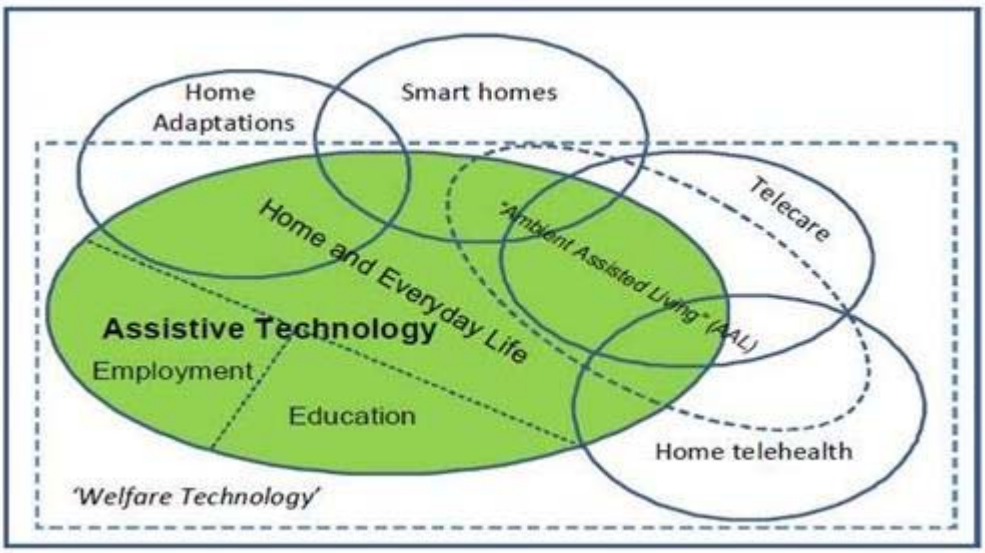

Figure 1 Assistive Technology domain (NDA, 2012)

The level of people with a disability working in employment is disproportionate compared to the able-bodied population. However most disabled young people see work as vital to their life as it gives them status, independence and choice and allows them achieve "adult status" (McGinty & Fish, 1992). The recent 2011 census statistics have shown 33% of people with disabilities of working age are employed, compared to 66% of nondisabled people (Ireland and Central Statistics, 2012)

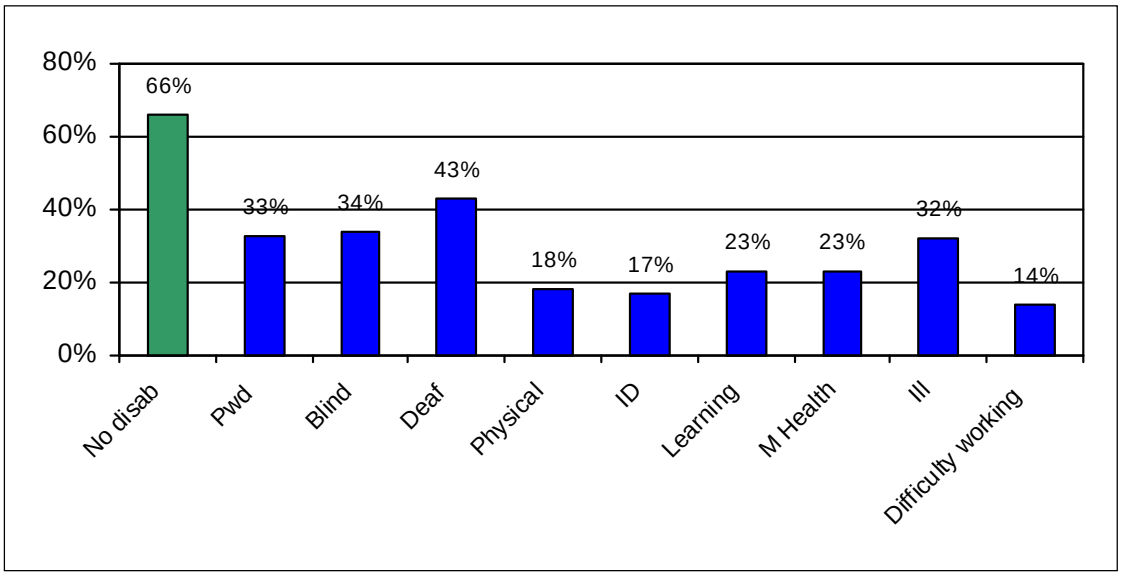

Figure 2 Disabled people v non-disabled in employment (CSO 2011)

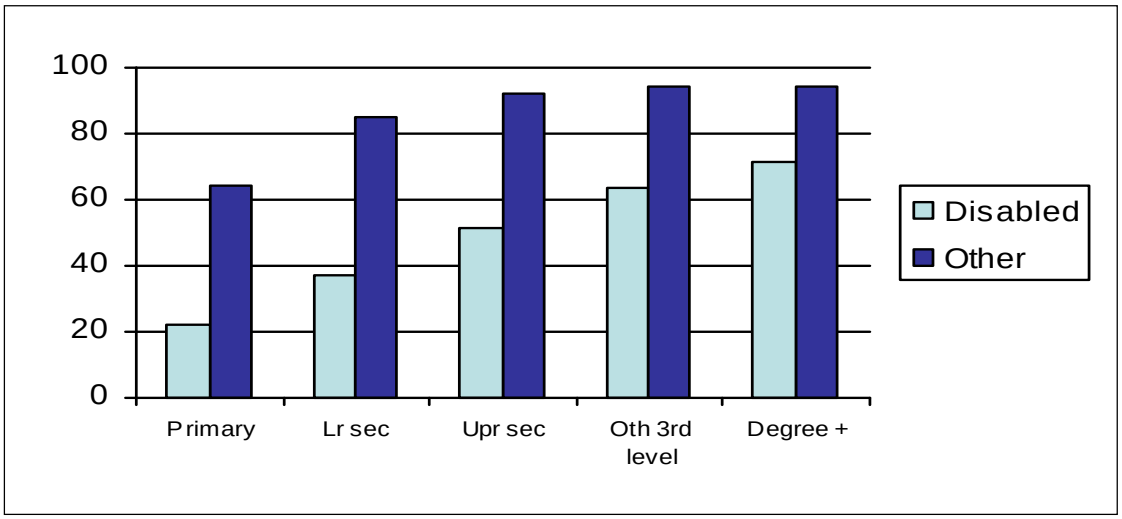

Figure 3 Employment rates of men aged 25-34 with disabilities, by highest level of education received (CSO, 2011)

Higher levels of educational attainment are associated with increased employment rates for those with disabilities as demonstrated in Figure 3. As stated the number of students with a disability at third level education has risen significantly in the last decade (Ahead, 2012). However as recent census statistics have demonstrated, despite these the numbers of disabled people in employment remains disproportionately low to able-bodied individuals.

Although the level of Irish literature on the use of assistive technology in the workplace is low, a comparable report by the British Assistive Technology Association on research into assistive technology in the workplace states: "*That AT solutions appear to be much more likely to be offered to employees as a result of individual requests for support than because they are embedded in the culture and procedures of an organization*" (British Assistive Technology Association (A), 2013).

Such research highlights the low transition of assistive technology devices into a workplace environment. Putting the onus on the employee to request technology supports shows a lack of knowledge and awareness on the need for the employer to create an inclusive working environment setup. The report goes on to comment: "*The research conducted indicates that employees are generally reluctant to declare a disability at work. Whatever the reasons for this – fear of losing a job, being passed over for promotion or feeling stigmatised – it is clear that an essential pre-requisite to*

the wider and more effective use of AT is a management culture within which an employee is offered or feels comfortable enough to ask for support to identify, provide, and maintain whatever AT they need" (British Assistive Technology Association (B), 2013).

The use of assistive technology and its benefits should be viewed as a skill/attribute potential employees possess. Feeling stigmatized around the use of such enabling technologies reduces the user's self-confidence and minimizes their potential job opportunities.

The identification of a valued structured assessment both within the education sector and employment sector is seen as an asset to ensure that users' needs are being met and that their full potential can be reached. Gamble *et al.* (2006) comments on this universal view approach to technology assessment: "*the use of a systematic decision-making process, although time intensive, may reduce traditional barriers to AT, increase the perceived effectiveness of accommodations, and reduce costs associated with discontinuance*" (Gamble *et al.*, 2006).

Such assessments are grounded in the social model of disability and ensure the user is central within the decision making process. Such a structured approach to assessment aims to increase the correct match in technology and reduce the level of abandonment or potentially high cost solutions.

The level of compliance and understanding of workplace accommodations including assistive technology specified under national and European law is also a factor that prohibits the use of assistive technology within an employment sector. Within an educational environment students who feel they are in need of such accommodations are invited to register with the respective disability service, they in turn are provided with a student led needs assessment with a view to engaging with a range of accommodations to adjust the learning environment to their needs. It is less clear how aware the employment sector is of its obligations in relation to the Disability Act 2005 and the Employment Equality Acts 1998 and 2011. These Acts set out the obligations on public service bodies in terms of both the employment of people with disabilities and provide clear guidelines to improve the working environment for those with

disabilities. It is unclear how employers are both interpreting and acting on these acts. As a recent NDA report into compliance with the Disability Act states: "*Public bodies must, in so far as practicable, take all reasonable measures to promote and support their employment of people with disabilities*" (National Disability Authority, 2011).

Such compliance or understanding of the policy is difficult to quantify however examples of such cases such as *A Medical Worker v HSE West* (A medical secretary v HSE West) and *Ring v Skoube Werge* (Ring & Werge) show the potential cost in not providing the correct support and accommodations assessment within a workplace setting. It highlights a lack of understanding of how Irish and European law interprets such cases and the monetary consequences to such outcomes.

1.2 Project Description

This research aims to examine and contrast support and assessment frameworks of the use of assistive technology between an educational sector and the employment sector. It will advocate the need for clearer and more transparent support structures for the end-user and transition of such enabling technologies throughout two major assistive technology domains - employment and education.

An applicable assistive technology evaluation framework will be used to evaluate the level of current use of such enabling technologies within their present sector and from this data a proposed transitioning framework tool to enable a continued use of assistive technology devices and software and support for students with disabilities between such sectors will be introduced.

The main objective of this research is to investigate the service level provision of assistive technology devices and software and its transition or lack of between third level education service providers and the employment sector, however this goal cannot exist in a standalone context as that would limit the understanding of the problem domain and thus it is necessary to draw from other sources and areas, such as current studies into the level of work accommodations disabled users have encountered in the workplace, the variety of assistive technology assessment tools and how such tools can

enhance and match technology with the user's traits and abilities. Finally this research also takes a view of how current Irish and EU employment/disability legislation influences the provision of such reasonable accommodations and how such governance impacts the potential employer's hours and employment levels of disabled users.

With the advent of higher numbers of students with disabilities entering third-level education and enrolling, there is a clear need for reasonable accommodations within their course, however there is a paucity of clear information regarding transitioning such accommodations to a working environment. Although the student has recognized and engaged in their need for such accommodations, such as assistive technology, there is no clear pathway in place to allow a student transfer such skills and technology into a working environment without having to re-disclose such a need. In doing so the student will have to re-justify the need for such an accommodation and puts the onus on the student to come forward and disclose such a need.

In this research a total of eleven interviews will be undertaken, this will consist of three groups of interviewees. The first group of interviewees will be four students with disabilities who are currently in third-level education. The second group of interviewees will be four graduates with disabilities who are either currently employed or have been employed in the past, the final group of interviewees will be three assistive technology officers who will review the findings of this research".

The research will aim to show a viewpoint from current and past third level students on their use/support level of technology. The outcomes will evaluate if such use matches the aspirations of the EU employment officer made over a decade ago in 2003: "*The enhancement in quality of life that will result from a wider use of Assistive Technologies will lead to a generation of new aspirations, new demands to promote improvement in such equipment to the benefit of people with disabilities, and thus to new innovations in a continuous positive feedback loop of market innovation and development*" by Anna Diamantopoulou, Commissioner for DG Employment and Social Affairs (at4inclusion.org)

1.3 Aims

The aim of this project is to explore the transition from education to employment for assistive technology users and to develop a framework for a transition planning assessment tool to enable the transfer of assistive technology supports between educational and employment environments. Such an approach will allow the user to pinpoint where such technologies would be useful in a workplace environment and provide a support line for employers to engage within the adaption of such accommodations.

1.4 Project Objectives

- To examine the current state of Assistive Technology provision within Ireland and the EU.
- To investigate appropriate literature within this field.
- To develop an experiment that will ascertain and evaluate the enablers and barriers to Assistive Technology use/satisfaction of current 3rd level students and compare this against a graduate viewpoint of use of Assistive technology use/satisfaction in a workplace environment.
- To gain feedback and views on the use of Assistive technology from current 3rd level students, graduate students with disabilities and selection of employers.
- To document and evaluate the findings from the experiment
- To develop a framework/ exit strategy for the successful transition of acquired transitive technology skills from an educational environment to and Employment environment.
- To provide recommendations for any future research in this area

1.5 Research Methodology

This research will use a qualitative life time history methodology approach to make a connection between the users' events in the use of technology and activities in which

the technology has been used. The life history approach places "narrative accounts and interpretations in a broader context – personal, historical, social, institutional, and/or political" (Hatch and Wisniewski, 1995). Shah & Priestley (2011) assert that "Connecting biography with history, the core of the 'sociological imagination', means ensuring that accounts of disability are not read as accounts of 'personal troubles' but as evidence of 'public issues'".

The methodological approach allows the researcher to contrast views of current final year third level students against a collection of graduated students in their use and engagement in procured assistive devices. The methodology will also focus on the level of support and assessment given to such sets of users to enable the correct match of device/software to their needs and uses within their relevant environments. The relevant data will be collected using a life history methodology from eight current and past students of Trinity College Dublin.

As such the dataset will be mainly qualitative under headings such as:

- Support channels
- Evaluation of need – match of technology
- Institutional culture

There will be some quantitative data collected, e.g. number of years using the device, hours spent daily with the device/training hours spent but because the number of students in this study is small, no quantitative predictions will be attempted; rather the experiences and feelings of those involved will be considered. Further to this descriptive statistics will be used to analyse the quantitative data. No inferential statistics will be utilised due to the small numbers involved in the study and the nature of the study's focus

The investigation will also undertake a detailed audit (Sweeney, 2008) of current assistive technology assessment tools to enable a constructive interview and assessment process for the purposes of the research aims and objectives. To this end, the assessment will ensure quality characteristics will be targeted and evaluated in line with the relevant literature throughout the entire process. Briefly, some of the subject areas that will be evaluated are:

Level of Support channels available:

1. The level of support available to users in their use of assistive technology?
2. How effective the support levels have been to encourage such use?
3. The response from the institution or employment area to incorporating new technologies and troubleshooting issues?
4. The awareness of outside support channels and how they avail of such networks?

Level of Evaluation of need:

1. Has the institution/employer introduced and conducted any technology assessment in the setting up of the working/study environment to ensure the user was a key component in use of technology?
2. Was a medical or social model of assessment used in the loaning or supporting of technology?
3. Has the evaluation made led to a successful use of the technology and enhanced the user's skill base?

Institutional culture:

1. **Disclosure/Assessment**: Did the user have to disclose or justify their use of the assistive devices with the institution/employment area, did they feel comfortable bringing such technology into the environment?
2. **Co-workers**: What was the reaction support levels from the user's peers / co-workers in the use of such technology, was it inclusive environment?
3. **Law**: To what degree are employers aware of government and European employment and disability laws?

Note: This list is not exhaustive, further areas will be proposed and analysed during the thesis completion.

Following the assessments, their results will be analysed and any trends in the assessments identified. A collection of quality characteristics will be presented and documented to produce a proposed sample assistive technology exit assessment to be

trialled specifically for student transition from the education to the employment sector. This assessment intends to highlight to the employers the skills and traits the users have benefited from in use of the assistive technology and how such technologies can benefit and enhance the user ability in preparation for a working role.

1.6 Thesis Road Map

This thesis is broken into seven different chapters; from chapter 2 to chapter 4 the main focus is on the literature review surrounding three main areas of the research title. From chapter 5 to chapter 7 the focus is on the review and assessment of the research participants. The final chapter concludes the research and provides areas of future work to enable thesis recommendations to be fulfilled.

Chapter 2 looks at what the term assistive technology means and how it fits with mainstream technology use. This chapter also covers the main devices and software introduces by the investigation participants and the different level of abilities users can be classified as having attained in their use of assistive technology.

Chapter 3 introduces the reader to past research into the transition of assistive technology within the employment area. It examines research of barriers and support strategies used by rehabilitation services in the use of supporting users in the employment environment. Themes covered by this chapter include identifying the right technology, introduction of assistive technology to the workplace, physical environment and the use of workplace supports or job coach.

Chapter 4 examines a range of specific assistive technology assessment models and how such models are entwined with the International Classification of Functioning, Disability and Health (ICF). This chapter will critique such frameworks, for example Matching Person Technology (MTP), Student Environment Tasks and Tools model (SETT) and the Québec User Evaluation of Satisfaction with Technology (QUEST). This chapter will give an overview of how such tools can benefit users of assistive technology and raise the engagement in a wide variety of environments.

Chapter 5 will take a view of current disability and employment law surrounding work accommodations cases that have set a precedent in this area. This chapter will take a snapshot of Irish, EU and the United States statutes in this area and aims to highlight different facets and approaches to ensuring disabled users are protected against discrimination as well as the employer's responsibility to provide reasonable accommodations within the workplace.

Chapter 6 introduces the design element of the experiment within this research, the methodology used and how sample question were structured. Chapter 7 add to this approach by describing the used of the QUEST and HAAT models in the design of the interview process and key themes extracted from the interview process.

Chapter 8 presents the results of the assessment process. This chapter will also present findings elicited from the semi-structured interview process carried out with each research participant as well as reviewing findings from the employer's survey on their knowledge and use of assistive technology within the workplace.

Chapter 9 construct an exit assessment tool based on the findings of the proceeding chapters as well as best practices and guidelines in the assessment of users with a disability. This model will be the basis to assess the level engagement and barriers of assistive technology use both within and educational and employment environment.

Finally chapter 10 reviews and concludes on the findings of this research process and makes recommendations for future works in this area.

2. What is Assistive Technology?

2.1 Introduction

The term "*assistive technology*" can have different meanings depending on what scenario or environment the user is working within. Assistive technology can be anything from a low technology (*low-tech*) simple-to-use device such as a pencil grip to a sophisticated technology such a text-to-voice software or software that recognises you voice. Within this chapter a number definitions of assistive technology will be presented to give a clear explanation of the term and the distinction between low-tech to high technology (*hi-tech*) devices in relation to technologies referenced within this investigation. Further to this the level of human ability ranging from a novice user to and expert high level user will be outlined to show how such gaps in ability and technology ability affects a user understanding and engagement with assistive technology aids.

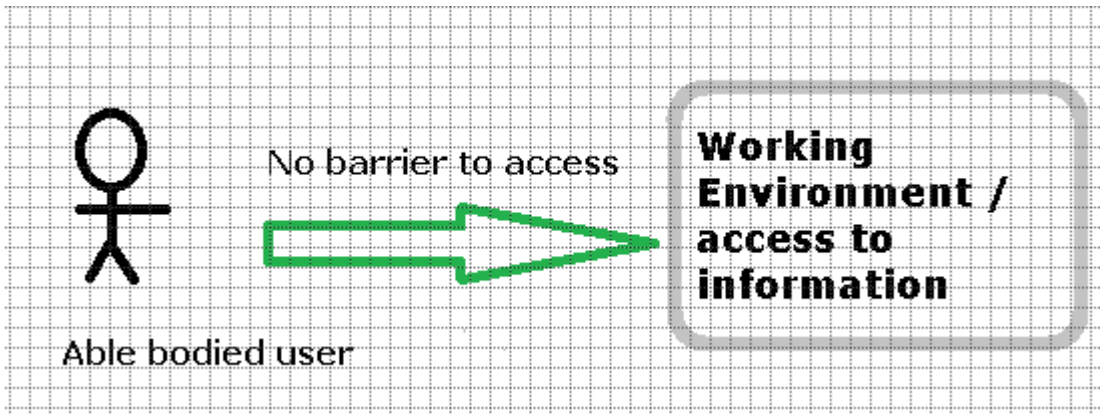

Figure 4 Abled body user and Assistive Technology

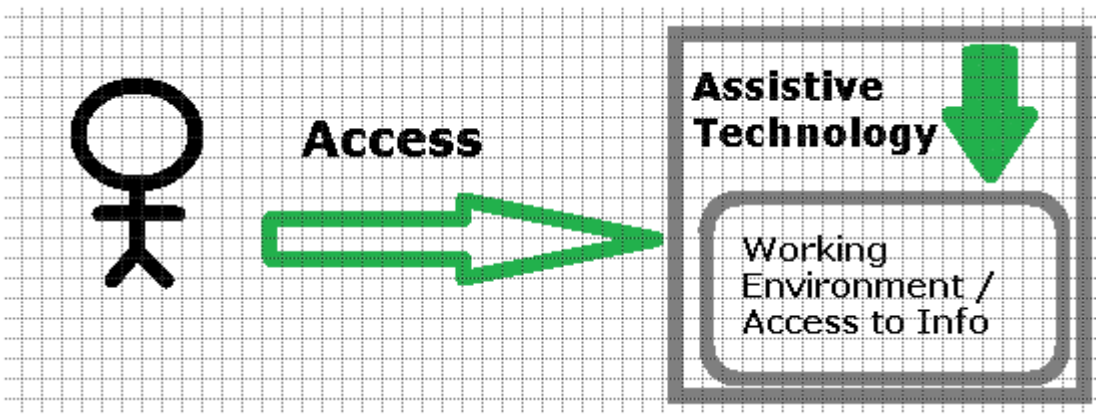

Figure 5 Disabled user and Assistive Technology

2.2 Assistive Technology defined

As referenced in the previous chapter the most commonly used definition of Assistive Technology is provided by the International Standards Organisation:

> "*Any product (including devices, equipment, instruments and software), especially produced or generally available, used by or for persons with disability: for participation; to protect, support, train, measure or substitute for body functions/structures and activities; or to prevent impairments, activity limitations or participation restrictions*." (ISO.org).

This broad definition covers all aspects of what assistive technology is aimed towards; participation, support, increased activities and to prevent restriction. The definition does not rule out any device or software in this regard and is all-encompassing in its narrative description of assistive technology benefits.

This definition is also reflective of the American-based definition defined within the American Assistive Technology Act, (1998) and used by the America Assistive Technology Association (ATIA) as:

> *"An item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities"* (Assistive Technology Association, 2013).

A criticism of the above definition is the distinct reference made to the use of assistive technologies by individuals with a disability reflecting that the use of such technologies are solely used by disabled users and are not seen as ubiquitous technologies used by all sectors of society. A more user-friendly definition can be seen by the American National Multiple Sclerosis Society which defines assistive technology as:

> *"A term used to describe all of the tools, products, and devices, from the simplest to the most complex that can make a particular function easier or possible to perform"*

Or to simply put, any use of technology which can help you perform a task more easily.

The use of such assistive technology as defined above is broad and covers many devices and aids by a range of users with a range of abilities. The difference in attributes of assistive technologies is wide as seen in the summary in the below figure (Parette and Murdick, 1998).

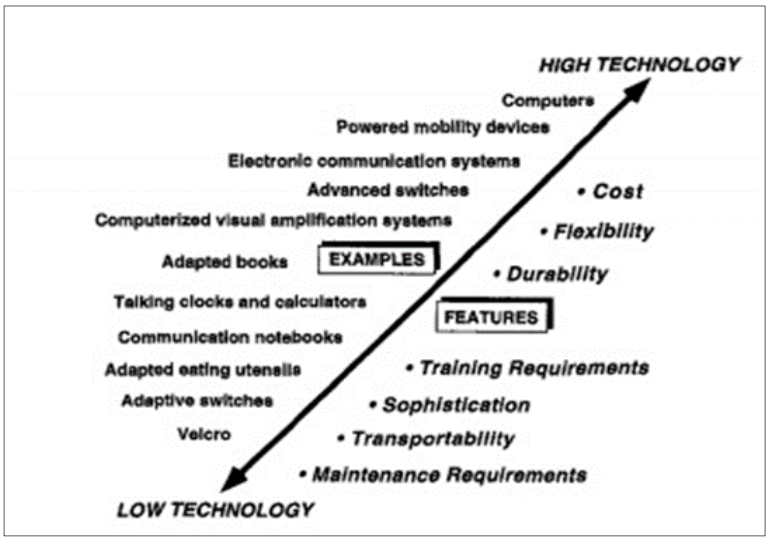

Figure 6. Attributes of Low and High Assistive Technology

The following sections will expand on the categorisation of assistive technologies from the low-tech to hi-tech with specific reference to technologies referenced by participants within this investigation:

2.3 Low-Tech Assistive Technology

Low-Tech devices are aids that do not take any length to train, are cheap to purchase and easily attainable. Cook and Hussy (a 2008) state simply that low tech devices are "*inexpensive simple to make and easy to obtain*". Examples of such low tech devices include magnifying glasses, ergonomic supports such as pencil grips and back support cushions or even the use of Velcro material to attach to the physical environment to increase accessibility and ease of navigation.

2.3.1 Ergonomic Supports

Ergonomics is the study of human interaction with a working environment. The aim of such supports are to reduce muscle strains, fatigue and alleviate bad posture that may

lead to physical barriers to completing work on time, e.g. of such are adjustable chairs, keyboards, lighting and simple pencil grips.

2.3.2 Walking Canes

White canes are used by visual impaired users to aid their navigation of the physical environment by touch. Canes have been used by the visual impaired for their independent travel for thousands of years; but the design of modern long, white canes did not appear until after World War II, when systematic cane usage techniques were developed by Hoover in 1962 (Kim and Emerson, 2012). The cane is an example of a low-tech device as its use is self-explanatory, the cost is low and it takes a small learning curve to acclimatize to it use and benefits.

Figure 7 Foldable Cane

2.4 Hi-Tech Assistive Technology

Hi-tech assistive devices by their nature take a steeper learning curve to fully master. Such technologies are more expensive to purchase and have additional functionality to allow adaptability to the user's needs and preferences. The use of such technologies may be complex and need to match the user's ability/environment to ensure they are not abandoned at an early stage of use. Examples of such devices are: Closed Circuit Television (CCTV) Magnifier, screen reading software, voice recognition software, scanning software and braille supports such an embosser that created braille print.

2.4.1 Screen Reading Software

Screen reading software is predominately used by those who are blind or have a high level of visual impairment. The software reads aloud what is on the user's monitor starting from top left-hand side and working its way down to the bottom right of the screen. There are a number of keyboard shortcuts available to users to skip content and to jump to bookmark or headings styles if the webpage, system or document has been designed correctly with accessibility standards adhered to. The most commonly used paid screen reading software is the JAWS Screen Reading Software (JAWS). Such software hi-tech accommodation is high in cost. Alternatively NVDA - non visual access (NV Access) is free, opensource screen reading software which is downloadable from the Internet, at no cost and carries a large proportion of the JAWS functionality.

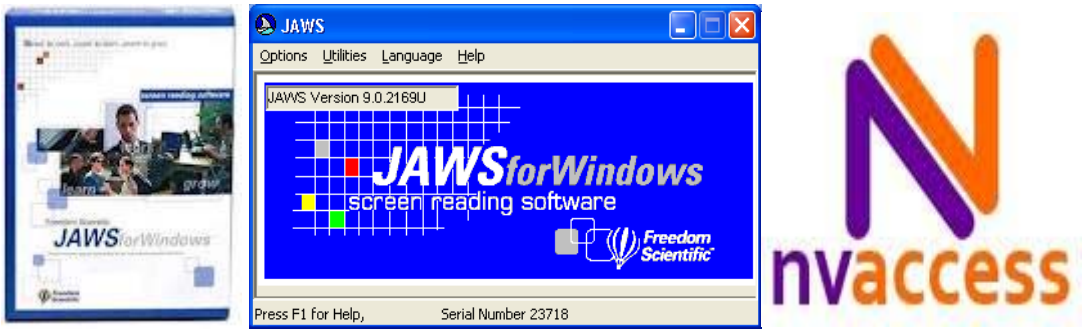

Figure 8 Jaws & NVDA software Logo's

In recent years such screen reading software has become incorporated in major operating systems packages as seen in Microsoft Windows eye (Window-Eyes) and Apple voice-over (Apple - Accessibility - OS X - VoiceOver) products which allow users free access to voice-assited navigation of the device and interface.

2.4.2 Magnification Software

Magnification software is used mainly by those with a visual impairment. The users in this case have limited vision but can use this software to enlarge the screen and in some cases the software incorporates text-to-voice functionality. The software also has a number of visual aids to enable the user locate an item on the screen in an easy and ergonomic fashion. Magnification software allows the user to enlarge the screen

without losing the graphical resolution. The most commonly used software packages are Zoomtext (Zoomtext - Ai Squared) and Supernova (SuperNova Magnifier).

Figure 9 Screen Magnification software

2.4.3 Voice Recognition Software

This software is used by those who may have difficulty with operating a mouse or keyboard but also may have a learning disability in the formalisation of words when asked to type. The software allows a user to input commands and text via their own voice with an aid of a microphone. A commonly used package in this market is Dragon NaturallySpeaking.

Figure 10 Dragon Voice Recognition software

Recent smartphone mobile technologies have embraced such software and raise the awareness of the benefit of such an alternative method of data input, that is of low cost and seamlessly built into the phone operating system. Examples of such technology are Apple Siri assistant Siri (Apple - Siri) and Googles equivalent Google Now (Google Now).

Figure 11 Smart phones voice recognition applications

2.5 Technology Use - Ability and Knowledge

The level of user knowledge and ability-level in integrating technology supports in day-to-day activities rely heavily on the user themselves. Their ability and knowledge in using and interacting with the technology when needed plays a critical role in the assessment process when procuring such devices. Cook and Hussy (2008a) state that a user's ability is gauged by the "*transferring of a skill from a related area and applying it to a new task and is a basic trait of a human".* A skill or knowledge level is *"a level of proficiency which is comparable to effectance*". Cook and Hussy (2008a) further state that the participant's ability and knowledge "*has important implications for teaching people how to use a system and the development of strategies*". Such user knowledge and ability-level can be described in three categories:

- Novice Users
- Intermediate Users
- Expert Users

2.5.1 Novice Users

A novice user is defined by Cook and Hussy (2008) as a "*user with little or no experience with that particular system or the tasks for which it is used*". The user ability is low and awareness of potential functionality and ease-of-use of the device or software is low. A novice user has to overcome a learning curve to familiarise themselves with their assistive device The novice user is less likely to trial the device to its maximum and relies heavily initially on their support network and working

environment to integrate and build confidence in its use. The novice user may not see the device as an aid or friend and the level of abandonment is high if the device is not matched with adequate training to the user needs and activities.

2.5.2 Intermediate Users

An intermediate user ability as defined within this study has a basic understanding of the assistive devices expectations and has undertaken use of the device for more than four to six months. An intermediate user also has the ability to work with the assistive device independently but relies on expert help for troubleshooting and maintenance. Such a classification of user is a link between low to high tech, the user understands the advantages on the assistive technology and have attained the basic skills to work with their device or software. For users defined as having an intermediate level of technical ability further support/ training will allow the user transfer to an expert user where support is needed lees frequently.

2.5.3 Expert Users

An expert user has the ability to troubleshoot any minor issues with the software or device, and is comfortable with the functionality and the expectations of the software. They use such software on a daily basis without the need for expert outside support. Cook and Hussy (2008) describe an expert user as a user "*who takes more risks with the equipment in terms of stretching the way it is used and trying new activities with the system*". An expert user exerts less effort in using the system than either of the previous two categories of user, as they are comfortable with using its functionality and are able to self-support their use in integrating the assistive device into a new environment.

2.6 Conclusions

The above literature sets out to provide a clear understanding of what assistive technology is defined as, and to show how it can serve as an accommodation to allow access to mainstream technologies. Following this, the level of categorisation was described, from low-tech, simple devices to hi-tech, complex devices which require

additional resources and training. The complexity involved in getting benefit from the assistive device is important to note, the factors to consider include the support channels needed for the user to overcome any possible learning curve and how such technology must meet the need of the user activities along with the user's own ability and knowledge to adjust and transition any technology acquired to a new working environment. Without a correct match of the user ability along with the adequate support the level of abandonment of such technology will increase. The following chapter will look more in-depth at barriers and enablers that allow access to assistive technology accommodations and their transition to a new working environment.

3. Reasonable Accommodations

3.1 Introduction

This chapter will examine current literature in relation to research into a range of studies of the use of technology accommodations. The literature reviewed examines support and accommodation strategies that have aimed to overcome a mis-match in services to support and aid disabled users in fulfilling full time employment and education.

3.2 What are Reasonable Accommodations?

An accommodation is defined as "any change in the work environment or in the way things are customarily done that enables a disabled individual to enjoy equal employment opportunities" (Dowskin & Squie, 2013). The aim of such accommodations, aim to enhance a user's self-confidence and attitudes in what can be achieved and how such accommodations can alleviate the negative impact of a disability.

Accommodations have a broad classification and can range from the regular change in procedure/activities such as hours of work, dates and times on deadlines to the more specific such as the use of assistive technology or one-to-one human-based supports such as *Learning Support Tutor* or *Job Coach*. The use of assistive technology, as one of the most successful strategies to employment accommodation, is seen to be crucial in removing barriers to employment, and to benefit the users' productivity and self-esteem (Yeager *et al.*, 2006).

A 2008 case study by the European Union classified the range of accommodation types available within the workplace (Forschung, 2012) under 5 main areas:

1. **Technical Solutions**: Provision of Assistive technology & physical environment modifications.
2. **Organisational Arrangements**: adjusting working hours, teleworking arrangements
3. **Provision of Assistance**: Work assistant or Job coach human accommodation.

4. **Qualification Measures**: In house specific training opportunities / trial period of employment.
5. **Awareness Raising Measures**: attitude change, modification of communication channels.

Organisational culture and policy, clear communication channels and agreed decision-making processes underpin the above set of accommodations. Without such commitment potential employees with a disability may be placed in environments where they are seen as a burden and not part of the team/organisational structure.

Accommodations available within the education sector also fall in line with the above framework. At present there is a lack of statistics available on the level of different accommodations availed of at third level. Recent Ahead statistics have shown 9082 students in third level education registered with a disability which constitutes 4.6% of the total student population (Ahead, 2012).

3.3 Barriers to Enabling Technology Accommodations

Disabled users looking to engage in the use of assistive technology as an aid to overcome their impairment are confronted with barriers to prohibit such access to the resources. Barriers to accessing such technologies and issues that arise from transitioning such technologies from different working environments are discussed in this section with the aim to highlights its roadblocks the users come up against in the use of Assistive Technology

3.3.1 The Cost of Assistive Technology

Evaluating the cost-benefit and securing funding of assistive technologies is vital to enable a clear positive service provision for the use of assistive technologies. Factors requiring consideration include ensuring the correct cost effective procurement process, knowledge of funding for government or state agencies and being aware of in-built or free accessible options available in current ICT products or via the web.

Andrich's (2002) research into the development of SCAI cost analysis tool, aimed to show the benefits of technology resources, commented on the effects cost barriers have in the procurement of technology supports: "*Evidence of cost-effectiveness and cost-utility of assistive technology is increasingly required not only by financing agencies, but also by rehabilitation professionals who need to know whether their choices proved effective within the rehabilitation programme, useful for the client, and making efficient use of resources*" (Andrich, 2002).

A basic costing heuristic could be that the cost of an assistive technology support must match the work activity. Cost in this context can be seen as a barrier to the correct procurement of assistive technology leading to poor service provision and leaving the employee at a disadvantage. A study (Lenker *et al.*, 2013) of 24 adult AT users, representing a range of ages and disability cohorts, concluded that cost effectiveness played a significant role on the decision to procure the correct technology device, users stated difficulties in justifying device impact when cost was a significant factor. As one participant stated: "*They're always pitching the cheapest option possible without considering the long-term implications of not funding the right option*'' (Lenker *et al.*, 2013).

Funding for assistive technology from an Irish perspective is spread across a number of sources. The employment sector responsibilities falls under the framework *Employment Directive 2000/78/EC*, which establishes the obligation for employers to provide reasonable accommodations (Europa.eu, 2000). Barriers to such accommodations arise when the cost of supporting such accommodations are raised. Within Ireland there is a government initiative grant available via the state employment agency FÁS, the *Workplace Equipment Adoption Grant* (WEAG) which is assessed by need. The uptake for this grant assistance has been low according to a recent NDA report (National Disability Authority, 2012) on the state of assistive technology within Ireland stating that out of a budget of €198,000 only €48,000 was distributed. The report goes to conclude: "*There appears to be very low take-up of the Workplace Equipment Adaptation Grant (WEAG) and there is a need to investigate whether there is substantial unmet need that is not being reached; as a first step, a*

more proactive approach could be implemented (e.g. an active awareness-raising campaign) and its impacts assessed."

Research on the Irish perspective on the use of assistive technology in a working or educational environment is limited, but literature from an American viewpoint is more substantial. A study of the barriers and facilitators affecting course completions by 404 graduate's apprentices and trainees with disabilities noted: *"cost and delay of access to equipment and adequate training resources is a significant obstacle to a successful transition"* (Cocks *et al.*, 2013).

The majority of literature makes the assumption that the user is working within a supportive environment and has access to support networks and state funding. Hedrick *et al.* (2006) highlights the significant cost of technology support if the user is self-employed. Hedrick states: "*Findings indicate that AT is important for the employment success of individuals with SCI/D. The majority of the AT devices owned by the respondents were characterized as important to work, and these devices were 3.5 times more expensive. The mean cost of assistive devices was 68% to 124% greater for persons who were self-employed compared with persons employed by others.*" (Hedrick *et al.*, 2006).

Such cost barrier research shows how funding prohibits the user with a disability from independently living. The cost barrier also ensures the user may never be afforded the opportunity to engage in an independent support denying them the opportunity to access full employment and preventing them from becoming active members of day-to-day society.

3.3.2 Universal Design Barriers

Universal Design Principles and *Accessibility Guidelines* aim to provide a framework for the design & inclusive use of interaction of everyday good, product and service. For example ensuring the design of user interfaces accommodate a wider-angle of

individual preferences and abilities. That the use of a design of a product or service is simple, intuitive to use and equitable to users with a diverse abilities.

Ignoring such guidelines can result in a more limited usability and interaction between the assistive technologies and such enabling technologies. For example the use of the internet and *Web Content Accessibility Guidelines* (*WCAG*) guidelines and the flow of information has decreased the isolation of individuals with disabilities and has given them greater access to education and employment opportunities (De Jonge, 2007). Ron Mace's Principles of Universal Design show a clear example of such guidelines (Universaldesign.ie.). Such a framework structures clear guidelines on ensuring goods, services and the built environment are designed in an accessible and usable manner.

Using the Universal Design Principles is not without its barriers, the design of technology has traditionally been a complex process with increased functionality delivered by menu and sub-menus and the lack of appropriate end-user testing inhibit the growth of more universally design technologies (Björk, 2009a). The research paper concludes that: "*the traditional product development models guiding development processes cannot conform to UD as the presence of user intervention is lacking in most company driven product development models*" (Björk, 2009a)

Research also highlights a range of EU research projects that endeavoured to promote the use of integration of such design principles. Whitney *et al.* (2011) makes reference to the missing 30% from poor disadvantaged backgrounds including those with disabilities, who are excluded from accessing digital software resources. This investigation emphasises the need for further work to emphasise the benefits of universal design to the creators of these technologies via improved policies and course design which incorporate universal design as an integral element of their delivery.

Universal design can also be seen as a step too far due to additional time and costs that may be incurred with employing it. (Björk, 2009b). The research concludes: "*Support from society, both in financial terms and in improving competence in industry, is essential to ensure that new methods for product development become known and practised for the creation of UD products, systems and environments*" (Björk, 2009b).

By redefining problems, changing environments, and selecting UD products and approaches, the quality of life of the individual may be greatly enhanced. Universal Design should complement assistive technology and lead to a more inclusive and ubiquitous use of technology. Projects such as *Realise* (realisepotential.org) aim to highlight the need for Universal design and assistive solutions for a range of issues freely submitted by user. The benefit of such an approach leads to improved quality of life (Joines, 2009) and to the reduction of barriers to services and environments.

3.3.3 Employer Information and Expert Technology Support

Ensuring support channels and information available is a vital factor to a successful engagement with assistive technology. Armstrong et al (2010) argues that despite indications of potential for commonly available assistive technology, there is a high level of abandonment because people who buy them are unable to integrate them into their everyday lives.

The need for stronger communication organisational channels between employers and employees on their satisfaction/ dissatisfaction is also cited (Unger, 1999) (Hedrick *et al*., 2006). Research within the U.S on a range of Assistive technology accommodation studies have also shown attitudes and employees perception of disability itself as being a greater barrier to assistive technology engagement (Yeager *et al*., 2006), (Rogan et al., 1999).

Although the functionality of design of the technology is imperative the lack of information and the organisational structure, as described by Tobias Halt, is significant as is the benefit of good universal design and assistive technology solutions.

"Beyond the truly tech-savvy leadership circle, there is a real shortage of expertise at the service level. This scarcity is made worse by the fact that few people with disabilities know where to go to find experts."(Tobias, 2003)

Workplace policy and culture within an organisation is a further factor that must be taken into account when addressing assistive technology devices and universal design principles. In a study of 27 employers in the recruitment and support of 48 users of

Augmentative and Alternative Communication (AAC) a positive outcome was achieved in the integration process where the employers had a clear set of workplace policy/ accommodation (83%) and diversity training available to all staff (85%) (Bryen *et al.*, 2007). The support levels and use of employment policy if not adequately provided for can represent a barrier to the successful use of assistive technology engagement.

The need to provide support networks to overcome such barriers is discussed in the next section.

3.4 Support Strategies within the workplace

Literature has shown there are a number of strategies to enable access to technology supports within a workplace environment that promotes the use of universal tools and in doing so increase the awareness of assistive technology uses. The section takes a snapshot of such strategies and highlights how such approaches enable greater access to disabled users.

3.4.1 The Role of the Job Coach and Natural Supports

As previously discussed, the barriers to the use of assistive technologies, such as poor cost design and policy, stem from a lack of awareness of such devices. A strategy introduced by literature of both natural in-house supports (*Natural Supports*) and job coach-employment specialists (*Job Coach Initiatives*) to bridge the knowledge gap for both employers and employees can be seen to have both positives and negatives in their outcomes. To make the distinction between the two approaches: *Natural Supports* are defined as "*The focus on natural supports emphasizes the participation of supervisors and co-workers in the hiring, training and supervising supported employees*" (Cioffi 1997). In contrast, *Job Coach Initiatives* can be seen as: "*a consultant or facilitator to the employer by building on supports which exist in the workplace, as well as the expertise of the employer*" (Unger *et al.*, 1997b)

The distinctive support approaches do not have to be seen to be in competition with each other; Rogan, Banks & Howard (1999) in their investigation in which workplace supports are being conceptualized and implemented by four organizations found a need for a mix of both *Natural Supports* and *Job Coach Initiatives* to improve employee integration, communication channels, knowledge of reasonable accommodations provides a framework for long term independent unsupported employment.
Further to this the assistance of *Job Coach Initiatives* is seen to work in conjunction with assistive technologies but not as a direct replacement. The aim of both perspectives is to introduce and assist in the correct integration of assistive devices not replace the need for its use. Assistive technology can play a major role in the integration and successful uptake of employment positions. The aim of the *Job Coach Initiatives* are to provide assistance in this transition of previous supports and merge them with the current job environment. Strobel & McDonough (2002) explore the use and barriers to the use of assistive technology in the workplace, and they state how assistive technology can be aimed to reduce the duration of *Job Coach Initiatives*, lower costs and increase independence/ integration: "*While assistive technology certainly will not replace the personal assistant, it can sometimes serve to reduce the number of hours that the personal assistant is needed on the job site"*.

Stumbo *et al* (2009) further add to this view by highlighting the work of Agree *et al.* (1999) of 4,006 individuals 65 and older reported that AT use does not necessarily replace personal assistance, but may, in fact, supplement it in a number of ways, for some groups for example win conjunction with a personal assistant (Stumbo *et al.*, 2009).

An alternative view is provided by Wehman and Bricourt (1999) who reviewed nine studies surrounding the use of both *Natural Supports* and *Job Coach Initiatives*. The research states "*neither approach has been particularly effective in allowing individuals with disabilities to participate in competitive employment, and neither has fully encouraged consumers to choose their jobs and plan their careers*" (Wehman and Bricout, 1999). They present the view that such an approach does not empower the disabled user to make their own decision on their pathway to employment and could potentially leave them over-supported reliant on human interventions to make a move to employment.

On reflection the aim of accommodation such as assistive technology is to equip the user with a skill that they can use to a positive effect in their life activities. The *Natural Supports* and *Job Coach Initiatives* both break barriers in the use of assistive technology and can be seen to highlight routes to a universal approach to workplace accommodations.

3.4.2 National Government Agency Support

As previously discussed, cost and access to support services are seen by many users with disabilities as a barrier to accessing technology supports. The role of National government agencies (NGO) is to work in partnership with formal structures and service providers to provide AT, but they also complement these structures in terms of their own activities (National Disability Authority, 2012). The same NDA report which tackles provision of Assistive technology within Ireland highlights the mixed fragmented approach to service delivery with agencies often in competition with each other for funds and clarity of role. This leaves the end needs not met is a satisfactory manner and in turn leads to poor engagement with technology accommodations.

An example of poor end user service provision is highlighted by Craddock & McCormack (2002). This Irish based research introduced the need for a client focused form of support by a locally based Technical liaison officer in supporting Assistive technology users within a single government agency, the Central remedial clinic (CRC). The TLO is trained by the relevant NGO in providing assistance and training in the use of assistive devices but has the added advantage of being locally based, allowing time to form a working relationship and carry out training in a familiar environment. The research highlights a framework to successfully engage users on the ground level by reducing costs and increasing support access channels. Such a support process can be seen to aid disabled users of technology make a transition to multiple environments.

A contrasting UK perspective of local government agencies, which Kaehne (2013), proposes the view of transition and support service as not one agency role but a mixed multi-unit approach that encompass the users' current setup/ supports and the

engagement from the users' new environment be that further education or employment. This approach if adapted increases support channels between agencies and forges new links in service provision in comparison to a single agency with a lack of expertise is certain environments. The drawback of this research is it focuses solely on a cohort of users with learning disabilities. However, parallels can be drawn on a student's transition from an education to a working environment and the need for a multi-unit approach to ensure technology accommodation supports were introduced (where applicable) into a new environment without the need to start the accommodation / funding from the beginning.

3.4.3 The Retail Model of Assistive Technology

Accessible technologies are becoming more visible, more usable, and more mainstream for a range of day-to-day activities by all users in society. Accessibility functionality which previously was seen as only applicable for users with physical or sensory impairments have been rebranded and refocused to now consider all users and how it is possible to ensure ease-of-use to enable better access to information and features in a variety of ways that suit specific users need.

Vanderheiden (2008) advances this view of increasing access to assistive technology devices and points to the development of a repository of range such open source assistive technology – the Raising the Floor (RFT) Initiative. The project aims to provide a basic level of free public assistive features and the ability to support the distribution of commercial assistive technologies (Vanderheiden, 2008). Such access is free, and it promotes the notion of assistive technology as a free resource and not as an expensive, funding reliant, unattainable product. A similar Irish project, Try-it (Try-it.ie.) has provided a localised version of the RFT Initiative, but funding for Try-it has proved to be a barrier to its growth.

Another view on access to technology in an affordable, timely manner is provided by a UK view of a "*retail model or consumer model*" to technology procurement and attainment. The model allows users to take a medical prescription based on an approved NHS assessment to an accredited retailer to collect simple daily living aids,

choosing from the products available and 'topping-up' if they wish (Dept of Health, 2011). The model which pursues a consumer-centred framework allows the user to make the choice from a range of products that are available to meet their needs. A visual representation of this model can be seen as depicted by (Draffen 2011):

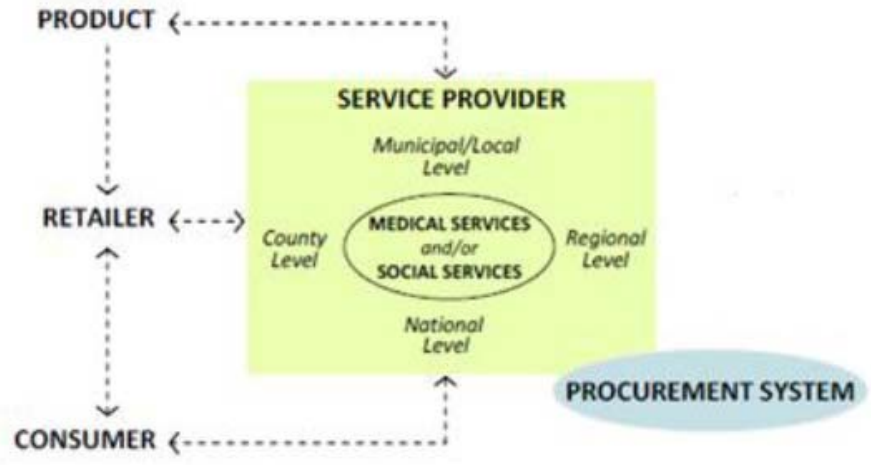

Figure 12 Consumer Model (Draffen 2011)

Thus the use of a free and a more openly retail-centred model has many advantages – easy availability, lower cost and better consumer choice of the technology they engage with can be seen to provide a better outcome in the engagement in technology and break down cost and design of use for assistive technology users. Such models are not without their drawbacks, allowing the user solely pick the type of technology leaves open a poor chain in the line of support. The lack of a clear assessment of needs for the environment and activities the users are engaged in, and an assessment from a support agent of the users' skills and traits are a vital cog in ensuring a match in technology. Such free and universal access to assistive technology is a positive step to an increased visibility in the use of such enabling technologies but further research is needed to ensure a positive outcome on the procurement to shorten the level of user abandonment and negative feelings if expectations are not met.

3.5 Conclusions

This chapter explored a range of literature on the user and barriers to reasonable accommodation provided to users with disabilities. Reasonable accommodations aim

to provide tools and resources to enable full participation of users with disabilities within a working and learning environment. The need to provide such supports are highlighted by the increasing numbers of students with a disability entering third level education with a view to full employment and full participation within their daily lives. The lack of transition planning of such accommodations leaves a gap in the support chain of users with disabilities as requesting assistive technology supports may be seen as a negative during or after the interview stage.

There are a number of factors that prohibit such requests but conversely potential support strategies exist that could manage the transition process more effectively. The primary barrier identified by the literature is cost. The question of who is going to pay for the assistive technology (such as expensive screen reading software or hardware supports such CCTV or voice recognition) is compounded by the fear of who is going to support the user to ensure they are able to complete and participate fully in regard to their work duties. Such barriers show a lack of knowledge of assistive technology supports available from a range of national agencies to enable financial assistance as well as job coaching skills. To enable and highlight the need for supports, how a user with disabilities is evaluated and assessed for supports is a vital factor to match such technology to the user activities. Without such a structured approach to assessment a poor match in the procurement and support of assistive technology as highlighted in this chapter is exposed. The following chapter will investigate a range of assistive technology tools and highlight their benefit in the use and support of assistive technology.

4. Assessing Assistive Technology Use

4.1 introduction

This chapter reviews several assistive technology assessment framework tools and considers the two distinctive approaches to disability which impact such models, which are the medical and social view of disability. The use of assistive technology assessment tools as stated by DeRutyer (1997) is the "*evaluation process to establish how well something works; for which clients it works; and to what level of efficiency*". Further to this Light (1999) states that assessment tools provide a framework within which to classify areas of inquiry. Such framework tools allow for a clearer procedure in the decision making process and for contoured funding of these enabling resources.

Assistive technology frameworks are broken into three distinct approaches as described by Hersh and Johnson (2008):
(1) *Classification methodologies*: taxonomic systems for defining the domain categories in the disability and/or assistive technology fields for example: International Classification of Functioning, Disability and Health (ICF)
(2) *System modelling methods*; Allows for a structured approach to assessment looking at the human and the environment in which the user carries out their day to day activities. An example of such a framework is the Human Activities Assistive Technology model
(3) *Assistive technology outcomes modelling*: Such models aim to evaluate the quality of life via structured assessment frameworks that use both quantitative and qualitative data to predict Assistive technology use. An example is the Matching person to Technology framework

This chapter will further look into the design and outcomes of such models that aim to address support staff needs in addressing stakeholder's barriers and enablers in accessing and engaging with such enabling devices.

4.2 The Medical versus Social View of Disability

Approaches to disability support assessment have traditionally been categorised into two distinct approaches a *medical* approach and *social* approach to disability. Both reflect opposing perspectives on how society views disability.

4.2.1 The Medical Model of Disability

The medical model of disability originating from the World Health Organisation (WHO) historically views disability as an "issue" which resides with the disabled user. A "disability issue" then occurs when the impairment prevents a person from being able to "*perform an activity in the manner or within the range considered normal for a human being"* (Hersh and Johnson, 2008). The "issue" is a medical problem which is seen to be fixed by making adaptions to the user. Control resides firmly with medical professionals; choices for the individual are limited to the options provided and approved by the 'helping' expert.

Within the medical model an individual's health status, life situations and social experiences are viewed as a consequence of the individual's health condition whether that is a physical, sensory, intellectual or mental health condition, or a combination of some or all of these (Good, 2003).

4.2.2 The Social Model of Disability

The social model view of disability originating from Union of Physically Impaired Against Segregation (UPIAS, 1976) which has increased support over the past two decades focuses on ridding society of barriers to access, rather than relying on 'curing' people (Söder, 2009). Oliver (1996) a leading advocate of the social model of disability argues that *"It is not individual limitations, of whatever kind, which are the*

cause of the problem but society's failure to provide appropriate services and adequately ensure the needs of disabled people are fully taken into account in its social organization"

Professionals have tended to define goals achieved (e.g. independence) in terms of physical functioning (medical viewpoint), whereas consumers more often equate independence with social and personal freedoms (Scherer, 2002). Such a medical driven approach to functioning stigmatised the disabled user as the focus that needed "fixing" stunting growth and transition into further education and workplace environments.

With the advent of a social approach to disability a more universal approach viewed society and the environment as the major barrier to inclusion. A social approach to assistive technology views not the user as the problem but how such technologies fit into everyday society. By working together as a team, consumers and rehabilitation professionals can identify effective technologies that meet the consumer environment (Scherer, 2002). Ensuring such an approach is successful is a challenge because of the variety of societal barriers faced.

The lack of a holistic approach to the assessment phase heightens the chance of abandonment of the assistive technology. The term abandonment' refers to the disuse of a previously obtained device, for any reason. The abandonment of assistive equipment has a negative impact in economic terms, both for the individual and for a national healthcare system, and means that the user's needs continue to be unmet and that his or her autonomy and quality of life are reduced (Verza et al., 2006). Research by Craddock and McCormack show that in Ireland 53% of all users of assistive technology abandon their technology, with lack of support' been cited by over 60% of users as the primary reason for the abandonment (Craddock, G., McCormack, L., 2002).

Although numerous assistive technology assessment models have appeared in literature, none have been shown to predict assistive technology usage (Lenker & Paquet, 2003). The failure of a service provider or employer to require a comprehensive assessment of user needs, priorities, and Assistive technology preferences at the beginning of the AT usage, as well as a support selection process

should also be considered a significant barrier (Scherer and Glueckauf, 2005). Reimer-Reiss and Wacker (2000) found there also has to be a “relative advantage” to the user in engaging in the technology. It has to be shown to make a difference in a disabled user’s daily function and activities for it to be effective and turn into a reliable everyday aid. Further to this Mondak (2000) on reviewing how technology can be used as an effective reasonable accommodation views the need for the end user to be the centre of the selection and implementation of technology accommodation ensuring engagement and a positive outcome.

The above literature points to the need of an effective assessment framework that encompasses a wide variety of the user traits, activities and support channels for a positive match in technology. The following section evaluates the usefulness of such assessment tools and outlines how they play a part in meeting the user needs.

4.3 ICF - International Classification of Functioning, Disability and Health

The current revision of the International Classification of Functioning, Disability and Health (ICF) framework was introduced in 2001 by the World Health Organisation (WHO) setting out a framework for classifying the health components of functioning and disability (WHO, 2001). The ICF (as a classification model) describes the overall health and functioning by focusing on "what the individual can do" as opposed to "what the individual wants to do” (Arthanat *et al.*, 2008).

The framework allows for the mapping and coding of terminology to allow for a clear governed set of vocabulary to assist in supports and understanding disability from both a medical and social perspective – termed as a *bio-psycho-social model* (WHO, 2001). Each domain is defined broadly to encompass, all age and disability populations, the types of technology employed, and the environments of use (Lenker and Paquet, 2003). A complex alphanumeric coding system is used to represent the classification.

The framework can be used to map Assistive technologies needs and abilities under six major six major areas (Douglas *et a*l., 2012);

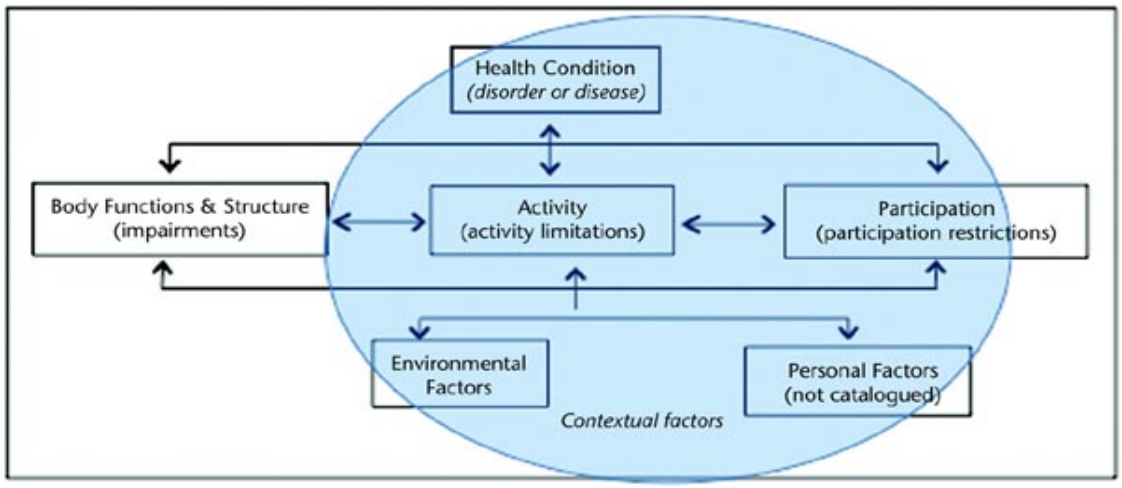

Figure 13: ICF Framework - http://web.missouri.edu

- *Body function or structure Impairment* – problems such as a significant deviation or loss.
- *Activity* – concerned with performances in activities at an individual level.
- *Participation restrictions* – problems an individual may experience in their involvement in life situations.
- *Environmental factors* – concerned with variables which can be manipulated (whether physical, social or attitudinal) which might improve performance on activities and/or increase participation.
- *Personal factors* – factors such as a lack of family support limitations and 'participation restrictions'.

Douglas *et al* (2012) further evaluated the ICF as a tool to structure an assessment process for users with a visual impairment. The research highlighted the issue of understanding and referencing social barriers in the construction of interview assessment on the barriers on physical mobility and travel. The interviews were centred on the three stages of the ICF as follows: Activity and Participation, Restriction barriers and personal factors. There was 960 active participants from a sample of the 1007 recruited involving telephone interviews for an average interview length of 40 minutes. The process was split into three stages reflecting the ICF: *Activity & Participation, Restriction barriers and Personal factors*. Douglas views the ICF as a positive tool enabling a clear communication of need commenting: "*The*

particular strength of the ICF in this context is that it gives the useful vocabulary we were seeking and crucially a vocabulary for participants to express their opinions. Most significantly, the way we were using the vocabulary does not force causal links between the concepts of impairment, activity and participation".

Further to this research, Bauer *et al* (2011) looked at the benefits of use of the ICF in relation to mapping and consistency of terminology used in a range of online American assistive technology databases. Such databases hold characteristics of a wide range of Assistive technology products to aid and promote the use of assistive technology by health professionals. The research aimed to evaluate a sample of databases resources (AbleData and assistivetech.net) against the ICF framework, to construct the use of a complete assistive technology device classification (ATDC) mapped against ICF codings. The research commented: *"The ICF provides an excellent framework on which to relate assistive technology devices to health and health-related domains by defining key concepts including health states and health-related states, functioning and disability, impairment, activity, capacity, performance and participation, personal and environmental factors, barriers and facilitators"* (Bauer *et al.*, 2011).

Although the ICF has many advantages regarding the coded terminology, the literature references issues with the size and complexity of its coding system as a barrier to its use for untrained professionals. There are also significant issues with the layers of terminology in coding a user who presents overlapping conditions and activities. Conversion of existing assessment tools to comply with an ICF framework is also seen to be time consuming, and it negatively effects the use of this framework (Simmons-Mackie, 2004; Ptyushkin et al., 2011); *"There are many category and subcategory codes; each of these codes could potentially have qualifiers and associated contextual codes. Many of these codes overlap making the system cumbersome and sometimes confusing"* (Simmons-Mackie, 2004).

The lack of classification of personal factors, and the division of person-related classifications between different categories of the ICF does not facilitate its use in assistive technology modelling, which means it does not support design for all approaches, nor does it particularly encourage holistic approaches based on considerations of social, infrastructural and environmental barriers (Hersh and

Johnson, 2008). The ICF model does not clearly delineate parallel interventions that affect performance and which lacks temporal and casual components (Lenker & Jacquet, 2003).

The use of ICF is viewed overall as a positive tool and framework for the matching and assessment of supports. It provides a tool that merges both a medical and social model view of disability which is unique in its design. The use of the ICF has seen the design of many assistive technology assessment tools which will be discussed further in this chapter, that have coded their structure according to the ICF framework, giving a universal approach to assessment. Research and findings of the benefits of an agreed classification continue to be published, which has led to our growing understanding of the benefits of the bio-psychosocial model of disability.

4.4 MPT - Matching Person and Technology

The most prominent reearch tools reflected by the research literature is the use of the Matching Person and Technology (MPT) model (Scherer 2004). The framework highlights a clear structured assessment process for assessing a user's needs for assistive technology, one which is consistent with the ICF terminilogy and perspective (Lenker & Jacquet 2003). Emerging from grounded theory research, it is viewed as the most comprehensive assessment in asstive technology provision (Arthanat *et a*l, 2007).

Figure 14 MTP Model

The MTP is structuresd into six clear stages, with a corresponding six assessments tools available to the user, as described by Scherer M. J., and G. Craddock (2002);

Step One: Worksheet for the Matching Person and Technology (MPT) Model is used to determine initial goals, potential accommodations, and technology supports needed to attain the goals.

Step Two: Technology Utilization Worksheet is used to identify technologies used in the past, satisfaction with those technologies, and those which are desired and needed, but not yet available to the consumer.

Step Three: The consumer is asked to complete his or her version of the appropriate form depending on the type of technology under consideration, with different forms for different technologies: General Assistive Devices (ATD-PA), Educational (ET-PA), Workplace (WT-PA) or Healthcare (HCT-PA). Consumers are then asked to identify the environment they will be using the technology in.

Step Four: The professional discusses with the user those factors that may indicate problems with his or her acceptance or appropriate use of the technology.

Step Five: After problem areas have been noted, the professional and consumer work to identify specific intervention strategies and devise an action plan to address the problems.

Step Six: The strategies and action plans are committed to writing in order to enhance implementation

The tool is comprehensively structured to prioritise outcomes in assistive technology use against three main traits – Personality, Environment and Technology (Scherer *et al*., 2005). These three factors enable the framework to predict assistive technology usage and its impact (Lenker and Jacquet, 2003). The approach is influenced by the medical model of disability and aims to determine 'limitations' on functioning, identifying goals and technologies that could be used to improve functioning, as well

as characteristics of the person, environment or technology that could lead to inappropriate use or abandonment of these technologies (Hersh and Johnson, 2008).

Goodman *et al* (2002) in a study looking at the use of assistive devices within third-level environment students shows an example of one of the MTP tools (ATD PA) being administered to 14 disabled students enrolled on a computer access module. The majority of these students were classified as "novice users" when it came to using technology. The students were interviewed on 3 occasions, on their evaluation and satisfaction with prescribed AT. The results showed a positive adaption with the characteristics of the individuals in the class; *"Seventy-five percent of the students who took the class adopted at least some of the AT a year later."* (Goodman *et al*., 2002)

Scherer and Craddock (2002) researched the validity and reliability of the MPT. The research focuses on the use of the Assistive Technology Device Predisposition assessment tool (ATD PA), showing how the tool was trialled in two studies (US-based and Irish based) successfully, giving the service provider a better view of factors that can lead to lead to technology abandonment. The participants in the study were ten spinal cord injury disabled users (US-based) and forty-five (Irish-based) students who completed items from the ATD-PA. Results from the study highlight favourable reliability on the use of the ATD-PA to gauge the influences of Assistive technology use or non-use, concluding that: "*ATD PA has been shown to have good reliability and validity and, thus, it can be concluded that it is a useful measure both clinically and in outcomes research. This testing of the Matching Person & Technology model has determined that the model adequately represents the relevant influences on AT use and non-use or abandonment*." (Scherer and Craddock, 2002)

The framework shows a clear structure for the evaluation of barriers and enablers that lead to the use or abandonment of assistive devices. However, there is no systematic framework or classification of activities and the choice seems to be based on assumptions of what types of fundamental activities disabled people might experience, according to Hersh and Johnson (2008). The model also outlines being able to point to a "perfect match" in the assistive device, but in reality, such devices are recommended because they represent the best available compromise at the time of evaluation (Lenker

& Pacquet, 2003). Also, the time needed to complete the tool in full can be argued as being a barrier when using the complete six steps.

In terms of the benefits of the MPT, it has been shown to have reliability and validity in determining the factors related to device abandonment and in assessing the impact on quality of life (Cook and Hussey (C), 2008).

4.5 QUEST - The Quebec User Evaluation of Satisfaction with Assistive Technology

Demers *et al* (2002) present an assessment for the level of satisfaction with outcomes of assistive technology use – (QUEST). The model involves a bi-dimensional twelve point evaluation tool on user satisfaction of assistive technology in two areas – Device and Service (see Figure 6). The tool is adaptable for use with a wide range of assistive devices.

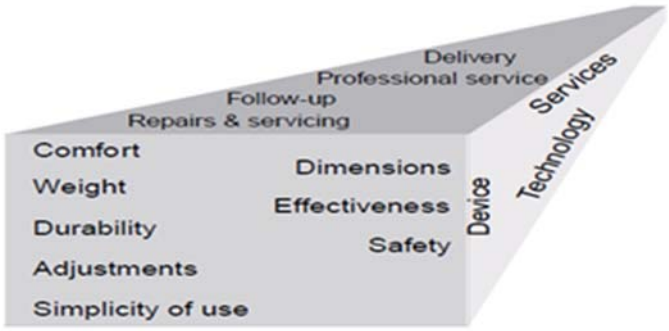

Figure 6 Bi-dimensional satisfaction structure

The length of the assessment is relatively short, lasting from 10-15 minutes maximum. Its size and length makes it a more user-friendly tool to administer than others. Each item is scored using a five-point satisfaction rating scale, with a score of 1 valued at "not satisfied at all", and 5 indicating that the end user is "very satisfied". The term satisfaction is defined in the QUEST framework manual as "*an attitude about a service, a product, a service provider or an individual's health status*" (Demers *et al.*,

2002). The Quest yields three scores: *Device*, *Services*, and a total QUEST, calculated by summing and then averaging valid responses to the twelve questions.
Wessels and Witte (2003) studied the reliability and validity of this tool where 2002 users of the QUEST model were interviewed on satisfaction ratings on using a broad range of assistive and rehabilitation devices. The same researchers highlighted how the modification of the QUEST framework (D-QUEST) allows for a non-applicable option for users to choose from. This option allowed for greater flexibility in the modification of the tools to fit certain assistive devices; the non-applicable option; *"The non-applicable modification substantially lowers the numbers of missing values, but does not interfere with the possibility to calculate a mean satisfaction score".*

The additional flexibility points to a user-centred approach to assessment, allowing the tool to be used in variety of environments. The validity and reliability study results, using the QUEST tool, show that 1197 users were largely or totally satisfied with both service and device use. The research highlights how the tools show a clear link in service/support of the device with its use and engagement.

A further example on the use of the QUEST highlights the positives and high level of satisfactions on the use of voice recognition software amongst ten users in both an employment and educational environment (DeRosier and Farber, 2005). The use of the QUEST gave structure and validity, allowing the emergence of four clear results themes on the satisfaction of the technology - 1. Access; 2. Independence; 3. Efficiency with time; and 4. Choice – flexibility.

The advantages of using the QUEST tool enables a short and concise assessment of technology use; the assessment can be self-administered which is not complex to complete or understand. There is no need for extensive training to ensure the tool is valid upon completion. The tool gives clear results and links into the satisfaction or dis-satisfaction with the use of assistive device; research highlights its positive use and reliability across a range of assistive device needs. Research highlights gaps in assistive technology service provision due to several reasons such as, a lack of support, and training and barriers on the use of the device, such as the interface, weight comfort and simplicity of its use. The need to enable adjustments/modifications, as seen by literature (D-QUEST), is a clear factor to ensure compatibility with the assistive device

in question, and not just on rehabilitation devices, as the current QUEST 2.0 is focused towards. The tools are a further example of a user focused psycho-social evaluation that question both the user ability, skills and traits, as well as the environment and support framework available.

4.6 HATT - Human Activities Assistive Technology

The *Human, Activity and Assistive Technology* (HAAT) framework model (Cook and Hussey (B), 2008) highlights the relationship between the person using the assistive device and their ability to accomplish a desired task (Linker & Paquet, 2003). The model is an assistive technology model focused on a modified version of the model of human performance by Bailey (1996). The model focuses on the promotion of goals which determines the success and functional outcomes of the technology; *"HAAT model exemplifies Assistive technology usability by describing the interaction of a user with an assistive technology (device) to accomplish an activity in a given context."* (Arthanat et al., 2007).

The model aims to connect the users' ability and strengths. For example, if a user is unable to spell words correctly, the medical intervention is to work with that user to improve word formalisation sufficiently enough to improve comprehension; with the use of the HAAT, the intervention looks at enabling the user to complete the task regardless of how it is completed, by the use of assistive technology. The intervention does not aim to fix the user but to enable them overcome the task they need to complete i.e. spell efficiently and create content independently. The framework allows for the identification of technology that is long lasting and aids the service provider in predicting future changes in working environments and skill/ability (Cook and Hussey, 2008). Further to this, the approach is one of the very few attempts to present a general systems structure for the technology of the assistive system (Hersh and Johnson, 2008).

The framework is broken into four areas: the Human, Activities, and the Assistive technology, underpinned by the context of networks the user can connect with when adapting to the technology and understanding the benefits of its use.

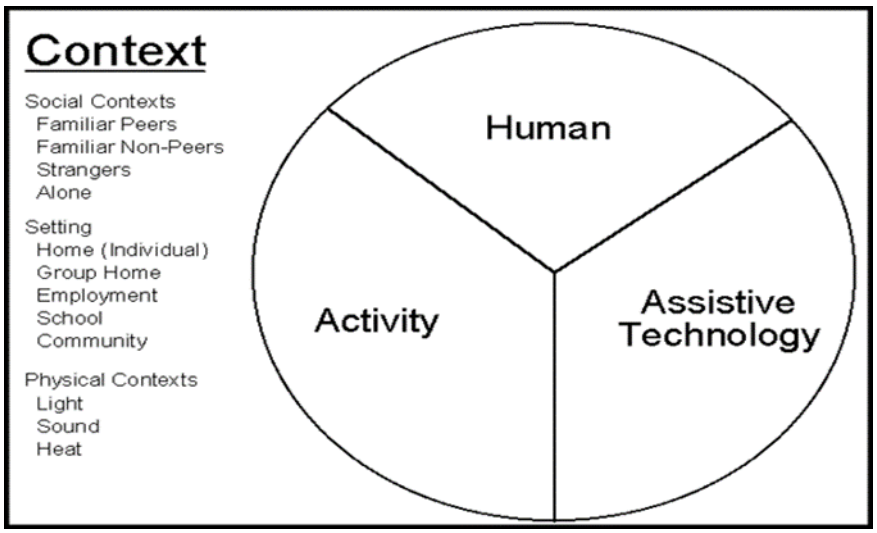

Figure 15 HAAT model Cook & Hussy (2008)

For *Activities,* the three basic performance areas are:

1. Daily living (Communication and mobility)
2. Productivity (Work and study activities).
3. Play and leisure activity (Activities related to self-expression, enjoyment)

For *Humans,* the components we consider includes:

1. Physical (Strength, coordination, range of motion, balance)
2. Cognitive (Attention, judgement, problem solving, concentration, and alertness)
3. Affective (Emotional elements)

For *Assistive Technologies*, we may have any subset or all of the follow components:

1. Human technology interface (How the technology interacts with the user)
2. Activity Output (What activity will it aid with)
3. Processor (How it processes commands)
4. Environmental Interface (Can it be used in a range of environment)

As the model is a conceptual framework, it is open to interpretation and does not offer specific predictions between its descriptive element and outcomes (Lenker and Paquet, 2003). End-user aspects of the assistive technology component, such as usability,

documentation and training are also lacking (Hersh and Johnson, 2008). The HAAT model's validity and reliability have not been tested and it provides no ready-to-use assessment tool, however, it is used by Cook and Hussy (2008) as a core model of Assistive technology professional (ATP) certification. The model is widely accepted and valued as a working framework for assistive technology assessment.

4.7 SETT - Student, Environments, Tasks and Tools

The SETT tool (Zabala, 2002) is an educational-focused assessment tool to assist educational professionals in the choice and training of a disabled user with assistive technology. The tool set themes of questioning of technology using similar categories and structures as the HAAT model under four main themes (Zabala, 2005):

1. ***Student:*** Abilities, needs, areas of concern
2. ***Environment:*** Physical access, support channels, instructional layout, attitudes of staff and family
3. ***Tasks***: Natural day to day task and specific task are required
4. ***Tools:*** How complex is the device in question, do they meet the ability and need of the student

The use of the above themes are a base for evaluating students' needs, however, they are not a rigid tool that must be adhered to, as per the requirements of the MTP or QUEST tools. The framework allows for the collection of qualitative data for improved service provision. The tool is not a one-time assessment, as the tools intend for the user and support staff to be revisited in a term called "re-SETTing"; *"ReSETTing is not starting over, but rather revisiting the information in the SETT Framework often in order to update and expand upon it as changes in the student, the environments, the tasks and the tools occur."* (Zabala et al., 2004).

This iterative framework ensure students' needs are revisited and adjusted according to need, progression and ability. The framework provides a systematic method for discussion and decision-making that is similar to the design of the HAAT model. The intuitive nature of the SETT model has led to its widespread use by school-based teams (Edyburn 2002).

The framework is an example of a simple tool that is used to adapt and construct with little to no user training needed to administer it. This simplicity and flexibility can also be seen as a negative due to its broad terms in its use of quantitative measures. The framework is specific to an educational environment and lacks further validity outside of this domain that would show its usage in everyday practice (Lenker & Jacquet, 2003).

4.8 Conclusions

The use of a clear structured assessment tool enhances the knowledge and support needed for both the user and support services to enable the successful use of assistive technology devices. The move to a user-focused, psycho-social assessment provides a platform from both a medical and social perspective to meet and provide a platform for a consistent structured form of service provision. The assessment provides a structure for both a user and service provider (educational or employment support service), to formalize goals and areas of need where assistive technology can play a role in enhancing the disabled users' environment.

The range of tools and their coding within the ICF is seen to give a clear effective structure of terminology to enable the construction of both conceptual frameworks and assessment. The use of an ICF coded assessment can affect the barriers to use and abandonment of assistive devices as it proposes assessing both the user's needs, traits and the environment for which the device will be used (or supported). This promotes a universal supportive culture which can ensure that the needs of disabled users are met.

The full assessment tools, such as the MPT and QUEST, show examples of fully validated and reliable tools that enable for the matching of technology with the user and calculate the satisfaction of the technology form use. The use of a framework such as the HAAT and SETT, in comparison, shows a broader unstructured process that allows the service provider and user to match themes and to set goals in assistive technology use against the usability of support in question. Both approaches allow for the evaluation the user needs across a range of psycho-social factors, allowing them to see a clear pathway for use and support of assistive technology devices.

The use of assessing users' needs within the educational sector is provided by the institutions/college disability service, which uses a variance of the above assessment instruments within a student-led assessment and support environment. However, the use of such tools within an employment environment is less evident. The aim of this student-focused research will aim to highlight if such a clear structured assessment process is used or known of within an employment sector. It will determine if the lack of such a process acts as a barrier to the use and transition of enabling assistive technology devices.

5. Present Employability Law & Implications

5.1 introduction

This chapter will discuss a range of Irish Law, EU and national law directives that provide for the need for users with disabilities, making sure their needs are met within an educational and employment environment. The compliance and understanding of such complex law frameworks are discussed in order to highlight the value of such directives in enabling the transition of such enabling technologies accommodations within a workplace setting.

5.2 How does Law play a part?

The use of reasonable accommodations, and the need for a clear structured assessment process for the enabling use of assistive technology, as discussed previously, is clearly underpinned by both European law and Irish law frameworks. The advent of a user focused model of service provision, and the move from a medical view of assistive technology service delivery to an inclusive social model, has seen the use of European law frameworks providing clear directives to society on the provision of reasonable accommodation within educational and employment environments.

This is a consequence of the paradigm shift that society (and in this case, the employer) is in charge of, enduring that they meet the needs of individuals with disabilities, enabling them to fully participate in social (and working) life (Europa.eu, 2000).

However, there is further work needed to ensure policy is monitored & communicated in practice (Ashcroft & Lutfiyya, 2013). Such accommodations, are widely

understood within an academic environment but are less defined in professional practice (Tee, et al, 2010).

Borg et al., (2011), on the role & right of users to access assistive technology within the Convention on the Rights of Persons with Disabilities (CRPD), states;

"A non-discriminatory interpretation of the CRPD entitles people with disabilities of both sexes and all ages with a right to demand available and affordable assistive technology as a means to ensure their full and equal enjoyment of all human rights and fundamental freedoms".

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5.3 The Irish Perspective

5.3.1 Disability Act 2005

In July 2005, the Irish Parliament passed the Disability Act 2005. The act initiated a broad framework, which seeks to ensure the needs and access to services and everyday life is protected under Irish law.

The Act is broken into six parts and establishes a basis for:

1. An **independent assessment** of individual needs, a related service statement, and independent redress and enforcement for persons with disabilities.

2. Access to public buildings, **services and information,** ensuring information is provided in an accessible format and is universal in design.

3. An obligation on public bodies to be **pro-active in employing people with disabilities -** take all reasonable measures to promote and support their employment of people with disabilities & ensure that at least 3% of their employees are people with disabilities.

The initiation of proceedings against a public body on grounds against the Disability Act the user on having used the internal complaints procedure of the public body

concerned, may ask the Ombudsman to investigate the complaint. One of the main concerns of people with disabilities and their representative organisations was the omission from the Act of the right to seek judicial remedies where any of the provisions of the Act are not carried out. These concerns were shared by the Irish Human Rights Commission and the UN Committee on Economic, Social and Cultural Rights (Inclusion Ireland).
De Wispelaere and Walsh (2007) reiterate this view, seeing the act as a missed opportunity in the construction of disability rights within Ireland stating;

"The disability sector insists that legal remedies are crucial for ensuring disabled people's rights are properly safeguarded. For critics, the absence of a substantive role for the legal system demonstrates that the Act is not rights-based."

In essence, the Act confers right on disabled Irish citizens to have their needs assessed, but no enforceable right to any of the services that may come from such an assessment. The legal entitlement to these assessments has been deferred, except for children of five years and under. In 2008, full implementation of Part 2 of the Disability Act (2005) was postponed as a consequence of the decision not to commence similar components of the EPSEN Act (2004), which also pertain to assessment.

The lack of a right to judicial challenge within the act highlights a lack of a mechanism to effect change within the Irish society. A lack of a right to query the assessment outcomes and access to enabling services is a major negative aspect of the disability rights movement. The assessment has not been judged against the user needs, but is valued against the 'practicability' of providing the services and the financial resources available. The disability sector asserts that an assessment of needs must also imply the right to have those needs met (De Wispelaere and Walsh 2007).

5.3.2 Employment Equality Acts 1998-2011

The act provides legislative provisions, promoting equality & prohibiting discrimination on nine grounds, one of which is disability, including an inclusive definition of disability and a requirement for reasonable accommodation provision (Employment Equality Acts, 2008).

Nine grounds of discrimination:

1. Gender
2. Civil status
3. Family status
4. Sexual orientation
5. Religion
6. Age (does not apply to a person under 16)
7. Disability
8. Race
9. Member of the Traveller community.

Discrimination is defined as the "less favourable treatment based on any 'relevant characteristic'" (Buckley, 2000). The act is extensive in providing anti-discrimination protection within an employment environment crossing the nine categories above. Discrimination based on disability is covered by three main sections:

Section.2 (1) (c) the malfunction, malformation or disfigurement of a part of a person's body

Section 16(3) (a) for the purposes of the Employment Equality Acts, a person who has a disability is fully competent to undertake and fully capable of undertaking any duties if the person would be so fully competent and capable on reasonable accommodation being provided by the person's employer.

The duty of reasonable accommodation provides the core protection of disability discrimination legislation.

The lack of provision of reasonable accommodation can be seen in the case examples show below:

1. A Complainant v An Employer 2008 – (DEC-2008-068) the employer called the complainant, who was deaf, to interview at very short notice. When the employer refused to defer the interview in order to allow the complainant time to get an interpreter, they was unable to defend the presumption of discrimination under the

Acts. This led to an award to the complainant of €8000 for the effects of the discrimination.

2. A Complainant v A University - (DEC-E/2013/137). This dispute concerns a claim by Mr X that he was discriminated against by a Third Level Educational Establishment in relation to the provision of training under Section 12; he was subjected to harassment as outlined in Section 14A; and that the respondent failed to provide reasonable accommodation as provided for in Section 16 of the Employment Equality Acts 1998 – 2007 on the grounds of disability in terms of section 6(2) and contrary to section 8 of those Acts. This led to an award to the complainant of €1000 for the effects of the discrimination.

Section 16(3) (b) the employer shall take appropriate measures, where needed in a particular case, to enable a person who has a disability –
a) to have access to employment
b) to participate or advance in employment
c) to undergo training.

In the case of Stanley v Irish Wheelchair Association (DEC E2012-188), it enforces the need and obligation to illustrate for employers to accommodate job applicants when considering them for a position in advance and during an employment phase. The case states that the aforementioned Claimant, who is deaf, applied for a part time position with the Irish Wheelchair Association (herein after "the Respondent") and was duly invited for an interview. Prior to attending said interview, the Claimant informed the Respondent that he would require a sign language interpreter and that he would arrange the same himself. However, the Claimant was unable to arrange an interpreter for the scheduled interview but informed the Respondent that he could arrange for a later date. The Respondent refused the Claimants request to re-arrange the interview for a later date.

Although section 16(3) requires employers to do all that is 'reasonable' to accommodate the needs of disabled persons, the cost to the employer must not be greater than 'nominal'. This use of the term 'reasonable' is seen as a failure of the act

as it allows the term "reasonable" is open to interpretation (Buckley, 2000). The impact of section 16(3) could possibly impact greater on smaller firms and their ability to provide such working adjustments.

The act is the major tool in the advancing redress in the lack of provision of support within the workplace or if the disabled user feels they have been discriminated against with regards to their disability. It provides a formal complaint and judicial procedure to enable universal access with an employment environment. The provision of the correct reasonable accommodation, with the act including assistive technology and the need to ensure the employee is accommodated for in the need for such technology provision, highlights the need for a transition framework from an educational environment to a work environment where the student has been supported and assisted in the use of their assistive technologies.

5.3.3 Equal Status Acts 2000-2011

The Act (Equal Status Act, 2000) came into force on the 25th October 2000 and was further amended on the 19th July 2004. The act essentially modifies the right to choose whether and how to do business with any given person by outlawing discriminatory practices within public service on 9 grounds (Gender, Civil Status, Family Status, Age, Race, Religion, Disability, Sexual Orientation, and Membership of the Traveller community). The Act differentiates from the Employment Equality Act 1998-2001, by specifically covering access to everyday goods and services provided within the public domain only.

"The act seeks to ensure where goods and services are already provided there are supplied cleaned of bias against members of particular social groups and that unjustifiable conditions that disadvantage those people are eliminated" (Walsh and Irish Council for Civil Liberties, 2012)

Though the Act specifically looks at enabling access to everyday services provided to the public, Section 42 of the Act highlights the employer liability, ensuring legally that employers are responsible for the conduct of their respective staff

Section 42 (1); Anything done by a person in the course of his or her employment shall, in any proceedings brought under this act, be treated forth purpose of this act as done also by that person employer, whether or not it was done with the employers knowledge or approval.

The act provides for redress against a lack of training, poor organisational culture and policy in relation to the harassment and discrimination of disabled users within a workplace environment. It promotes the need for an inclusive environment where disabled needs and accommodations are assessed and provided for without direct or non-direct discrimination. It levies the onus on the employer to promote an inclusive environment and provide the necessary policy and guidelines to staff on the use of workplace accommodations.

5.3.4 Safety, Health and Welfare at Work Act 2005

The Act (Safety, Health and Welfare at Work Act, 2005) aims to establish a clear framework for the safety, health and welfare at work of his/her employees. The Act implies employers should carry out a risk assessment in relation to the potential risks an employee may encounter within the workplace:

"19.—(1) Every employer shall identify the hazards in the place of work under his or her control, assess the risks presented by those hazards and be in possession of a written assessment (to be known and referred to in this Act as a "risk assessment") of the risks to the safety, health and welfare at work of his or her employees, including the safety, health and welfare of any single employee or group or groups of employees who may be exposed to any unusual or other risks under the relevant statutory provisions.

The Act also establishes clear demands on employers to carry out health surveillance, medical checks and other examinations:

"22. — This general duty requires that an Employer ensures that health surveillance appropriate to the risks to safety, health and welfare that may be incurred at the place of work (identified by risk assessment per S. 19), and any specific requirement for

health surveillance required by relevant health and safety legislation is made available to employees.

Issues raised by this regulation may incur employee privacy and disclosure issues. The employee may not agree that health surveillance is required. If resistance is encountered, the employer is protected in requiring compliance where assessment is necessitated under regulations.

The Act is a further tool that ensures the employee is adequately assessed and accommodated for, in the need for the correct working tools including assistive technology. It ensures an ongoing assessment surrounding the user functional need, and promotes the disclosure of possible impairments – visible and invisible. It places the responsibility for a safe working environment, including the provisions of the correct assessed health and safety intervention to promote staff welfare, within the employer's jurisdiction.

5.4 European Perspective

5.4.1 EU Directive 2000/ 78 / EC

The Council of the European Union adopted in 2000 the Framework Employment Directive 2000/78/EC, establishing a general framework for equal treatment in employment and occupation to prevent people in the European Union from being discriminated against because of religion, disability, age or sexual orientation (Europa.eu, 2000). Whittle (2002) states;

The underlying purpose of the Framework Directive is to improve the employment opportunities for certain groups of people, and people with disabilities are clearly one of those groups (Whittle, 2002).

However, the directive does not give the right to disabled users to access work based on their disability or impairment alone. The Framework Directive aims to realise this purpose by laying down minimum requirements that have to be implemented by

member states within a specified timeframe, and which should be actively encouraged, to extend the principle of equal treatment, as well as improve on the level and quality of the protection, that it affords (Whittle, 2002). Furthermore, Article 8 (2) ensures that the directive cannot be used as an instrument to reverse disability protection within member states.
The directive makes explicit reference to the provision and assessment of reasonable accommodation within a workplace environment.

Article 5— In order to guarantee compliance with the principle of equal treatment in relation to persons with disabilities, reasonable accommodation shall be provided. This means that employers shall take *appropriate measures*, where needed, in a particular case, to enable a person with a disability to have access to, participate in, or advance in employment, or to undergo training, unless such measures would impose a disproportionate burden on the employer. This *burden shall not be disproportionate* when it is sufficiently remedied by measures existing within the framework of the disability policy of the Member State concerned.

The interpretation of such a directive can be seen in Ring & Werge (2013). This landmark ruling is particularly significant in the boundaries of this Act, as it represents the first decision on the definition under the Directive since the EU concluded the UN Convention on the Rights of Persons with Disabilities (CRPD) in 2010 (Court of Justice of the European Union). The ruling in favour of Ring affirms that the CRPD takes precedence over EU secondary/national law; the lack of provisions of reasonable accommodation is significant, as it seen to affirms that the CRPD takes precedence over EU secondary law and allows for a redefining of the term disability;

Article 1 CRPD states that:

"Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others."

A difficulty for an employer's interpretation of the directive is that the employers only recognise barriers that disabled people present and not their ability to complete the task

to the required ability (Whittle, 2002). A further issue surrounds the use of the phrase "this burden shall not be disproportionate"; what defines the word "disproportionate" and how this varies from employer to employer. The use of such a term remains open to employer interpretation and confusion, where the support and awareness of disability rights are not addressed (Waddington, 2007).

However, the directive as a positive raises awareness of the right of employees to accommodations by becoming aware of the penalties involved in employment discrimination (Bell, 2001). The directive underpins all Irish employment law and highlights the commitment of European law to provide and assess for reasonable accommodation, ensuring that disabled users are afforded equal opportunities within a workplace environment.

5.4.2 EU Charter on Fundamental Rights

The human rights of employees, and the need for justification for enhancing support and transition roles to eliminate discrimination of disabled users, is further protected by Article 21;

Article 21—Non Discrimination—Any discrimination based on any ground such as sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation shall be prohibited.

The Article's principle of non-discrimination has great potential in the employment sphere, where different treatment of workers is the norm. In isolation, the prohibition in Article 21 could be read as implying only "negative" protection, without requiring proactive policies or positive state intervention (Bercusson, 2002). However, a systematic interpretation linking Article 21 and further core articles of the charter enable a universal approach to human rights and protection against discrimination.

5.4.3 The United Kingdom view

UK legislation on the provision of reasonable adjustment, including the use of assistive technology, is covered by the Disability Discrimination act (DDA) (1995)/Equality act UK (2010). The legislation is interlinked with a Department of Work and Pensions Access to Work scheme (Access to Work – gov.uk), which provides support for employers and disabled employees including assistance of assistive technology.
The Equality Act seeks to strengthen the requirement to demonstrate a 'positive duty' by being proactive and thereby preventing discrimination before it happens. The Act describes an 'anticipatory duty', which means we need to anticipate the need for adjustments and have these in place without being asked for them. In addition to the 'anticipatory duty', the Equality Act requires that an individual student's 'specific needs' are met; this means we have to consider the use of reasonable adjustments where appropriate. However, the abandonment of a disability 3% quota system for employers to meet is seen a shift away from EU based law.

The definition of Disability under the Equability Act is seen a major drawback in the Act's effectiveness (Butlin, 2011).

The act defines Disability as:

A person (P) has a disability if
(a) P has a physical or mental impairment, and
(b) The impairment has a substantial and long-term adverse effect on P's ability to carry out normal day-to-day activities.
(http://www.legislation.gov.uk/ukpga/2010/15/section/6)

The Act in turn fails to incorporate any new understanding of disability (Gooding 1996) and it has restrictive investigation powers to bring cases before tribunals on behalf of complainants, as stated by Gooss et al (2000);

"DDA differs from both the US and EU positions in terms of its essentially voluntaristic approach towards enforcement. This, in turn, means that, of itself, the DDA provides little practical incentive for employers proactively to move towards better practice."(Goss et al., 2000)

Overall the use of the term “substantial disadvantage” is the use of reasonable accommodations, as defined by the Act; this leave it open to interpretation along with the many exclusions available to employers and the inadequate mechanism also commented on by UK disability groups, who see the Act as poor in comparison to EU community and United States law.

5.4.4 The Dutch view

The provision of Assistive technology is enacted in Dutch law within the Act for Employment and Income According to Employment Capacity (WIA) (Sickness & Disability), and it is in line with EU community law. The responsibility of service provision of assistive technology is the responsibility for the Employees Insurance Administration Office (UWV). The WIA focuses not on impairment but on the capabilities of partially disabled people to work for and to generate an income (Bingham et al., 2013). The aims of the WIA are:

1. To promote reintegration and to protect the incomes of employees who are restricted in the work they can do, due to illness or incapacity i.e. to increase the long

2. To protect the incomes of employees who are restricted in the work they can do due to illness or incapacity.

The primary aim is to promote a return to work via the use of reasonable accommodation, including assistive technology .The major advancement seen in this act allows for a clear distinction on ownership and transferability from different environments. Ownership of portable devices, procured via the UMV, are held by the disabled user and not by any single educational or work organisation. It allows for the transferability of such tools seamlessly between environments.

The legislation is clearly based on a social model of disability in comparison with the UK viewpoint, which focuses on increasing support, participation and functioning within daily society, driven by government assistance and employer contributions.

5.4.5 The Norwegian view

Legislation within Norway is holistic in its system, covering Assistive technology for all three settings. It can be considered to be perhaps the most coherent and well-developed system overall, in the EU (NDA, b, 2012). Norway is unique in its approach, as it values assistive technology within a national social insurance framework, which allows for assistive technology to be centrally procured via the state. Provisions for assistive technology follow obligations set down by the EU Directive 2000/78. Responsibilities for service provision within the Act falls to Norwegian Work and Welfare Organisation formed in 2006 (NAV).

The main pieces of legislation in relation to employment supports are provided by:

1. Social Security Act: NIA main legislation covering Assistive technology for independent living, employment and education purposes - part 10 regulates financial support for AT;

   Part 10 - in the NIA defines the right to "Support to increase functional ability in working life". The term means that the person has had their "capabilities to carry out income aggregating work long lasting reduced or have had their possibilities to choose occupation or workplace considerably reduced".

2. Employment equality legislation imposes reasonable accommodation obligations on the employer, providing a legal protection against discrimination in working life. The employer has a role both as a potential identifier of needs, establishing contact with relevant milieus for assistance, but also as a gatekeeper for implementation of ICT tools (Hansen, 2009).

5.5 The United Nations Perspective

Ratified by the EU in December 2010, it establishes Disability, not only as a social matter, but as a human rights issue and a matter of law (United Nations, 2007). The Convention on Rights of Persons with Disabilities (CRPD) acts as a major human rights instrument of the United Nations, with the goal of ensuring protection of rights

of disabled users by holding governments accountable for the services they provide to this population. CRPD requires states to bring their national legislation into compliance, with further requirements in place to designate a focal point and coordination strategy to monitor compliance (Articles 4(1)(a) and 33) (Butlin, 2011).

Borg *et al* (2011), through the use of content analysis, critically reviews 25 out of the 50 articles within the CRPD, where the use of assistive technology is applicable.

"The CRPD seems not to give persons with disabilities the right – or legal support – to approach their government to demand necessary assistive technologies at affordable cost, which for many may be at no or very little cost. For people in need of assistive technologies for other purposes, the hope is for the governments to follow the spirit of the CRPD rather than the exact wording" (Borg *et al*., 2011).

However, the paper concludes that access to assistive technology can be argued for as a right of users, as seen via Article 6, 7, 4 and 3 in their right to basic human of freedom, education and participation:

"Thus, a non-discriminatory view of the measures in the CRPD provides an opportunity to advocate for and to formulate, implement and evaluate policies that ensure equal access to all aspects of provision of assistive technology, irrespective of impairment, sex, age or human rights purpose of use."

The provision for a linked strategy, which enables a clear service provision of enabling technologies throughout a user's life stages, is vital legislation in ensuring such legislation and policies are not taken for granted. To date however, the CRPD has not been fully ratified within Ireland and the powers afforded to disabled users by the right remain out of touch to disabled Irish users.

5.6 The United States Perspective

Legislation within the United States for the supports and rights of disabled users to access assistive technology is vast:

The Assistive Technology Act (2004) aims to provide grant assistance for the use of assistive technology, so they can more fully participate in education, employment, and daily activities on a level playing field with other members of society. The definition used by the Act allows for abroad interpretation of assistive technology and what is applicable for grant aid by the Act;

“Any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.”

The significance of the Act is that "the United States is the only country in the world with statutory legislation relating to the acquisition of assistive technology and a definition of assistive technology with legal standing" (Dove, 2012).

The Americans with Disabilities Act (ADA). The ADA is a civil rights law that prohibits discrimination against individuals with disabilities in all areas of public life, including jobs, schools and all public and public amenities. The Act covers discrimination within three main areas – employment, state and local government – including transportation, public accommodations i.e. hotels, cinemas liveries etc. and access to telecommunications – TV and Radio for users with a sensory disability.

With regards to the employment section of the law, it prohibits discrimination in recruitment, promotions, training and other privileges of employment. It further restricts questions that can be asked about an applicant's disability before a job offer is made, and it requires that employers make reasonable accommodation to the known physical or mental limitations of otherwise qualified individuals with disabilities, unless it results in undue hardship (Guide to Disability Rights Laws, 2005). This section of the Act reflects EU directive 200/78/EC, i.e. the statutory requirement to provide reasonable accommodation within the workplace to combat discrimination and enhance the working environment for disabled users.

Hernandez *et al* (2009) raises potential negatives or overprotection afforded by the ADA. Putting the cost on the employer and the need to provide accommodations may

lead to higher cost and concerns for lack of support knowledge recruiting disabled users:

“To achieve the aims of the ADA and increase employment among the disability community, there is a need to arm job seekers, employment specialists, and employers with important information about accommodation implementation” (Hernandez et al., 2009).

Case law in this area is vast, and examples of redress in the lack of provision of reasonable accommodations in the use of assistive technology can be seen in Enyart V Bar Examiners (2011). Enyart sought to take the Multistate Professional Responsibility Exam and the Multistate Bar Exam using a computer equipped with assistive technology software known as JAWS and ZoomText. The National Conference of Bar Examiners refused to grant this particular accommodation and were found to be discriminating against the plaintiff via the ADA in the lack of reasonable accommodations to accomplish her educational goal (Enyart v. National conference of the Bar).

Section 504 of the Rehabilitation Act of 1973 became the first federal civil rights law to protect the rights of individuals with disabilities (Section 504). In essence, it prohibits discrimination on inclusion on any state assistant program. The act states:

"no otherwise qualified handicapped individual in the United States shall, solely by reason of his/her handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance" – section 504.a.

Section 508 (Section 508) further strengthened the rights under the rehabilitation act by stipulating the right to access electronic and information technology. Such an addition was seen to be far reaching in the allowance and integration of the active device by requiring that Federal agencies' electronic and information technology -- such as web sites, telecommunications, software, hardware etc. are fully accessible to people with disabilities. It proved that, by ensuring the procurement of products are

fully accessible to the use of assistive technology, and by their use, they do not provide a barrier to inclusion.

The case of the National Federation for the Blind (NFB) V Target Corporation was taken on grounds of discrimination against a blind user of their website not meeting public accommodation requirements. NFB prevailed in the case and set a national precedent for future cases in this area of website accessibility and for website accessibility standards. Much further work is needed to enforce section 508 for non-governmental agencies and barriers such as cost and support for such change continue to raise barriers for a true universal approach (Lane, 2002). However, such provision of access within US law is seen as the envy of the Disability community worldwide in the promotion and governance of disabled user's rights and access to national services.

5.7 The Australian Perspective

The Disability Discrimination Act 1992 (DDA - Australia) provides protection for Australian citizens against discrimination based on disability and sets out an employer's 'obligations to provide access to an inclusive workplace including work accommodations'. The seven part Act covers employment discrimination, harassment and right for accessibility standards. However, there is no specific language in the DDA addressing assistive technology consideration. The Act was amended in 2009 to incorporate a duty of reasonable adjustment across the areas protected within Act. This amendment to sections 5 and 6 of the Act is seen to be an important step in disability rights, as it ensured that reasonable adjustment provisions are a legal obligation on employers and that disabled users were afforded the right to reasonable adjustment before adverse consequences, as seen in Fetherston v Peninsula Health (2004). The role of aiding the use of workplace adjustments made via the DDA falls to the responsibility of the Department of Social Services, via the employment assistance fund/job access initiative, allowing for the procurement of Assistive Technology and workplace accommodations.

The DDA, although closely aligned to UK DDA policy as a whole, is silent on the point of 'unknown disability' - a disabled user who have chosen not to disclose their disability. This view differs from UK policy, which provides for such non-disclosure and puts the onus and responsibility on society to provide adequate assessment in the provisions of reasonable adjustment and support mechanisms (Dickson, 2011). An example of this in an Australian context can be seen in Sluggett v Flinders University, where the claimant failed to show discrimination in the case against the college, and against the Act in the lack of provision of an accessible venue of lecture due to lack of disclosure (Sluggett v EOC & Flinders). However, if staff within an organisation are aware of an access issue based on disability, such as a need for adaptive or assistive technology, the DDA Act does allow for ensuring adjustments to be made in advance of the function or activity being carried out (Dickson, 2011).

Australian legislation surrounding the use & provision of Assistive technology is not clear or distinct, in the case with US law. The use of Assistive technology is covered under the term reasonable adjustment, leaving the meaning of how Assistive Technology is provided for open to interpretation. The DDA further uses a complex long listed definition of disability which is difficult to interpret. As a whole, the Australian DDA mirrors its UK counterpart by setting down clear rights of the disabled in their right to access employment sector and affordable work adjustments.

5.8 Conclusions

Disability rights and advocates, on the use of assistive technologies as a reasonable adjustment, rely on national & international law to underpin user's rights to access and avail of such enabling technologies. Guidelines and coders of practice use, developed by many organisations in the provision of such adjustments, have little power or effect if not aligned to national law, which sets human rights on equality and universal access. As seen by the literature, European law, and the provision of reasonable accommodation/adjustment, overarches national law. The EU would be seen to be undermined if rights were limited by national laws and practices in this regard. The value of EU law will only be realised if the alignment of national law is set against EU

affirming rights to engage in work, training, equal opportunities, and other social and labour standards.

A snapshot of the United States system has seen assistive technology play a more effective role with US law. The Assistive Technology Act 2004 is currently the only piece of international law with specific details on the right to acquisition and service provision of such technologies. The Act shows US commitment for the use and support of assistive technology specifically, and it ensures a clear differentiation against other work/education adjustments. The Act also complements the broader ADA Act and Section 504/508 of the rehabilitation Act, giving the user explicit rights to a universal approach to accessing information via assistive technologies.
Regarding the use and knowledge of user rights to reasonable accommodation by law, the terminology used by definition can be seen to be complex to decipher for both disabled users and organisations, and as shown, can often lead to judicial conflict via the courts. A strategy of increased understanding and awareness of what is covered by disability law could be seen to empower the user in accessing assistive technology and further adjustments if warranted. Disclosure of disability and the taboo that surrounds this area may hold the user back in regards to career development, which could be extinguished if human rights on access to adjustments and transition paths between sectors, such as education and employment, were enhanced.

The next area of this study will look at a framework to evaluate the barriers to such need for adjustments and look at an evaluation process to question such service provision catered for by law. This will be done through a sample cohort of post and pre exit third level disabled students.

6. Design

6.1 Introduction

The purpose of this chapter is to accurately describe the research methods by which this study was carried out. The purpose of this investigation is to comprehensively identify factors involved in enabling a clear transition of enabling assistive technologies between an educational 3rd level environment and a working environment. The availability of supports is seen as a vital instrument to enable participation within society; without them, it is seen to stunt this growth. Such a viewpoint is highlighted by Shah (2006) who states:

"Where young people who have a disability and require additional support to their peers, the choices available to them, in relation to academic subjects and future careers, may be severely truncated".

By examining the educational and working experiences on the use of assistive technology by disabled users, it can provide useful insights into how access/barriers to such technologies have shaped the transition and enabled access to the employment sector.

The use of a structured and tested assessment tool is vital to the outcomes of this investigation. Efficacy of an assistive technology device is determined by the effect resulting from its use in comparison to the effect claimed beforehand (Gelderblom and de Witte, 2002). To this effect, the identification and use of an assessment tool, via a qualitative approach, allows for a clear structured process to examine the efficiency in the interacting/transitioning of enabling assistive technologies between contrasting environments.

This main focus of this chapter is to look at the justifications for using qualitative research as a design methodology, in progressing to the research outcomes. The chapter evaluates the positives and negatives of existing assessment tools, as a method to enable the construction of the qualitative approach within the stated research question.

6.2 The Use of Qualitative Research

As this study is aiming to identify the significant factors associated with the use and transition of assistive technologies, a qualitative approach is deemed to be most suitable. It has been argued by O' Day & Killeen (2002) that, "One of the great strengths of qualitative methodology is its capacity to explain what is going on" in complex situations involving interdependent individuals, institutions, groups, and systems". Further to this, it has been argued that Qualitative research provides us with, "sanctioned, scholarly methods for understanding those who, on account of their disabilities, struggle to achieve equitable treatment both within the educational system and in the community at large" (Pugach, 2001). The use of a qualitative approach in the design of this investigation was deemed an appropriate method within this study, as it allowed the participants to reflect narratively on their experiences in interacting with their procured assistive device or software. It also allowed for the user to describe, using a semi structured format, the barriers encountered in using such a support to formulate the results and findings described in later chapters.

6.3 Life History Approach

A life time history approach to qualitative research aims to make a connection between the users' events in the use of technology and activities in which the technology has been used. Hatch and Wisniewski (1995) state that the life history approach "*places narrative accounts and interpretations in a broader context – personal, historical, social, institutional, and/or political*". Shah, & Priestley(2011) assert that: *"Connecting biography with history, the core of the 'sociological imagination', means ensuring that accounts of disability are not read as accounts of 'personal troubles' but as evidence of 'public issues'*".

Such an approach allows for the evaluation of the user experiences, via the use of Assistive technology assessment frameworks, in their use of technology throughout their lifetime experiences. It allows us to gauge narratively if such technology

accommodations have been successful or impact negatively in their transition from education to a working environment.

6.4 Assessing and Evaluating User Needs

The literature has highlighted the need for an assessment process that is structured and reflective of views that both enable and prohibit the use of assistive devices.
Technology assessment (TA) allows for a socially driven evaluation on the successful use of technology. A broader definition of technological assessment is "*a process that considers the societal implications of technological change in order to influence policy to improve technology governance*" (Decker and Ladikas, 2004). The need to assess technological use aids the engagement and use of technology; it sets a level of expectation expected from the device and sets clear pathways of support available to the user or institution where the user is engaged in. This section highlights the use of assessment approaches used within this qualitative study to evaluate the use or non-use of assistive technologies, evaluating the external barriers within the physical environment which users have experienced in their engagement with their assistive device or software.

6.4.1 Use and Constraints of the QUEST Tool

Demers et al (2002) present an assessment for the level of satisfaction with outcomes of assistive technology use – Quest. The model is a refinement on an earlier version of the model and involves a bi-dimensional 12 point evaluation tool on user satisfaction of assistive technology in two areas – Device & Service

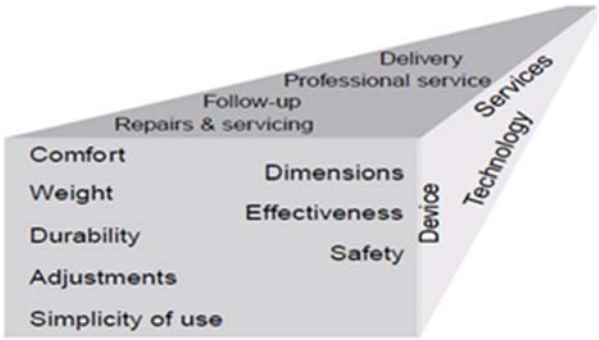


Figure 16 Quest model

The use of the Quest within the context of this research was seen to be viable due to the short and effective method of evaluating the device with the level of service provision available to the user, allowing for short quantitative results in both areas - device - support. The modification of the questions allowed greater flexibility and is shown to be reliable as shown by the literature previously covered (Wessels and Witte, 2003). Within the context of this research, the terminology used did not reflect every assistive device on offer on the market. For example, Question 1 - the dimensions (size, height, length, width) of your assistive device? Or Question 2; how safe and secure your assistive device is? This terms would not be relevant to a user who uses assistive technology software, such questions needed redefining to ensure a valid response rate.

1	2	3	4	5
Not satisfied at all	Not very satisfied	More or less satisfied	Quite Satisfied	Very satisfied

ASSISTIVE DEVICE ***How satisfied are you with,***					
1. the **dimensions** (size, height, length, width) of your assistive device? *Comments*:	1	2	3	4	5
2. the **weight** of your assistive device? *Comments*:	1	2	3	4	5
3. the **ease in adjusting** (fixing, fastening) the parts of your assistive device? *Comments*:	1	2	3	4	5
4. how **safe and secure** your assistive device is? *Comments*:	1	2	3	4	5
5. the **durability** (endurance, resistance to failure) of your assistive device? *Comments*:	1	2	3	4	5

Figure 17 Quest Tool sample

6.4.2 Use and Constraints of the HAAT Model

The Human activity assistive technology framework model (HAAT, Cook and Hussey

2008 b) is a further assessment tool to evaluate and highlight the factors in ensuring the positive use of assistive technologies. The tool introduces the use of three core factors associated with positive human interaction:

- **Human**: Traits and abilities of the user; e.g. physical, cognitive or emotional that act as barriers to technology use.
- **Activity**: In what context will the device be used in; e.g. self-care, productivity? Does the technology meet those needs and is adaptable to the activity it is required to interact with?
- **Assistive Technology**: How does the technology interact with the user?; e.g. screen reading software via a sound or braille output is such a process complex and allow for the correct interpretation or output?
- **Context:** What external social supports (Family and friends) are available to the user and what physical environment will the device or software be used within.

Underlining the human element of satisfaction/match with the technology is the **context or environment**, the level of support, e.g. Family, institutional or social; barriers that may hinder and promote use and satisfaction of such tools.

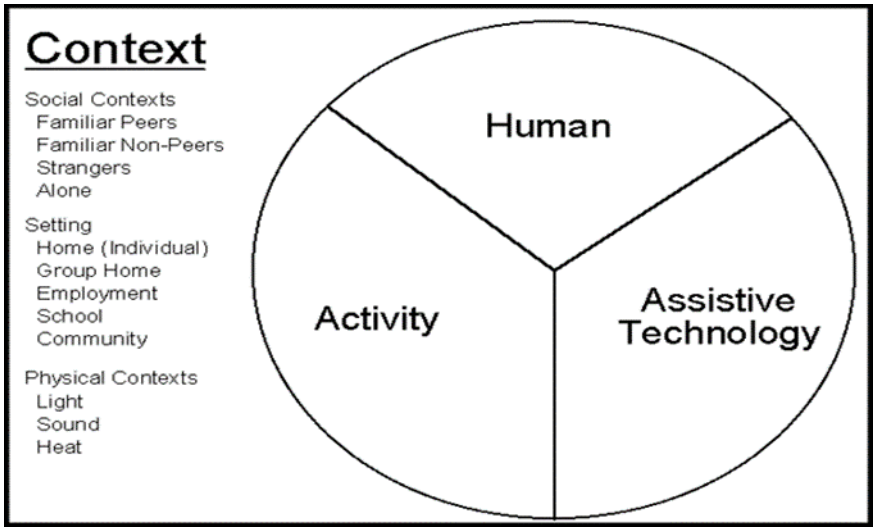


Figure 18 HAAT model

In the context of this research, the HAAT tool allows for collection of data under clear identifiable headings. It allows the construction of clear qualitative process that evaluated the satisfaction or dissatisfaction with assistive technology usage.

The model focuses on the promotion of goals which determines the success and functional outcomes of the technology.
"HAAT model exemplifies Assistive technology usability by describing the interaction of a user with an assistive technology (device) to accomplish an activity in a given context." (Arthanat et al., 2007).

The negatives of such an approach sets boundaries of evaluation broadly and rely heavily on user interaction. Collaboration is not only critical for the HATT Framework, it is also critical in gaining the buy-in necessary for effective identification of barriers and enablers to the technologies use. Shared knowledge gained by the use of the HAAT can only be developed if the opinions, ideas and observations are respected and present a true reflection of engagement with the technology.

6.5 Interview Assessment Design

In this research, interviews were designed to gain experiences from the eight participants on their daily working experiences of working with Assistive technology both within a working and educational environment. The semi-structured interviews asked nineteen questions of each participant. Each question was aligned with one of the dimensions of the HAAT model of assessment, and allowed for the evaluation of the use of Assistive Technology across the four HAAT dimensions; Human, Activity, Assistive Technology, and the Context. The specific inclusion of disabled users solely within the interview design is essential to this research in order to evaluate the barriers of assistive technology use. This approach is in line with National Disability Authority guidelines (NDA, C) in this area, from 2002, which states that the inclusion of disabled people in research "*is an essential element of ensuring that disability research accurately reflects the perspectives of people with disabilities*".

The interview questions were aligned to the HAAT model and are also reflective of transitional studies of Christ (2008) and a recent British Assistive Technology Association research project on an inclusive working environment (British Assistive Technology Association, A, 2013).

Q1. What does the term 'disabled' mean to you?

This broad's question was asked to evaluate how closely the participant values themselves as been disabled or impaired, seeking what stigma is attached to the term *"disabled*", and how it effects the participants in their daily activities. Does such a term affect them negatively and create barriers, or does it provide them with an identity to ensure equal rights? The area is linked to the *human* element of the HAAT in evaluating the user's perception of their "Disability" and queries if the term disabled affects their disclosure or request for assistive technology support.

Q.2 Are you afraid of technology as a whole - With suspicion? With stress? With fear? As a friend?

This area links to the *human* area of the HAAT and past technology use of the MTP. It evaluates if the user values themselves as a novice or an expert in term of their use of technology. Does technophobia play a part in the user's ability to interact with technologies or new technologies? Is using technology an added frustration in accessing information taken for granted by abled body users? Such a topic looks at if their ability deters their use of assistive technology within a new environment or allows them gain independence.

Q.3 What does the term Assistive technology mean to you?

This point establishes if the participants deem assistive technology to differ from day to day technology. Should the term *assistive technology* be separated at all? Does the term assistive technology itself cause a barrier? This point puts a value of what the participants perceive assistive technology to be, allow them achieve and if *context/environmental* barriers should affect their use/ transition to a new environment.

Q.4 Has the use of Assistive Technology changed your view of technology?

This theme links with question two in establishing if the use of assistive *technology* has been a positive experience and enables the breaking down of barriers and access to educational and workplace activities which were deemed out of reach without the assistance.

Q.5 Has the use of you assistive technology been a necessity for you?

This area establishes what *activities* the participants uses their assistive technology to overcome. Do they use them solely for work or educational *activities* or do they use them outside of this environment? How reliant are they on their technology as an aid, and what length of time do the participants spend using their technology daily? Would such technology be needed if transitioning to a new environment or stage in their life?

Q6 Is the use of your assistive technology a hindrance to you?

This question, which is tied to the *Assistive technology* factor, queries what the participant's perception of their assistive technology is. Does it hinder access to task and activities or help them overcome such tasks? How does it interface with the environment, is such a process effective or lead to frustration? Does such use of assistive technology lead to possible abandonment of the technology if needed within a new working environment?

Q.7 Can you describe any barriers you have come up against in using your technology?

This asks the participant to identify any *environmental/context* barriers they have encountered, which has stopped or curtailed the use and transition of their assistive technology, in either a working or educational environment. How such barriers were overcome, what important strategies were deployed to ensure the technology was part of the solution to grow the participant's independence and self-determination.

Q8. Are you ever discouraged from using technology as a way of accessing information i.e. getting friend or human to complete the task?

This theme looks at *the environmental/context* factors in which the participants used their assistive technology within. Has the user ever been discouraged to use the technology to overcome their educational or working activities or task? Had a human resource ever been a solution put forward over using an independent technology solution and what are the participants' thoughts on such a process of replacing technology with a human element? This topic focuses on external perceptions of assistive devices and if such perceptions would discourage their use in a new environment.

Q.9 How are you supported in the use of your assistive technology financially, by training, by people, by free software?

This question evaluates what external supports the participant have received to enable their use of assistive device/ software. Has such supports been effective to enable use in the *environment/context* the participant uses the device within? Is the support constant and reliable in ensuring the user's confidence grows, enabling the use and transition in an educational or working environment?

Q.10 Would you like to know more about potential assistive devices by support staff – i.e. kept up to date on new tech?

This question relates to user support channels in the *environment/context* they work within. Are new approaches or technologies made available for the user to obtain or use? Such new approaches may allow for greater functionality to complete the activity needed more effectively. Are such new technologies relayed and supported within the environment they use their current assistive device in? Does it promote an inclusiveness and supportive environment?

Q.11 Are you anxious in requesting assistive technology accommodation or support?

Do the participants feel they are opening themselves up to highlighting a further need for additional accommodations within the environment/context they use technology? Do such requests place additional barriers or stress on the participant in disclosing a need or do the participants see the request of support as positive in enabling independence and gaining a new skill in accessing information?

Q.12 Do you think you were adequately assessed to ensure the technology you got met your needs?

What levels of assessment took place, if any, to ensure the user needs were matched when being introduced to the *assistive technology*? Was the user assessed by the institution or employment area concerned, and were a range of factors such as support available, with the user traits and IT skills taken into account before the solution was agreed upon? Was an assessment or evaluation of need ever discussed when moving to a new working/supportive environment?

Q.13 Do you think an assessment process has been/ would have been successful in matching the technology to aid in achieving your goal /activity?

An additional question to Q.12, this question evaluated if an assessment process is a valuable tool in assessing the need for and use of *assistive technology* and if the user had been evaluated for such a need. Was the process successful in ensuring the correct tool was chosen and ensuring a better transition of support and technology to a new environment?

Q.14 Do you use you assistive software outside work or educational activities?

This theme tied to the participant's *activities* of the HAAT, and evaluated if the use of assistive technology is tied to one task or activity, inquiring if the use of the assistive technology continue outside of work or educational activities and if the use of such technologies outside of their work/educational activities benefits them in accepting and engaging in their technology?

Q.15 (S) Can you see you using this technology after you leave an educational environment? (Current student based question only)

The question under the *activity* factor of the HAAT questions asks if the use of the assistive technology will be transitioned to a working environment if the need arises. Could the user see them using such a device in an employment environment and see the positives or negatives of transiting such a support to a different environment?

Q.16 (E) Do your work colleague support /understand what you AT device let you achieve? (Graduated – employed students only)

The question looks at the *environment* and the support the participant receives from work colleagues within the same role. What culture exists or existed within the employment environment the assistive devices is used? Are work colleagues supportive in your use of the assistive device and understand the objective in its use? Is the culture positive or negative in the understanding and use of your assistive device, enabling the disclosure and transition of their assistive technology?

Q17. Do you self-support yourself in its use over asking for assistance i.e. cost – getting solutions that involve Assistive technology/Information Technology?

This question queries if the user self supports themselves in troubleshooting problems with their assistive technology, without any assistance from the educational or working support networks i.e. IT helpdesks etc. The question queries if there is a need for expert support in integrating the use of assistive technology and making the employment *environment* aware of available expert support channels. Would the need of expert help provide an improved transitional phase for the students or is a self-support network sufficient?

Q.18 Are you aware of Irish law provisions in the right to access reasonable accommodations?

This topic looks to question the knowledge of the user is relation to Irish and EU law within the *environment/context* of their assistive technology use. The questions aims to seek perspectives on awareness and understanding of the right under EU & Irish law on access to reasonable accommodations and if such recognition in Irish law would affect their use in transition and requesting supports in a new working environment.

Q19. Would you hope you employer has an understanding of such regulations

In follow up to the previous question, it additionally asks if the participant's employers are aware of current EU/Irish law with regards to reasonable accommodation or if this area is not relevant to their use of assistive technology. In regard to current final year students, they are queried if they feel employer knowledge of such need for accommodations would be a benefit in looking for access to the employment sector.

Q. 20 Overall, do you think the use of AT for disabled students is a positive support

This overarching question asks the participant to summarise the use of *assistive technology* and if they value its use as a reasonable accommodation moving into the future. The questions aims to ask if such support has a lasting positive or negative effect on enabling access to completing the participant's education and transitioning to the employment sector.

6.6 User Sampling

A sample size of eight users were used in this research study ranging in age from early twenties to late forties. In relation to the size of the sample used, Goodson and Sikes (2001) claims that *"adequacy is dependent not upon quantity but upon the richness of the data and the nature of the aspect of life being investigated"*. In this regard, the sample size of eight past and present students who have engaged in the use of assistive technology allowed for a reflective quantitative collection, using the life time history approach in assessing and evaluating the satisfaction and transition of such technologies between two separate environments. The gender was split to ensure any reflective pattern was accounted for regarding satisfaction with assistive technology that attributed to gender. Additionally, a broad range of ages were sought, ranging from 18 years old to a participant in their late 40s in order to explore any potential discrepancies in age.

Seven of the eight participants were visually impaired and used a mixture of screen reading software, for example, Jaws or NVDA, and screen magnification software such as Zoomtext, an inbuilt accessibility option in the operating system. To ensure the investigation included an opinion from a separate disability cohort, one participant with a diagnosis of dyslexia used a mixture of ergonomic supports and proof-reading Texthelp software. They were also asked to give their thoughts on transitioning such supports to a new working environment. Participants had a mixture of technical expertise ranging from an expert knowledge (being comfortable troubleshooting and identifying new solutions independently) to a novice participant (whose reliance on external supports was greater). The range of skill levels allowed for a reflection on the transition process and if such supports were empowered by the users own ability.

Finally, the mix of students currently in their final year of their current education cycle were set against four graduated students who are currently in full employment or have worked in fulltime and who returned to postgraduate studies. The selection of this grouping allowed for a clear response to barriers that can aid the use of assistive technologies and allow for a further transparent transition phase between environments. For a summary of the participant sample, please view the table below:

GENDER	
Male	4
Female	4
AGE	
18 – 25	3
25 – 40	1
40 – 50	4
DISABILITY TYPE	
Blind – No vision	3
Blind – Low vision	4
Learning difficulty - SLD	1
EDUCATION/EMPLOYMENT	
Current Postgraduate student in education	2
Current Undergraduate student in education	2
Employed – past graduate	2
Past employed – returning to education	2
TECHNICAL EXPERTISE	
Expert	2
Intermediate	3
Novice	3
TECHNOLOGIES USED	

Screen magnification	4
CCTV	4
Mobile apps	8
SLD proofing s/w	1

Table 1 Research Participants

6.7 Participant Recruitment

The researcher within his role of assistive technology officer within a third level education plays a key role in supporting students in assistive technology provision registered with the Disability service. For the completion of this research the term *participants* was used throughout to describe both the current students and graduated students. Goodson & Sikes (2001) have argued that the use of this term this does "not have the same 'othering' and homogenizing implications that the traditional research designations do". The participants were recruited via their working support relationship with the researcher.

The students agreed to participate in the research to highlight their experiences in using assistive technology, and to highlight the benefits and its shortcomings when used in different environments. The breakdown of the student background and ability is provided in figure 13 (above). All participants were asked to be a part of the study face-to-face in a meeting with the researcher. All participants were then asked via email formally to participate in the study. Validity and reliability of the research were factors encountered by the researcher during the investigation. All research questions were provided for the interview and questions/themes were communicated in advance of the interviews to ensure consistent themes and to allow for clear responses. The researcher was aware of bias in interviewing students supported by him in the participants' educational cycle. Plummer (1983) identifies three main sources of bias within social science research, "*those arising from the subject being interviewed, from the researcher itself and those arising from the subject-researcher interaction*". The paper goes on to point out that to eradicate bias from research would be akin to reading research without human participation.

The researcher felt having an established working relationship with the participants established lead to a cleaner, more effective interview process, were reviews were naturally given and were trust was already established. Rapport & disclosure, as shown by Wicks and Whiteford (2006), are significant factors that must be evaluated when undertaking qualitative research. Further to the specific use of the life time history approach, Booth (1996) states this approach requires the need for a close fostering of a working relationship between the researcher and participant, and by developing a level of rapport, it can enhance results and disclosure by participants.

6.8 Conclusions

This chapter has presented the approach and methodology used within the research. The use and design of a qualitative approach via a 1:1 assessment process engaged the participants in a semi-structured method of gaining the participants views on their satisfaction with using assistive technology, and in finding the barriers that may prevent their transition between an educational and working environment. The use of the HATT model of assessment places particular emphasis on the user's views on their engagement with such a support. The further use of the life time history qualitative approach also allows one to make connections between the different periods in the participants' life and their use of assistive technology. The use of a qualitative approach, as shown by the literature, is a suitable method in assessing and understanding intricacies of disabilities in a social context (O'Day & Killeen, 2002).

The chapter has also mapped out the characteristics of each of the participants within the study and highlighted the validity-bias factors that presented itself to the researcher when recruiting and interviewing the participants. Due to the rapport and relationships between the researcher and the participants, it is felt that the use of a qualitative life time history approach, along with the quantitative use of the Quest evaluation tool, allowed for a clearer path in presenting the findings of the research. The design of the investigation also viewed that no research is completely free from bias and that if the

subjective opinion is what the researcher is seeking, then a life history approach is most suitable. From this design chapter phase, the investigations next chapter will cover how the research was implemented and how high level themes developed from the interview process.

7. Implementation and Methods

7.1 Introduction

This chapter aims to introduce the implementation and initial findings of the experiment developed from the design phase of the investigation discussed in the previous chapter. The chapter highlights how the key information was obtained and areas identified under the two main areas of data collection:

1. *Semi-Structured quantitative assessment interview* - The main topics and themes derived from the interview assessment process will be identified.
2. *QUEST evaluation* - qualitative user evaluation and satisfaction with technology

7.2 Interview Assessment Process

As described in the previous chapter, this investigation interviewed eight participants on their views on the use of Assistive Technology in different supportive environments and asked them to reflect on their levels of satisfaction with such enabling devices.

7.2.1 Location of Interviews

All interviews took place within the library complex of The Ussher library in Trinity College, Dublin. The location of the interviews was chosen by each individual participant. This was to ensure that they would feel comfort and relaxed in a location they knew and felt free to discuss issues presented by the interviews. Bearing in mind that seven of the eight participants were visually impaired, the choice of a familiar setting within their current or past educational environment was sensible. The setting was adequate for the purpose of the interviews due to quiet surroundings and lack of any potential interruptions; this allowed for a constant interview process where the participant could focus on the questions being covered.

7.2.2 Interview Questions

All interview questions were sent to all the participants before their respective interviews were conducted. This was to ensure the participants could prepare an adequate response to areas that could cause confusion if asked without prior knowledge. The questioning followed a semi-structured format, allowing for clarification from the researcher to ensure a clear understanding and validity of response. Each participant was encouraged to talk freely about their satisfaction with using their assistive technologies; the reason for this semi-structured approach was to ensure that participants explained their issues in their own words. Overall this approach worked well due to the supportive relationship the researcher has with all participants. For a few of the participants, a number of clarification questions were asked to allow them to express their views fully.

7.2.3 Interview Durations

All interviews took place within a four-week period, from 02/04/14 to 30/04/14. No maximum duration was placed on each interview but on average each interview took 45-50 minutes.

7.2.4 Interview Confidentiality

Confidentiality was a major factor considered by the researcher throughout the process due to the fact the participants were talking about areas of past and present employment. All participants were advised that their personal identities would not be used in the investigation results and all transcriptions would use pseudonyms as shown below. Each participant was advised that each assessment interview would be recorded using a digital recorder and transcribed later by the researcher.

	Gender	**Student / Graduate**	**Participant code**
Interview 1	Female	Student	*SF1*
Interview 2	Male	Graduate	*GM1*
Interview 3	Male	Graduate	*GM2*
Interview 4	Female	Student	*SF2*

Interview 5	Male	Student	*SM3*
Interview 6	Male	Student	*SM4*
Interview 7	Female	Graduate	*GF3*
Interview 8	Female	Graduate	*GF4*

Table 2 Interviewees Codes

7.2.5 Interview Themes (Pre-Coding)

Themes were identified using thematic analysis. Thematic analysis is described by Braun and Clarke (2006) as: "*Identifying, analysing and reporting patterns (themes) within data. It minimally organises and describes your data set in (rich) detail. However, frequently it goes further than this, and interprets various aspects of the research topic".*

The approach offered a theoretically flexible way in which to analyse the qualitative data that is compatible with the life history approach. The themes are the participants interpretation of the issues in transitioning assistive technology supports to a new environment. Coded themes identified by the use of thematic analysis and the identification by colour codes against these themes which will be further explored and connected to past research in the following chapter.

7.2.6 Key Interview Themes (Pre-Coding)

Each question was analysed using thematic analysis and colour coded to enable the creation of the major themes which will be discussed further in chapter 8.

Q.1 What does the term "disabled" mean to you?

This was the first question, and is linked to the *human* element of the HAAT. The responses presented a theme of the lack of independence and awareness by the term "disabled". Poor Universal Design and lack of user input leading to greater barriers, a lack of awareness and a lack of support disables the users when the environment does not encourage the individuals to disclose a need for supports. For example SF1: "*For*

me, I recognise that I have impairments and therefore I am disabled in certain instances. For me, I often think I'm disabled by society rather than me been disabled, even though I would be classified as a disabled person. It is the fact that it's the way society is designed means that I cannot do particular things because of my impairments, but if things are designed in a different way I can do those things"

A further extension of this view was raised by two of the graduated participants who have currently or been previously employed who see the term "disabled" as both a *human* issue and a *context* issue, jointly reflecting the psychosocial view of disability. GM2 said: "*I used to completely agree with the social model of disability. The idea that disability is of social construct, and if you think of the population as a range of abilities, it is society that disables people….the only trouble with that is it really says to me, the individual that it's somebody else's problem, not mine whereas I do think though I should be doing something to accommodate towards myself*." From GF3: "*It covers a lot of people, but I also think it can be either helped or hindered by your environment. It's something that you've got to take responsibility for as well, you can't blame everything on the environment."*

Q.2 Are you afraid of technology as a whole – Do you look at it with suspicion, with stress, with fear, as a friend?

The themes of independence came clear in the user's responses to this question. The confidence and increased ability to use technology is seen as an advantage over non-disabled users. The technology allows them to undertake tasks that before they were reliant on others doing; such independence encourages the participants to tackle new roles where previously they felt were too difficult to attain. GM1 said: *"I think it's one of the few things that if you have disability physically or mental whatever technology allows you in some cases, not just level the playing field, but surpass your contemporaries because half of them don't use it. It makes life much easier when you know how to use it"*. The further themes of confidence gained by the correct assessment and match with technology procedure is also evident as the technology was seen as a plus and not a negative exercise; from a student perspective SM3 said: "*I had a fear of it but over time, with help I actually began to become more confident with it, see the value of it. It was a necessity, but now I actually used it quite freely and use it.*

I've come to love it, free and advantageous and very much part of my life, I could not do without.

Q.3 What does the term Assistive technology mean to you?

The themes of *technology* as needing to be universal in its design was prominent throughout the participant's responses to this question, the need for a "mainstreaming" approach to assistive devices to improve use was highlighted, as well as the notion that assistive devices are not just for disabled users. The more universal and usable all the technologies become, the more likely they are to be acceptable among their peers; SM4 said: "*I see* [assistive technologies] *as being different, there's no reason why they shouldn't become mainstream technologies. If I use the technology around my family they always say that could be really useful for them as well, there's no reason why it can't branch out to mainstream technologies, like advancements in iPads*". Such a sentiment is also reflective by the graduated participants, for example GM2 said: "*To give you access to something. I've always felt be much better if the technology I wanted to use would be more mainstream*".

Q.4 Has the use of Assistive Technology changed your view of technology?

The use of assistive technologies increases the ability of the participants and encourages them to participate in new activities and new roles; for example, SM3 says: "*I've radically changed, from being suspicious or afraid of* [assistive technologies], *even feeling incompetent around it to seeing it has something I really enjoy, not just value in it but as an absolutely necessary"*. Such use of assistive technology is reflected by an employed graduate, GF3, who said: "*It raised my expectations of what I should be able to do. Sometimes it doesn't always meet them. Before I would have got none, 'I just can't do that', for example accessing the website or information, but I kind of believed if somebody has developed is really complex programs for people to be able to use the stuff somebody's done all the hard work for a lot of people*"

Q.5 Has the use of your Assistive Technology been a necessity for you?

The responses to this question highlighted the *activities* the participants use their assistive devices for, with all users commenting on the importance of their assistive technologies in completing day-to-day activities; they have become an integral part of their lives which enables them participate confidently in society (education and work). The need for both using were key issues in the responses provided, for example, GM1 said: *"if I was to remove my use of assistive technology, I would be regressing basically in terms of my ability to function in the world to 1998! That's what you're talking about, for me it's integral to how I function"*. And, in a similar vein, a current student SM3 says: *"It was certainly comforting and reinsuring, something that enabled me to have a new confidence"*.

Q6. Is the use of your Assistive Technology a hindrance to you?

The responses to this question reflected on the assistive device itself and the frustration in the use of the technology without the correct support channels. If these support channels are not available, it may lead to the non-use of the support being provided, particularly if not available when changing environments. SF1 said: *"Yes, to the extent it doesn't always do as I said, work compatibly with the mainstream side of the technologies that I'm trying to work with. That can be challenging and frustrating, a hindrance"*. The lack of support as shown by the working graduate can cause uncertainty, for example, GF3 said: "*only when it doesn't work, for example when the Braille display I have it should be all singing, all dancing, but it falls apart unexpectedly. I'm not really sure where the fault is"*.

Q.7 Can you describe any barriers you have come up against in using your technology?

The level of awareness and support are major themes extracted from this research. The participants reflected on the lack of general awareness of the compatibility of mainstream technologies with assistive devices and the lack of support solutions available. Such awareness barriers can impede the transition of such technologies into

a new working environment. GM2 reflects on such a lack of support or understanding: *"If you want to try out a new piece of software you have to go through enormous hoops to persuade the IT department to allow you to install it. You could work with it perfectly at home, but within a work environment it was impossible. You would have to go through an elaborate testing process to ensure it didn't disrupt anything else. That was an issue. Now there are some workarounds"*. This issue is also reflected by a participant within the educational environment who was frustrated with the lack of end user testing and universal design principles. They highlighted this as an area of concern, for example, SF2 said: "*even though the page is magnified, it will split the screen so I can see half the screen. If I want to see the other half, I can't, that's not practical. It's difficult to work with, not practical. If I have a document open I can only see half of it. People can't work with what they have to"*.

Q8. Are you ever discouraged from using technology as a way of accessing information i.e. getting friend or human to complete the task?

Only a few participants were able to suggest examples of barriers to use of their technology, since most environments were seen to be supportive in the use of the technology. The Assistive Technologies were primarily being used for communication purposes and the participants were happy to use it over a human accommodation. One employed participant, GF3, reflected that technology that is not accessible curtails her independence and decreased functionality within her position, she said: "*A lot of the time there are parts of my work that aren't accessible and the solution largely is that I would get one my teammates to do it. I said to them; 'That's fine in the short term', but my personality, which is largely independent and I don't like people doing stuff for me"*.

Q.9 How are you supported in the use of your assistive technology financially, by training, by people, by free software?

The responses to this question showed the participants reflecting on the *context* in which the device would be used and supported in. The themes of level of support and level of awareness when first using such technologies were common in the responses; the need for a supportive process, not just financially, allows for integration of such

technologies in an inclusive manner. GF3 said: *"financially I was very well supported, my employer paid without hesitation for JAWS and Kurzweil, which when I was interviewed I didn't know how to use, they also paid for the Braille display; however I went over the other day for support and the person kept asking me why I am not using Chrome which I replied that it's not accessible! Three times! That's really just an awareness thing and hopefully that will just filter through"*. The lack of support is followed thorough by this response from GM2, who said: *"There were a number of people using JAWS within my organisation and the support solution was to ring me. So I became the support!!"*. Within an educational environment, the support and awareness of such devices are provided mainly by the college Disability Service, making the process better and a more amenable, as exemplified by SF2, who said: *"on the PC at home and Supernova I just found it was freezing all the time and very unreliable and took so long to set up. But in college the setup here was great; all the software was installed for me which was much easier"*

Q.10 Would you like to know more about potential assistive devices by support staff – i.e. kept up-to-date on new tech?

The responses to this question highlighted the *contextual* support and access to new technologies available. All participants felt it was important to know about new assistive devices and approaches. This trend tied to a constant support theme by participants and the need for the end-user to take a level of responsibility for support not just the need to be reliant on in-house support. GF3 said:*"I kind of try to keep myself up-to-date, if you're so reliant on the technology you need to keep yourself in the loop, I don't think the staff within my department would usually be aware of new technology"*. This approach is also reflected by participants' completing their educational cycle who would benefit from such special support after completing their course. SM4 said: *"I think it would be good for somebody to have a specific job doing this, maybe to send a newsletter or information, telling me what is out now, and how you can get hold of it. I get a magazine every month from Speak Out for people who are in wheelchairs, which shows you all the new stuff."*

Q.11 Are you anxious is requesting assistive technology accommodation or support?

The responses to this question focused on the *human* element and the *contextual* support element of the HAAT. Participants highlighted the lack of a clear avenue for requesting supports, and showing anxiety if the support is not a co-operative process, potentially resulting in a non-disclosure of a need for assistive technology support. In the following case SF1's, own perseverance and need to overcome any possibility negative responses: "*I have had occasions in the past when I have not asked for support, because I anticipated a negative response from the individual I would have to interact with…, I just got more thick-skinned and I couldn't really care what people think of me. It reflects just as badly on them for reacting in a negative way as it does me"*. Participants who have worked in employment reflect that sometimes there is zero support from the employers and how the participants are left to self-support themselves. For example, GM2 said: "*it was hard to get demo versions and it was a long process to see what things were accessible…I would have to go through a month of self-investigation to get to the point to know that it would work, that was off-putting*.".

Q.12 Do you think you were adequately assessed to ensure the technology you got met your needs?

Ensuring a match in the procurement and user's ability is a critical path in ensuring a successful match in the assistive device. A stark comparison was reflected in the participant's responses regarding the lack of a needs assessment in an employment setting where it is left to employees, in contrast to the structured supportive educational environment, where the College takes the responsibility. SM4 said: "*when I came to college I was definitely accurately accessed. I was sat down and shown different machines and different PCs that could benefit me. Over time I took a liking to certain stuff that was shown to me. And yes, the assessment was definitely up-to-date. Sure, look at me now, at the very end, which is positive*". This clear assessment is not reflected in the employment sector where the need for technology accommodation is not a topic raised by the employer and left to the employee to voice their concerns; GM2 said: *"no, there was no special needs assessment or accommodations assessment"*. GM3 furthered this point: "*It was very much that, when I started my manager sat down with me and I explained what was needed. I also mentioned to them*

at my interview, I brought my laptop along to all the interviews and showed the technology and how it performed. I was never taken up on that offer to demo it, and my manager did reference that that was a big mistake, because they was not sure of the technology and it freaked him out a bit"

Q.13 Do you think an assessment process has would have been successful in matching the technology to aid in achieving your goals /activities?

This follow-up question reflected the positives of the assessment process in an educational environment, but also the frustrations of a lack of structured approach to addressing such issues available to all staff in the employed sector. From a student's perspective, SM4 commented*: "one hundred percent, it's been a massive help to me enormously to get to my exams and finish my course*". Compare this sentiment with a currently employed participant, GF3, who said: "*there was no assessment as such so I have not reached my working goals as I'm not on phone support yet."*

Q.14 Do you use your assistive software outside of work or your educational activities?

The technology assessment aims to ensure that the assistive devices are not only used for educational and working activities but to enhance participation in leisure activities also. This independence theme was reflected by all participants in their responses and demonstrated the importance of being able to incorporate assistive technologies into their lives and reach their goals. GM2 said: "*absolutely. I use my Assistive Technology at home as well for reading the Internet, and working on a few external projects. It crosses my day-to-day activities all the time…. but my use of assistive technology is essential"*. The leisure aspect is shown below but the respondent also reflects on the need to use it every day no matter what the activity is, SF1 says: "*my phone has a voiceover and all of those things and I use it constantly, I have a Kindle App on my phone to download books, it's the voiceover that reads it, but it is a pleasurable activity. Its part of my life, I can't read print any more, for me, I can turn voiceover on and off with a flick of a button and its grand if I'm out and about. I can read a text message, so I click on the voiceover and it will read it to me. I use technology when and where I need to use it, regardless of the activity"*.

Q.15 (S) Can you see yourself using this technology after you leave an educational environment? (Students only)

The responses to this question focused on the *Activity* area of the HAAT, exploring a theme of transition and the wish to continue using the technology if moving into a new environment, be it work or future education. The responses also highlighted the importance of being allowed to use such technology, as shown by two current students. SF1 said: *"if I go further, in whatever direction, the technology is an essential part of my life, technology is essential on a daily basis for me, so I will always use it"*. SM4 said: "*I'd hope to keep going with study; maybe staying in the College environment, but if I do end up going into a law firm or company. I think I would* [still use my technology suite]. *I'd still use the stuff I have now and hopefully there is even more then"*

Q.16 (E) Do your work colleagues support (and understand) what your AT device lets you achieve? (Employees only)

The responses to this question raised the issue of support and organisational culture being positive to the use of assistive technology, but highlighted a lack of awareness initially for the need for such enabling technologies. A lack of understanding by others leads to a sense of frustration as shown by GM2, who said: "*if I was not technical, I could not do those jobs, seriously. When I go for a job, I know more about the technology than the guy I'm talking to... They usually don't get it, or don't care. So you usually have to go around them, and as I have technical grounding I can get around these guys, but the fact you have to walk in and think about these factors to get what I need is wrong. It shouldn't work that way*". An awareness day on assistive technology can relieve anxiety and raise awareness and understanding. On this matter, GF3 said: "*the most recent screen reader I've downloaded has a lisp. I've never heard of a screen reader with a lisp,* [my work colleagues] *find that very entertaining … I was really against* [an awareness day] *at the beginning because I'm not used to the 'let's make a big fuss' thing, I don't really do that, but actually I was quite glad because it made*

other people a lot more comfortable, one of the presentations was on assistive technology, a list of what blind people usually use"

Q17. Do you usually financially self-support or ask for assistance i.e. cost – getting solutions that involve Assistive technology?

The responses to this question centred on the level of assessment carried out and the human ability to troubleshoot issues if they occur leading to greater self-reliance and benefits from the device. The knowledge and ability with technology (expert or novice) to find solutions and reliance on support chains if unavailable were themes that came from this question; such themes are important to note for graduating students who are looking to take such technologies into a working environment and their ability to transition the technology if expert support is not available. The use of external support and government agencies are highlighted by many respondents, for example, GM2 said: "*to a large extent they felt that I would know where to get support, they left it up to me to find it out. I was in the fortunate position that I was able to do that. But that would be a lot more intimidating for somebody starting off without the knowledge. I got a lot of support initially as I said from the NCBI and got training*".

The ability to scope a preliminary support solution and work with a support agency or service was noted by current student, SM3, who said: "*I looked at a number of types of solutions online, then I had both support from* [the college Disability Service] *and support on the web. I looked at a number of types of solutions online … I would use a mix between myself and the service"*

Q.18 Are you aware of Irish law provisions on the right to access reasonable accommodations?

Answers to this question were mixed and based on the age profile of the participants. Younger participants were unaware of such provisions in law in comparison to the mature participants who were well aware of the provision but were sceptical of their use. The lack of knowledge of Irish law in regards to workplace accommodation is shown by current student, SF3, who said: "*I know the College access policy for sure!! But Irish law no, not all, I know about equality and all that, but that's all.*"

Those with awareness of Irish and EU law also commented on the weakness of these laws and their lack of enforcement in working environments, as commented by the graduated participant, GM2, who said: "*I was under the impression that there were a number of laws around the Equal Status Act and the Employment Equality Act and the Disability Act. My impression of them all was rather weak; they had phrases in them, such as "in as far as is practical" which are get-out clauses".*

Q19. Would you hope your employer has an understanding of such regulations?

The responses to this question, a follow-up to the previous question, reflected the feeling that employers have a poor knowledge of such regulation and how it's interpreted within company policy. Such a feeling of a lack of awareness of work accommodations leaves the student feeling isolated and vulnerable in asking for supports. GM2, who is a graduate, commented on his employer's awareness of Irish law: "*I'd say, not (laughing), I was the disability police!!"*. Such issues are of concern for students who are leaving an educational environment and need such accommodations; SM3 said: "*I would, but it's great to hope. I would hope there would be an appreciation of the needs of every employee, especially those who have some kind of disability. Realistically I know people tick boxes and employers will like to say they promote everything from the ozone layer to disability campaign and every campaign that's politically correct, but in fact the level of accommodation may be minimal"*

Q. 20 Overall do you think the use of Assistive Technology for disabled students is a positive support

The broad final set of responses summarised the participants' use of Assistive technology and their engagement in supports to accommodate that use. Overall, a positive series of reflections were reported, focusing on how such supports can enable access and promote independence if assessed properly and supported correctly. It was reported that assistive technology affords a more positive experience, and is very useful when transitioning to a new working environment. A current final year student (SF1) commented on the need to engage with supports: "*everyone should use as much support as they can, getting familiar with the technology they're using. Ensuring that the assistive technology they have is working to the best of their ability. It can be hard*

sometimes to engage in supports all the time as you feel you are being separated not included, but I definitely think if you can engage with them and get on with them, build a relationship, try to figure out what works, and what doesn't work, you have a better chance of getting on long-term".

The advantages of having expert supports are also echoed by a graduate (GM2): "*As I've discussed, it is not necessarily that easy to pick out the correct type of technology. For somebody who starting using it for the first time it can be quite bewildering, you need some support in finding out what to do. There's a lot of contradictory information on the Internet, so you need support for this. But in my case it's essential."*

7.3 QUEST Results

In addition to using a one-to-one interview process to evaluate and assess the participants, the use of the modified QUEST tool provided quantitative data on the participants' satisfaction with two aspects of their present assistive technology use – the use of the technology itself, and the support network available to them.

The purpose of the QUEST questionnaire is to evaluate how satisfied the user is with their assistive device and related service experiences. The questionnaire consists of twelve satisfaction items. For each of the twelve times, the participant was asked to rate their satisfaction in relation to the assistive technology device and the support service experienced using a Likert scale of 1 to 5:

1. = Not satisfied at all
2. = Not very satisfied
3. = More or less satisfied
4. = Quite satisfied
5. = Very satisfied

The twelve question paper based evaluation was carried out and completed by all participants (n=8) at the end of the interview phase. All evaluation using the QUEST tool took place in the Ussher library of Trinity College Dublin. All questions used a Likert scaled use of evaluation.

The 12 questions are split into two sections, eight are centred on the assistive device and the remaining four on the service provided:

Assistive Device –

1. Does you *technical ability* match you use of the assistive device?
2. What is you level of satisfaction with the *portability* if your assistive device?
3. The ease of adjusting *functionality* (understanding functionality) of your assistive device?
4. How happy are you *troubleshooting* problems with your assistive device independently?
5. The *durability* (endurance, resistance to failure) of you assistive device?
6. How *easy* is it to use your assistive device?
7. How *comfortable* are you using your assistive device in your environment?
8. How *effective* your assistive device (meet your needs)?

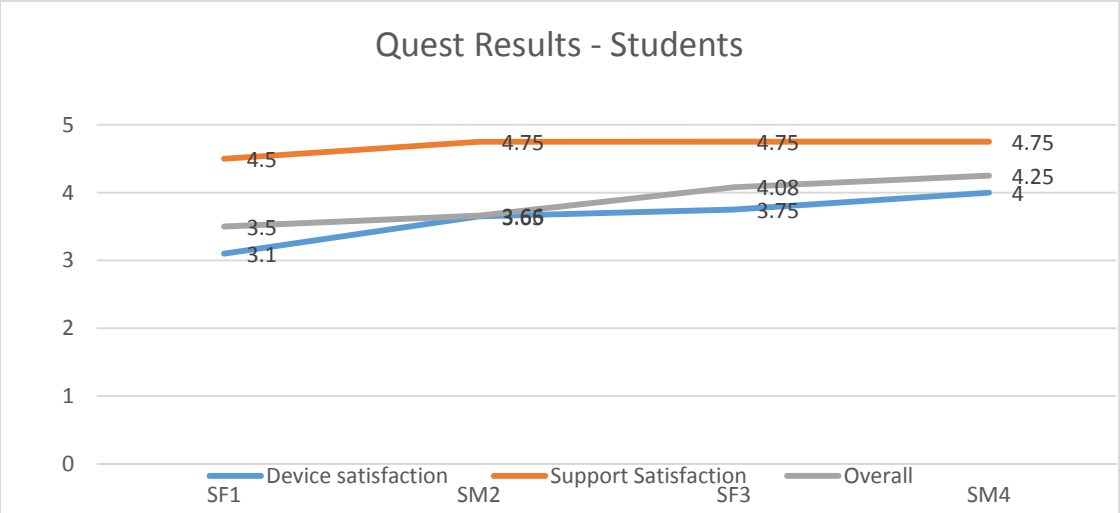
Service -

9. The service delivery program (procedures, length of time) in which you obtained your assistive device?
10. The repairs and servicing (maintenance) provided for the assistive device?
11. The quality of the training (information, attention) you received for using your assistive device?
12. The follow-up services (continuing support services) received for you assistive device?

7.3.1 Current Student Results

Student Code	Technical Expertise	Device	Support	Overall
SF1	Intermediate	3.1	4.5	3.5
SM2	Novice	3.65	4.75	3.66
SF3	Novice	3.75	4.75	4.08
SM4	Intermediate	4	4.75	4.25
Mean	-	3.62	4.68	3.87
Standard Deviation	-	0.37	0.12	0.35

The above table shows the high level of satisfaction of users with both there device and support. No user valued their device or the support they received as unsatisfactory and shows a high level of a positive match with the assistive technology procured via an structured assessment process

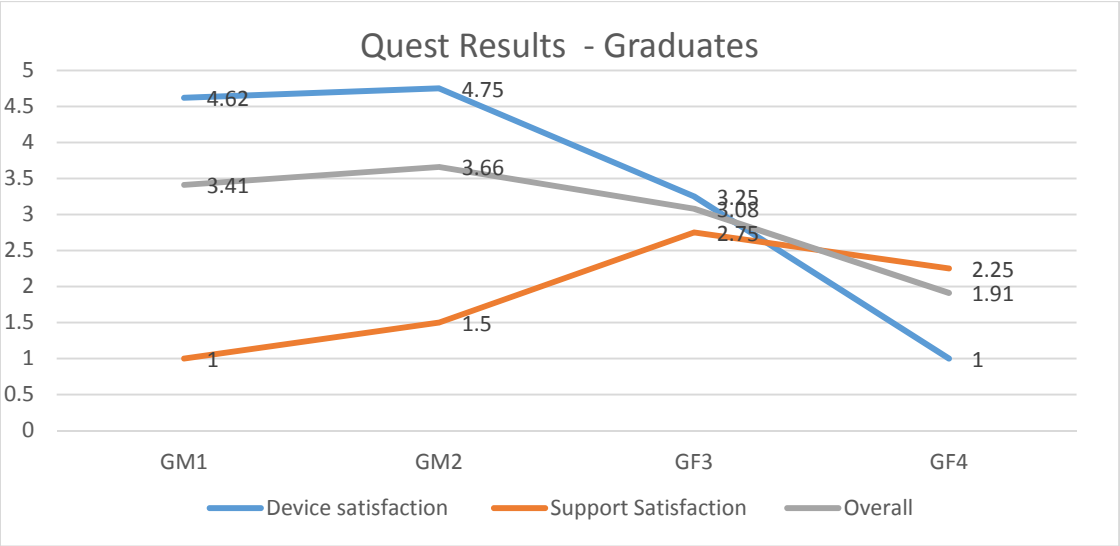


The above chart is a graphical representation of the student results of their satisfaction with the device and support received in the use of their assistive device

7.3.2 Graduated Student Results

Student Code	Technical Expertise	Device	Support	Overall
GM1	**Expert**	**4.62**	**1**	**3.41**
GM2	**Expert**	**4.75**	**1.5**	**3.66**
GF3	**Intermediate**	**3.25**	**2.75**	**3.08**
GF4	**Novice**	**1**	**2.25**	**1.91**
Mean	**-**	**3.40**	**1.87**	**3.01**
Standard Deviation	**-**	**1.74**	**0.77**	**0.77**

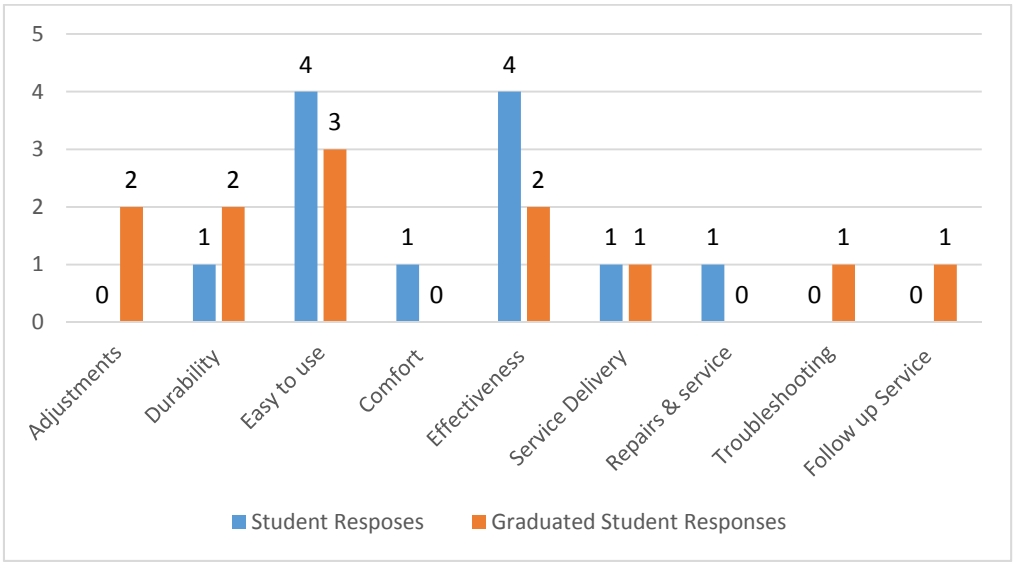
The above table highlights a contrasting poor dissatisfaction rating of supports level. Such poor supports are spread evenly across all ability types and highlight a poor service provision in this area, even though their use of assistive technology is a positive satisfying experience.



The above chart show a graphical representation of the graduated satisfaction rating of both the support and device usage by each graduate participant who engaged in this investigation

7.3.3 Satisfaction Items

In addition to responding to the twelve questions on the their satisfaction with the device and service all participants were asked to highlight their three most important satisfaction items from a range of twelve items, as shown below, with a comparison between the student and graduate viewpoint highlighted:



The nine items that received a response result from the participants were:

1. *Adjustments*
2. *Durability*
3. *Easy to use*
4. *Comfort*
5. *Effectiveness*
6. *Service delivery*
7. *Repairs & Servicing*
8. *Troubleshooting*
9. *Follow-up service*

The above chart highlights common themes of both graduates and current final year students of a need for their assistive device to be effective within their working environment and for such device to be easy to use/match their ability. Out of the four graduated participants, the highlighting of a follow up service, troubleshooting and service delivery where chosen above more common items chosen by the four students; these were centred more on the device characteristics than on the reliance ofn external support. The use of the Quest tool reinforces the findings from the interview stage, which will be detailed more closely in the following chapter.

7.4 Conclusions

This chapter looked at the major areas that influenced the investigation findings and which will be discussed in full in the next chapter. The choice of venue and the confidentiality, which was utmost in the mind of the researcher to allow the participants to provide meaningful responses to the assessment process, are outlined. Further to this, the introduction of the QUEST tool allowed for a reflection on the satisfaction on two common themes - support and the device. In addition to this, the major themes and responses to each question used in the interview/assessment process are highlighted. Such highlights are expanded on in the following chapter and connections between the findings of this study and existing research literature are explored.

8. Evaluation of Findings

8.1 Introduction

The purpose of this chapter will be to explore more deeply the key themes gained from the interview process and to link these results with the existing literature in this area. The themes will be identified by examining the interview process of the eight participants using Thematic Qualitative analysis. This analysis will outline the use of a five pass process as outlined by Auerbach (2003). The themes will be coded using a variety of colour to allow ease of identification and examination of key patterns from each participant to form the results from this investigation. Further to this, the themes identified will link to reflect exiting literature that surrounds this area. The results and themes identified from this investigation will form clear outcomes for further work within the assistive technology sector and form the basis of an exit assessment, which is highlighted in chapter nine.

8.2 Coding Procedure

All interviews were transcribed by the researcher individually. From the eight completed transcriptions, a five phase approach was derived to arrive at the narrative themes and views expressed by the eight participants which reflected the research topic. This process, known as the Thematic Qualitative Approach, discussed in Auerbach & Silverstein (2003, 38), states, "*A theme is an implicit idea or topic that a group of repeating ideas have in common"*. The coding of all participants results into a colour coded layout which allowed for the identification of the key themes for a better transition of assistive technology from an education to a working environment. The Thematic process is outlined in five pass process outlined below:

8.2.1 Pass 1: Explicitly State the Research Concern

Before any of the transcriptions were coded, the research question was written down above each transcription. This was to ensure that relevant text was examined for further use. Auerbach (2003, 44) states: "*Faced with a sea of text most of us are filled*

with anxiety with so much material to choose from. Therefore the simple act of explicitly stating your research concern focuses on what to know and why". Each transcription was read three times in full before any themes were extracted in order to get an understanding of how such responses feedback to the research question.

8.2.2 Pass 2: Select the Relevant Text for Further Analysis

From Pass 1, and from the analysis of the text, indefinable themes were extracted. These themes were extracted from patterns of responses to the semi-structured interview process based on the HAAT model. Each identifiable text was colour coded to reflect a repeated theme or area of response. Each relevant text was colour coded as per the below themes:

Red =	**A Supportive Environment**
Green =	**Assistive Technology Design & Procurement**
Purple =	**Independence and Ability**
Sky Blue =	**Assessment of Need**
Grey =	**Awareness of Irish Law**

8.2.3 Pass 3: Select the Repeated Idea by the Grouping of Passages of Text

From the selected themes and colour codes, all relevant text was copied into a new Microsoft Word document for further analysis. As stated by Auberach (2003, 54), these are called *repeated ideas*, "*a repeated idea is an idea expressed in relevant text by two or more research participants*". Again, each grouped themes were read over three times and links to the research question were identified.

8.2.4 Pass 4: Organise Sub-themes by Grouping Repeating Ideas into Coherent Categories

Repeated ideas were identified with sub themes, and labelled against each main theme in the proceeding table:

Themes	Sub-Themes
A Supportive Environment	**1. Benefit of expert** **2. Support Challenges** **3. External Support networks**
Assistive Technology Design & Procurement	**1. Access** **2. Universal Design** **3. Cost** **4. Opensource software**
Independence and Ability	**1. Independence** **2. Exclusion** **3. Technical ability of user**
Assessment of Need	**1. Educational assessment** **2. Employed assessment** **3. Change of need**
Awareness of Irish Law	**1. Awareness** **2. Enforcement**

8.2.5 Pass 5: Create a Theoretical Narrative by Retelling the Participants' Experience

All the themes and sub-themes were identified that address the issues and research concerns of this investigation; in this phase they are organised into a coherent results path. It uses the participants' own language to ensure their concerns and knowledge are relayed to the research, as shown below.

8.3 Coded Results of Participant Interviews

The main results of the interview process are highlighted below. Themes commented upon include: Use and Availability of an Expert Support Environment, the Design and Usability of the Assistive Technology Devices, the Independence and Ability such Devices Enable, and Knowledge of Current Irish law Provision.

8.3.1 Support Environment

The majority of the participants in this investigation commented on their support channels within their respective environments (education or working) as a major factor that enables or limits their use and engagement of their assistive devices. The *Support*

topic will start by highlighting benefits of expert assistive technology support available to the participants while in an educational environment. Following this, in a work setting, a lack of expert support results in frustration that curtails the transition and satisfaction with assistive technology. Finally, participants identify the key independent supports networks available when such human expert supports are inaccessible.

8.3.1.1 Support Benefits

There was a clear distinction in the benefits and availability of expert assistive technology supports between students in an educational environment and those in a working environment. This availability, as shown by the following excerpts from two current final year students, focuses the enabling benefits of the supports and how such supports enable lasting use to allow the participants to engage in their educational activities. SF1: *"I needed to be able to use the technology. The support I received in college was a huge factor in enabling my use; if something went wrong I could ring and get support. I learnt unless I did something really stupid I wasn't going to actually break it unless I dropped it,"* and also shown by SF3 "*even though I has Zoomtext on the PC at home and Supernova, I just found it was freezing all the time and very unreliable and take some long to set up, but* [in college] *the setup here was great. All the software was installed, that made things much easier."*

The nature of an expert assistive technology support allowed the users constant feedback process on a personal level and allowed them to not feel isolated in looking for support for "issues"; SF3 "*yes I think the approachability factor is a big issue, to be able to say 'I'm having issues with this…. it is not a one-day fix'"* and SF1 *"it can be challenging and you know it's a matter of support…but I can go back to somebody and say 'okay, I tried this, it hasn't worked, can you can suggest anything else?'"*

8.3.1.2 Support Challenges

Such views were in sharp contrast to the employees who highlighted the non-existent expert assistive technology support available to them in the workplace. A lack of knowledge and awareness of such devices and a lack of know-how on integration

methods in a workplace environment were issues raised, for example, GF3: *"I'm only anxious in my working environment because I'm not sure what response I'm going to get, they generally do not know what I'm talking about"*

This participant continues on to say that their employer is trying to deal with the IT support issues, but this can become a frustrating experience for everyone involved. GF3: "*I went over the other day for support and the person kept asking me why am not using Chrome, to which I replied that it's not accessible! Three times!! I have to admit I was starting to get frustrated, my nerves were starting to go, I felt like saying "you're not listening!!""*. Other participants have similar experiences, GM2: *"you have to go through enormous hoops to persuade the IT department to allow you to install it. It worked perfectly at home, but in a work environment it is impossible. You would have to go through an elaborate testing process to ensure it was secure"*. GM1: "*Their awareness of technology was poor and their awareness of assistive technology was zero. They are nice people, but they just didn't get it"*

In one case, the employee himself had to become the expert assistive technology support for the organisation, GM3: "*There were a number of people using JAWS and in my employment environment; the support solution was to ring me. So I became the support!!*

8.3.1.3 External Support Networks

The support of outside Government agencies was also commented on by all four employees; they highlighted the lack of matching specific technologies with the user needs. As one participant commented, GM1: "*it is person-specific at one of the government agencies i've used I found I am trying to thread a very difficult needle, they're trying to look after a load of people with a variety of needs. They are buying in a load of equipment that will cover all the bases. No dig on them, they're are great people, but a lot of the technology is not very useful"* and the lack of domain specific help as reflected by GF4: "*I heard that they were very good. But I don't think they're as good as they make themselves out to be. They don't actually offer you any real support"*.

The role of government agencies as described above was not all negative; participants commented on the assistance they receive from external government agencies and how they provide a valuable cog in the cycle of support. GM2 said: "*in fairness the NCBI have a technology unit, you can ring them and they'll give you help … I would have a list of people and organisations to contact and the NCBI would be one of the first ones"* and by GF3 "*I also have external support, which they have no problem with me bringing in... the NCBI come in and support me... it's another support I can use"*

The growth of online support and use of forums are also discussed by participants as a valuable resource link in transiting their device independently to a new environment if expert support is not available. GF3 commented: "*I'm on a lot of email lists that are good, you can just throw a question out there and somebody usually seems to know an answer"*. Such online support is also beneficial in an educational environment, SF1: "*I'm on a list where people send in questions about technology and get them answered. Even though it is an issue I have not come across it, they might recommend a free app that I could use. Most of the apps I have I got are for free. That way I discover new technology. As I said, a lot of it is because I've had to get familiar with technology"*

Such support themes identify the need for an accessible support network to enable the growth of the use of assistive technology, and in contrast the increased frustration that users must endure if such expert knowledge is unavailable. Such frustrations on the design and attainment of such technology are the focus of the next section.

8.3.2 Assistive Technology Design and Procurement

This section looks at the kinds of activities the participants perceived that their assistive technology allowed them to do, and the need for such technologies to become mainstream to improve the acceptance and usability not just for users with a disability but with all users within society . All participants used a range of assistive technology software ranging from hi-tech screen reading and magnification software, to lo-tech ergonomic supports such as extendable monitor arms and ergonomic keyboard and mouse solutions. From discussion amongst the eight participant, themes, such as, access, usability and universal design, cost and use of low tech supports such as mobile

apps, were prominent in describing assistive technology and what technologies meant to them.

8.3.2.1 Access

When asked to describe what the term 'assistive technology' meant to them, a common theme was its allowance to aid access to mainstream technology and operating systems. Users initially felt such technologies in their current format were add-ons to allow access to mainstream operating system functionality, as shown by SF1; "*for me, assistive technology means technology that I am required to use in order to access a lot of mainstream technologies in a way that other users don't have to. They can use the mainstream technologies without the additional assistance"*

The theme of assistive technology, as a support to aid the participants complete their education, is stressed further by SM4; "*basically to assist people through new technology that is coming out. Without it I would not be able to do half the stuff I'm doing in college. Reading the law books without it would be very hard. I don't know how people ma*nage*…It is helpful because without it you wouldn't be able to study. I wouldn't be able to do the exams that I wanted to do*"

8.3.2.2 Universal Design

The need for such technologies to become mainstream was stressed by all participants in the investigation. The need for such technologies to work seamlessly without the need for additional software was seen to be a major factor to allow the ease of transition of assistive technology between different environments. GM2 comments: *"I've always felt it would be much better if the technology I wanted to use would be more mainstream. In some ways it's become like the iPhone or the Apple laptop…you don't need to buy anything separate. The trouble with separate things is historically it's a bolt-on, it's an afterthought, it does not interface well. I think such an approach would help; the purchasing practice should also ensure that any technology coming into the organisation is accessible"*. The need of an inclusive approach is further commented by SF3: "*Things should go is towards integration, where assistive technology features are inbuilt, this stops you from having a cumbersome device. I'd*

be more positive towards technology that is geared towards the mainstream, and ergonomically better"

The need for employers to ensure such technology is universally designed is also commented upon. GM1 says: "*The process needs to be ongoing in the employment sector as well, a little bit anyway. I have a friend who has just set up an accountancy firm and they have this brand-new software. The software has a range of accessibility features in it. So in that situation it is fine because you just log on and you're clicking the accessibility functionality and go off and do your own thing*" and by GF3 "*They just need to sit down and go through the guidelines surrounding accessibility, and do a bit of tweaking. It's going to increase their user base and surely that cannot be a bad thing"*

8.3.2.3 Cost

The need for an inclusive universal design approach is also linked to the theme of cost which was also brought up by many users. The price of additional assistive technology supports can be seen as a barrier which restricts access to users looking for supports in this area. An integration-based approach would alleviate this issue for many, as commented by GM1: "*it should always have been that way; the people who make assistive technology have made a fortune. They knew that it wasn't integrated into the system so they could charge for every single license, but is that what you really want?"*

The participants continue this point by stressing the need for incentives to allow assistive devices to transition easily into employment: "*The cost is such a barrier and is prohibitive; maybe they should create tax breaks for such use"*

As such, the use of government grant schemes was spoken about by one participant (GM2) and the success he had in procuring technology that he needed: "*Some of the technology my employer paid for outright and I also used FÁS adaptation grants"*.

8.3.2.4 Open Software and Low Cost Solutions

A further sub-theme on the design and use of assistive devices is the participants' reflections on low cost supports. The identification of mobile technologies and low cost applications allow users to self-support their access. Further to this, participants reflected on the benefit of the simplest lo-tech devices that would again benefit a user looking to use assistive technology in a new environment. GM1 picks up on this point: *"I pick up bits and pieces every so often myself. I do not buy huge, expensive programs. I pick up little things. Some of them may be €20 maximum".*
This is reflected by a further participant, GM2, who said: "*Apple software apps, it has far more chance of reworking, and it's also cheaper or free".* The participant goes on to say how such use of open software allows increased access and adaptability allowing him to contribute to its output and design via the source code. The use of open source software also breaks down barriers, as it allows the user to adapt the software as required, GM3 says: "*At the moment I use NVDA, which I find is very good. It's free and open source. The fact that it is open source has been a great benefit, I was able to facilitate NVDA to display in Irish, so it's not just that it's free, but it's open source, so I can contribute to it as well and it benefits the system. That type of software has changed my views; you can actually influence it by working on it"*

This theme shows that there are valuable benefits to ensuring accessible procurement of mainstream hardware and software packages, and in some cases, it is possible to eliminate all potential cost fears from the employer. Also, the more universal approach is taken to the procurement and development of hardware and software increases the usability for all ensuring a ubiquitous approach to assistive device use.

8.3.3 Ability and Perception

The participants' ability and their perception of what their disability means to them is a key component to their continuing engagement in their assistive technology and allows them see their device as a positive aid. The three main themes highlighted in this area are: *Independence* gained from engagement in such technology, *Exclusion* and perception factors that prohibit the disclosure of such need, and the user's own personal technological *Ability*.

8.3.3.1 Independence

The independence gained by assistive technology devices, and how such devices enable day-to-day activities of the participants where shown extensively across all participants. SF1 commented: "*When I go further in whatever direction I go in technology is an essential part of my life. Technology is essential on a daily basis for me, I will always use it. I think asking for support enables me to become more independent and I have had to learn a lot*". The need to engage assistive technology to participate in all facets of daily life was commented on by GM1; "*if I was to remove my use of assistive technology. I would be regressing basically in terms of my ability to function in the world to 1998! That's what you're talking about, for me it's integral to how I function… it's a personal thing I don't like people doing things for me because I'm a very independent person, I prefer to do things for myself"* and by GM2: "*I use my Assistive Technology at home as well for reading the Internet, and working on a few external projects. It crosses my day-to-day activities all the time; I can't complete my day without assistive technology"*

8.3.3.2 Exclusion – User Perception

Although there is a strong reliance on the participants' assistive technology to participate in both work and education, barriers remain in their own and others perception of their disability. SF1 comments on this: "*How people perceive me, disables me. People see my impairments and automatically think I cannot do particular activities, so that's disabling*." Perception of their disability is also shown by SM2: "*My own perception would be a barrier, for example, embarrassment associated with the terminology. When it is dyslexia, people might dismiss it as being nothing. All of those issues were coming to play"*.

The feeling of being reliant on technology is also highlighted as a barrier by SM2: "*For me it means having to be dependent on other people for equipment, so there is a kind of dependency. You are dependent on other people being understanding*". This factor of reliance is further highlighted in a working environment, GF3 said: "*A lot of the time there are parts of my work that aren't accessible and the solution largely is that I would get one my teammates to do it. I said to them. "That's fine in the short term", but my personality, which is largely independent, and I don't like people doing*

stuff for me. Plus everybody else is doing their own work. I don't think that is fair to disrupt them because the setup is not correct".

8.3.3.3 Ability

The technical ability and knowledge to troubleshoot potential issues is seen by participants as a factor that leads to a better use and engagement of their assistive technology. The ability to see the device as a support aid is seen a factor. The need to acquire these skills is also shown as a factor to ensure the assistive technology is seen as a positive support worth using when transitioning environments. SF1 commented on her confidence and ability, which grows as she sees her device as something that is a necessity throughout her daily activities: "*I was terrified. It was not what it could do, but I always felt I would break it. I knew it was expensive. I was terrified I would break something that had been given to me. You have to learn, you have to get confident enough to use the tool to enable me to do as much as I can*." SM2 also commented on his ability and attitude change towards his assistive devices: "*I've radically changed from being suspicious or afraid of it, even feeling incompetent around it, to seeing it as something I really enjoy*".

GM2 sees the need to have a high level of technical ability to ensure that the device works as intended: "*if I was not technical, I could not do those jobs. When I go for a job, I know more about the* [assistive technology] *than the guy I'm talking to. I have a technical grounding, I can get around these guys, but the fact I have to walk in and think about these factors to get what I need is wrong. It shouldn't work that way"*. An example of how a mismatch in ability can lead to a negative approach to the technology as an aid is shown by GF4: "*Sometimes I think it's mostly I have to use it, I don't want to use it, but I'm just afraid of the technology, I'm not techie at all. I never have been and I don't think I ever will be*".

Two related issues are clear from this analysis, first, the need to ensure a match between assistive technology and user ability, and, second, the need for the assistive technology to be seen as a positive tool that will be lead to less reliance on adaptations and growth in user independence are key themes. The following section looks at the

assessment phase and how such factors need to be highlighted before the procurement and user engagement in the assistive technology.

8.3.4 Assessment

The role of a formal assessment which all participants have had within an educational environment was raised. Results shows the advantages of such a formal process to set expectations and build supportive relationships for further training as needed. Results from graduated participants highlight the non-existence of a similar process in an employment environment and the barriers that occur as a result. Finally, a sub-theme to reassess users to take into account a change of need or environment and the positives of such a process would allow were raised.

8.3.4.1 Educational Assistive Technology Assessment

A formal assessment allowed the student to align their needs to potential devices and be made aware of how technology could benefit them. SM4 comments: "*when I came to college I was definitely accurately accessed. I was sat down and was shown different machines and different PCs that could benefit me. Over time I took a liking to certain stuff that was shown to me. And yes, the assessment was definitely up to date*" and by SM2 "*I came to* [the Disability Service] *and I told* [the Disability Service] *what my background was, the needs were and* [the Disability Service] *went through it to test here. I remember sitting down, and through our multiple choice question. And that raised for* [the Disability Service] *issues and from there* [the Disability Service] *gave me XYZ. That was satisfactory... oh yes, I was delighted to meet with* [the Disability Service]*, and the support made life a lot easier*."

The assessment is seen to be led by the end-user and allowed the students to have the deciding factor in what technology they engaged with, for example, SF3 says: "*mine are very positive, but not just because I got so much, but have also turned down stuff like to ZoomX, because it just didn't work for me. I think it's important to note a service must be open-minded; the assistive technology officer cannot be dogged, forcing equipment on somebody. Even if two people have the same disability, there are so many different types of learning*."

8.3.4.2 Employment Assessment Barriers

The graduated participants commented on the lack of any formal assessment program to evaluate their need for assistive technology accommodations; such a process was left to the employee to identify and scope out the solution. This was reflected by GM2: "*It puts the onus back on the individual, like myself, it's more a person without a disability does not have to do. But I felt I had to do it myself. It would honestly be far better if there was somebody in the organisation who would be proactively realising this third party application has an accessibility issue"*

The difference between an educational setup and a working setup was commented on by GF3: "*I just told them what I use in college and what I thought I might need. I mentioned it to them at my interview; I brought my laptop along to all of the interviews and showed the technology and how it performed. I was never taken up on that offer (to demo it), and my manager did reference that was a big mistake, because it freaked him out a bit. There was no assessment as such so I have not reached my working goal as I'm not on phone support yet".*

8.3.4.3 Change of Needs

A theme that emerged is the need for a process to re-assess users for a change in needs; this was highlighted by participants. A user's activities and ways of working may change considerably from their initial educational assessment held in the first year of an undergraduate course. The benefits of a potential exit/transitional assessment were highlighted as a positive step for both the exiting students and for possible employers. As SF1 highlights: "*The majority of the time it is matching my need, but then again needs change. That's what people have to be constantly aware of and including disability supports in college just because the support suited a student in first-year doesn't mean it will suit them in second year, or third year. A follow-up assessment is needed maybe in light of the course or the field of study they are pursuing"*

An employed graduate (GF3) explains how such an exit assessment would benefit and ease fear of disclosing such a need: "*I think it would be great if you had someone to*

support transition and having a closer link between the employers and universities … It definitely gives you more options if you can walk up to somebody and say this is what this is and I'm confident in using it, I might need some support to be aware of, but at least I'm making the *step, and it reassures them about my ability*."

8.3.5 Legal Provisions

A theme of awareness of Irish legal provision in relation to reasonable accommodation was commented on by participants. The lack of awareness of these provisions by the younger participants strongly contrasted with a greater knowledge and use from the mature participants. The sentiment of a lack of enforcement and available loopholes were also noticeable.

8.3.5.1 Awareness

The lack of awareness of what is contained in Irish and EU legislation is noticeable by younger participants of the study, for example, SM2: *"I didn't really understand that if somebody is in employment then they should be reasonably accommodated. I didn't know it was enshrined into law. I would expect it would be. I have a vague understanding of it."* and by SF3: "*I know the college access policy for sure. Irish law? No, not all, I know better equality and all that, that's all"*.

8.3.5.2 Enforcement

A lack of communication and lack of enforcement of policy was seen as a frustration when looking for accommodations, for example, SF1: "*it's not communicated well enough, it should not be just a paper, it should be enforced. I know there are exceptions, but there are so many loopholes in legislation. People can easily say I can't do that because it's going to be too expensive. They don't even look for an alternative*" and by GM3: *"I was under the impression that there were a number of laws around the Equal Status Act and the Employment Equality Act and the Disability Act. My impression of them is that they are all was rather weak; they had phrases in*

them such as 'in far as is practical', get out clauses… I was a disability police". GM1 continues the theme: "*yes, and I've pushed that Law a fair bit, it needs to be adjusted, there are no penalties. There are some penalties with schools, but they are a slap on the wrist, but there are no penalties for employers. If I go for a job and I'm refused because they've made the consideration that my visual needs are costly, I should be able to say to them 'prove it, show me how it is costly, and explain it to me'*".

8.3.6 Key Findings

The key findings of the above results highlight a lack of working awareness of the benefits of assistive technology use and the need for such technologies to provide a benefit to the user. The lack of access to expert support and difficulty in integrating such devices within a working environment are shown a major barrier to effective assistive technology service provision. This process in contrast to an educational environment, where such support and access to such technologies were made available via a structured assessment process. The findings and themes highlighted via this investigation show a need for greater awareness and support made visible to employers.

8.4 Discussion of the Findings

The purpose of this section is to discuss the participants' results in relation to present literature in this area. The section is divided into five main areas which tie to the participant's results and themes analysed above – *Support*, *Assistive Technology*, *Independence*, *Assessment* and *Irish Law*. These main heading are tied to the research question and quantitative and qualitative results from the participants in this investigation.

8.4.1 Support

The availability and awareness of expert assistive technology support is seen throughout the user responses. There is a marked contrast between the embedded support culture for the integration and use of assistive devices in an educational environment, and the very little support provided in a working environment. Results

show that many participants are left to self-support themselves and come up with the solution to overcome their access to a working environment, in such cases, they become the Assistive Technology support team themselves, when it may not be part of their role. Such a lack of an integrated approach is not always down to pure employer unwillingness, as in many of the cases, the employer did not know where to turn to for assistance and had no awareness of how to integrate such devices into their current IT infrastructure. As Tobias (2003) explains "*beyond the truly tech-savvy leadership circle, there is a real shortage of expertise at the service level. This scarcity is made worse by the fact that few people with disabilities know where to go to find experts*" (Tobias, 2003). This shortage of knowledge leaves no option but for the employee to self-support. The solution is only put in place due to an individual request rather than the organisation taking the initiative to meet a need (British Assistive Technology Association, 2013).

Armstrong *et al.* (2010) argue that despite indications of potential for the use of commonly available assistive technology, there is a high level of abandonment because people who buy them are unable to integrate them into their everyday lives. Such a need leads to frustration and feeling of isolation. GF3 points to a request for support: "*I have to admit I started to get frustrated, my nerves were starting to go, I felt like saying 'you're not listening!*'". Without such a joined-up integrated support approach, the resources in acquiring the technology are lost and the potential to enable access within a new working environment are lost (Dooley, 2013).

Organisational culture and awareness of the term disability (Bryen *et al.*, 2007) has been shown to be a barrier to accessing such technologies and information. As GF1 states: "*Their awareness of technology was poor and their awareness of assistive technology was zero. They're nice people, but they just didn't get it*". The further use of government agencies can be seen to help in the understanding and supports of assistive technologies as a stepping stone and a transitional phase as seen in Craddock & McCormack (2002) on the deployment of technical liaison officers. Most of the graduate participants commented on the use of such agencies with mixed success. The resources available to deploy to such a restricted and governed working environment at present limits a more hands on support in such circumstances. Again, the user is left to instigate the support as GM1 says: "*If I was looking for something that will be part of*

my solution, I could have a list of people and organisations to contact and the NCBI would be one of the first ones". A benefit of such organisations is their ability to act as a job coach not just for the disabled employees but also as an awareness building process for their co-workers, as explained by GF3 on the running of an Awareness Day: "*but actually I'm quite glad because it made other people a lot more comfortable. One of the presentations was on assistive technology, a list of what blind people usually use. People are asking a lot more questions as a result, about what it does. Can you hear it? Can we touch the Braille display? etcetera".* Such initiatives can be seen as "*a consultant or facilitator to the employer by building on supports which exist in the workplace, as well as the expertise of the employer*" (Unger, 1999).

The need for a joined-up approach is put forward by Kaehne (2013), who suggests that support services are not a one agency role but a mixed multi-unit approach that encompass the user's current supports and the engagement from the user's new environment. This approach, if adapted, increases support channels between agencies and forges new links in service provision, in contrast to a single isolated point of support with a lack of expertise in certain environments.

8.4.2 Assistive Technology

Assistive technology is defined by the International Organization for Standardization as "*Any product (including devices, equipment, instruments and software), especially produced or generally available, used by or for persons with disability: for participation; to protect, support, train, measure or substitute for body functions/structures and activities; or to prevent impairments, activity limitations or participation restrictions*". Although all users saw their assistive technologies as an aid to increase their participation as per the above definition, the underlying themes for such technologies is to be designed with an inclusive approach, and to be mainstreamed to enable equal opportunities, are lacking. Such themes are seen as a move away from seeing such technologies as just devices used solely for disabled users. The benefit and need, as voiced by the results of this investigation show how such an approach can enhance quality of life, as recognised by Joines (2009), and leads to greater access to education/employment opportunities, as reflected by De Jonge

(2007), who states that computer access "people with disabilities now have access to many employment opportunities previously unavailable to them". The mainstreaming of such technologies enables more access and does not separate the end-user from exiting traditional mainstream technologies.

Challenges for such an approach to take place requires a shift in software design and end-user testing is needed, as seen by Björk, (2009b), who states "*Support from society, both in financial terms and in improving competence in industry, is essential to ensure that new methods for product development become known and practised for the creation of UD products, systems and environments*" and the need for organisational policy to reflect a universally inclusive approach to policy and to technology procurement as described by Whitney *et al* (2011). This important challenge is reflected by the participant's results as shown by SF3, where she speculates on her future use of assistive technologies after she leaves an educational environment: "*The way things should go should be to allow assistive technology features to be in-built, which stops you from having a cumbersome device. I'd be more positive towards technology that is geared towards the mainstream, and ergonomically better"*.

Incorporating the principles of universal design in combination with the use of low cost, or free, open source tools is advocated by Hedrick *et al*. (2006). One participant (GR1) in this study pointed to the use of government aid or tax breaks to increase use of assistive devices. This reflects the lack of take-up and awareness of current FÁS Workplace Equipment Adaptation Grant (WEAG), which is highlighted by the National Disability Authority (2012, 34) as a funding avenue that has not been maximised to allow for the integration and use of assistive devices in the workplace.

The need for a national assistive technology repository is highlighted by Vanderheiden (2008), in Ireland the *try-it.ie* site offers users a free open resource available to employers to trail and engage with assistive device before a commitment to full procurement is made. This approach moves away from the anxiety the employee may feel if the assistive software or device procured by their employers did not meet the needs. This is mentioned by GM2: "*If there was a clear solution that I knew would work then I wasn't anxious but if I was not 100% and you had to purchase to see if it*

would work, then I would be anxious. For example, getting a new screen reader, I would have to go through a month of investigation to get to the point to know that it would work, that was off-putting".

8.4.3 Independence

The use of assistive technology to enhance a users' independence and to see assistive technologies as tools to increase their ability was reflected throughout the results. As acknowledged by UNESCO (2011), the important role that assistive technology has on the lives of disabled students, allow "*students with disabilities to participate as equals in the learning experience*" and help "*to prepare them for life-long learning, recreation and work outside of Education*". The assistive technology, if matched correctly, can be seen to be crucial in removing barriers to employment, and to benefit the users' productivity and self-esteem (Yeager *et al.*, 2006). Student SF1 reflects: "*technology is an essential part of my life, technology is essential on a daily basis for me, so I will always use it*".

Assistive technology with the correct supports, and matching to the activity, aids a user's independence and self-determination. In contrast, if the individual is reliant on human support, the feeling of reliance is increased. As commented on by Wehman and Bricout (1999) on the use of a job coach or outside assistance reflects this balancing act: "*neither approach has been particularly effective in allowing individuals with disabilities to participate in competitive employment, nor neither has fully encouraged consumers to choose their jobs and plan their careers*". Results shown from this investigation highlight the wish to be independent and how assistive technology plays a role in this goal, as GM1 commented: "*it's a personal thing, I don't like people doing things for me because I'm a very independent person. I prefer to do things for myself. Some people do find that very helpful and depending on the nature of the disability that might work for them, but not from me. If I was to remove my use of assistive technology, I would be regressing basically in terms of my ability to function in the world to 1998! That's what you're talking about, for me it's integral to how I function*".

A wish for assistive technology to enable such independence reflects Reimer-Reiss and Wacker's (2000) need for the assistive device to give a "*relative advantage*" to the user engaging in the technology. It has to be shown to make a difference in a disabled user's daily function activities for it to be effective and it turns into a reliable everyday aid. Not all participants have seen their assistive technology as giving them a relative advantage, with the use of devices making them more dependent in some cases, as seen from SF3: "*for me it means having to be dependent on other people for equipment, so there is a kind of dependency. You are dependent on other people being understanding*".

Ensuring the user views their technology as a positive support takes time and a learning curve to overcome in many cases. The use of support should not be seen as a negative aspect to assistive technology use but as a resource to make the engagement a smoother process. These factors need to be outlined via an assessment process in order that such expectations can be set.

8.4.4 Assessment

DeRutyer (1997) discusses the importance of outcome measures for assistive technology, and states there is need for an "*evaluation process to establish how well something works; for which clients it works; and to what level of efficiency*". All current final year participants voiced the positive aspect of an assessment process and the matching of their need to their own ability was voiced as commented on by SF1: "*Leaving aside the willingness from* [the Disability Office] *to enable me play around it and come to decision myself.* [The Disability Office] *are not forcing the technology*". The teamwork approach, where the user is the focal decision maker, helps identify effective technologies that meet the consumer environment (Scherer, 2002).

In a working environment, a minimum approach to addressing assistive technology was evidently presented by the participants, for example, GF3 notes: "*there was no assessment as such, so I have not reached my working goal, as I'm not on phone support yet*" and by GM1 "*No, there was no special needs assessment or accommodations assessment*". Such sentiments reflect the work of Scherer and

Glueckauf (2005) who highlight that a lack of a formal assessment process adds a further access barrier for the employee to cross.

Although the initial assessment and framework described in the literature are seen as a positive step, a further need to reassess was raised by SF1 - the need not to see an assessment as a one-time event and the view to re-assess if circumstances or the working environment changed: "*The majority of the time it is matching my need, but then again needs change. That's what people have to be constantly aware of and including disability supports within college just because the support suited a student within first-year doesn't mean it well suit them in second year, or third year because as I said, needs can change and you need to be able, in needs to be in needs to be fluid enough reactive enough to change with the student and to say right if the support is not working it can be change*". Zabala *et al.* (2004) in their use of the SETT model (see Section 4.7) visit this area in the use of the ReSETTing model which revisits the information in the original SETT Framework often in order to update and expand upon it as changes in the student, the environments, the tasks and the tools occur.

Overall, the use of a formal assessment tool, as voiced by the current students, allows a formal communication of student need for assistive technology and set expectations against the user's ability and their support network. The lack of employment awareness of a similar process isolates the employee into self-supporting their own need; the lack of such awareness and on the employers responsibility under Irish Law only enlarges the gap in transitioning enabling supports and disables a student's ability to succeed within a workplace environment.

8.4.5 Irish Law

The role and rights of users to access assistive technology are stated in the Convention on the Rights of Persons with Disabilities (CRPD). Borg *et al.* (2011) comment that "*A non-discriminatory interpretation of the CRPD entitles people with disabilities of both sexes and all ages with a right to demand available and affordable assistive technology as a means to ensure their full and equal enjoyment of all human rights and fundamental freedoms*". Irish and EU law underpin an employer's responsibility to

provide reasonable accommodation within the workplace. As De Wispelaere and Walsh (2007) state: "*The disability sector insists that legal remedies are crucial for ensuring disabled people's rights are properly safeguarded.*

The results shown in this investigation highlight a lack of confidence and lack of any formal penalty procedure for such poor awareness, as reflected by two of the investigation participants "*it's not communicated well enough, it should not be just a paper, it should be enforced. It should be something that they actually have to do to the best of their ability. I know there are exceptions, but there are so many loopholes in legislation"* and "*There are some penalties with schools which are a slap on the wrist, but there are no penalties for employers. If I go for a job and I'm refused because they've made the consideration that my visual needs are costly, I should be able to say to them 'Prove it, show me how it's too cost, explain to me'*". The law can only be seen as a helpful resource where employers are made aware of their responsibility in this regard and are proactive in its compliance.

Further to this, the use of the term "reasonable accommodations" is seen to be open to interpretation, as reflected on by Waddington (2007). SF1 comments "*reasonable accommodations generally come with a "but", and it's how the individual determines what reasonable is. Some people will be quite happy to accommodate you to the best of their ability, others will not because they will feel it's somebody else's problem, I shouldn't have to do this*". This, again, reflects the lack of employer responsibility with regards to policy and the need for further work/communication in this area as commented on by Ashcroft and Lutfiyya (2013).

Such accommodations, are widely understood in an academic environment but are less defined in professional practice (Tee *et al.*, 2010); the poor level of awareness in law in providing such accommodations and the inadequate protection provided to the employees heightens the need for a greater integration and transition of support and knowledge between education and a working setting. The use of a transitioning plan can both help to educate and raise awareness from the employer's viewpoint and enable the smother transition of students who require assistive support in a working environment.

8.4.6 Summary of Discussion

The discussion indicated a clear link between the findings of this investigation with current literature. Research conducted by Tobias (2003) and Armstrong (2010) highlight a lack of expert support and knowledge in the service provision of assistive technology, this reflects a similar feedback from the investigation participants. Bjork (2009b) shows a greater need for the universal design of products and services which was also shown through by the investigation participant responses. DeRutyer (1997) indicates how a level of assessment and measured approach lead to a great use and acceptance of assistive technology; such measure were not seen within an employment environment as described within this investigation. With these areas in mind, the need for a greater transition planning and awareness is needed to grow assistive technology use and acceptance within a working environment. Chapter 9 introduces a draft assessment, which by design, embeds the findings from this investigation to enable such a clearer path.

8.5 Conclusions

This chapter has reflected upon the main results of this investigation and highlights the main themes of poor support within an employment area, where employees self-support any need for assistive technology without any input from the employers; this is in stark contrast to the education sector, where the participants valued the existence of expert assistive technology knowledge which assessed and aided the engagement of assistive technology to the participants needs. Such an approach highlights the value of a structured assessment and matching of the user ability to the task; it also reflects the lack of working knowledge of employers on the legislative need to proactively encourage and offer workplace accommodations. The lack of awareness on the benefits and use of assistive technology is lost for exiting students transitioning between educational and working environments. Added to this, the lack of any transition tool to aid the employer to engage actively in providing assistance and support is also highlighted. The following chapter introduces a draft exit assessment aimed to narrow such a gap and provide a working link between education and an employment setting, allowing the prospective employee to focus on the job activity

they are employed to complete, without the need to self-support or be the focal point to providing access issues.

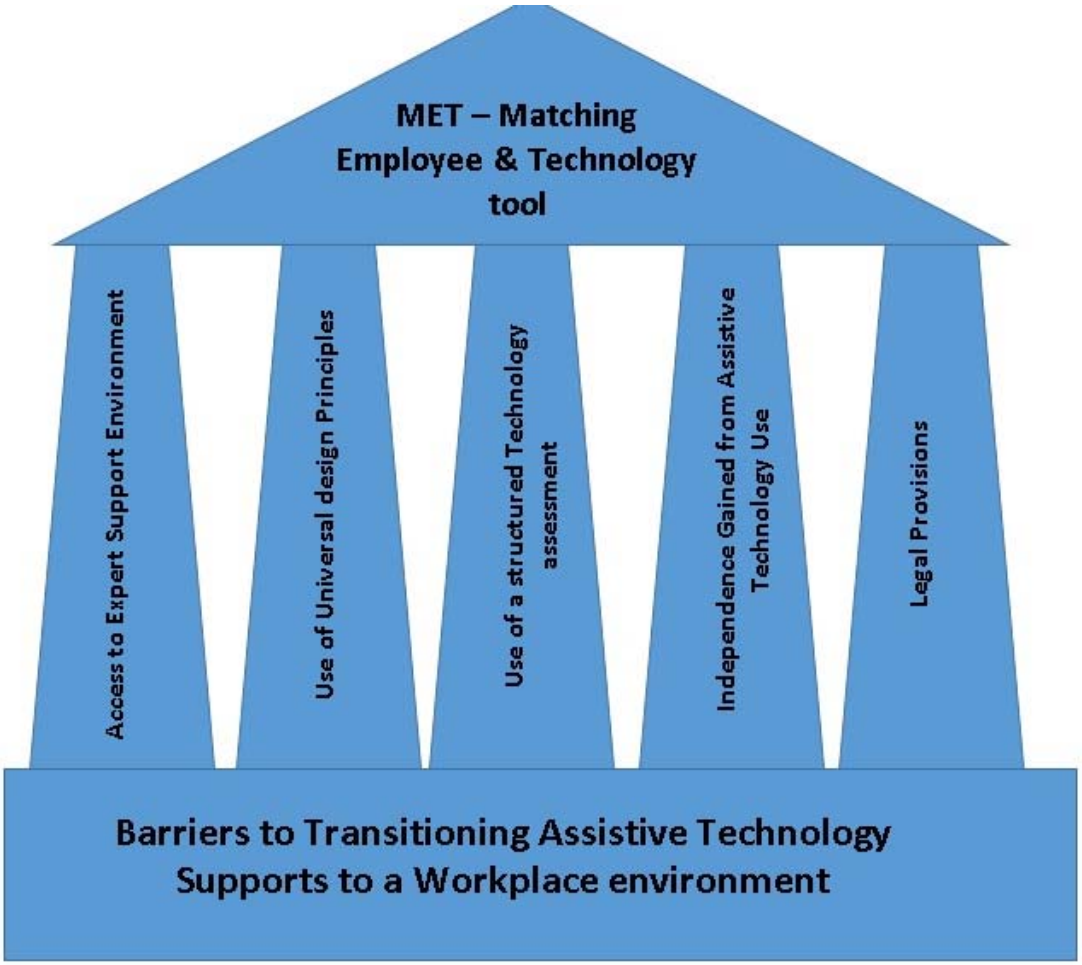


Figure 19 Findings of investigation

9. Matching Employees with Technology (MET)

9.1 Introduction

From the above investigation, results and discussion above, a draft exit assessment for use by students looking to transition to a working environment is introduced in this chapter, and this assessment can be used by employers in assessing a need for assistive technology for current employed staff. The use of an assessment tool allows the exiting students to map their use and support network of their assistive technology support and raise awareness amongst future employers on how such work accommodation may play a role in increasing access to information and completing their expected duties.

The assessment tool described below is designed to be used as a constant tool that can be revisited by the employer with the employee on an ongoing basis. The assessment aims to ensure that the assistive technology support is provided and puts a value on the enabling technology used by the employee. The assessment tool also aims to address awareness issues amongst employers, providing links to open source software (where available), and bridging any gaps between government agencies, to increase use and integration of assistive technologies used previously where they are seen to be resource vital to employee development in completing their work activities

9.2 Design of the MET

The below MET assessment tool is designed to be a concise assessment allowing both the exiting student or current employee to highlight areas of concern for future use of assistive technology that may have been previously used within an educational environment. The assessment covers the four main areas of the Cook and Hussey's (2008 b) HAAT model and cover the main themes raised by the results of the participants' interviews and the QUEST assessment tool.

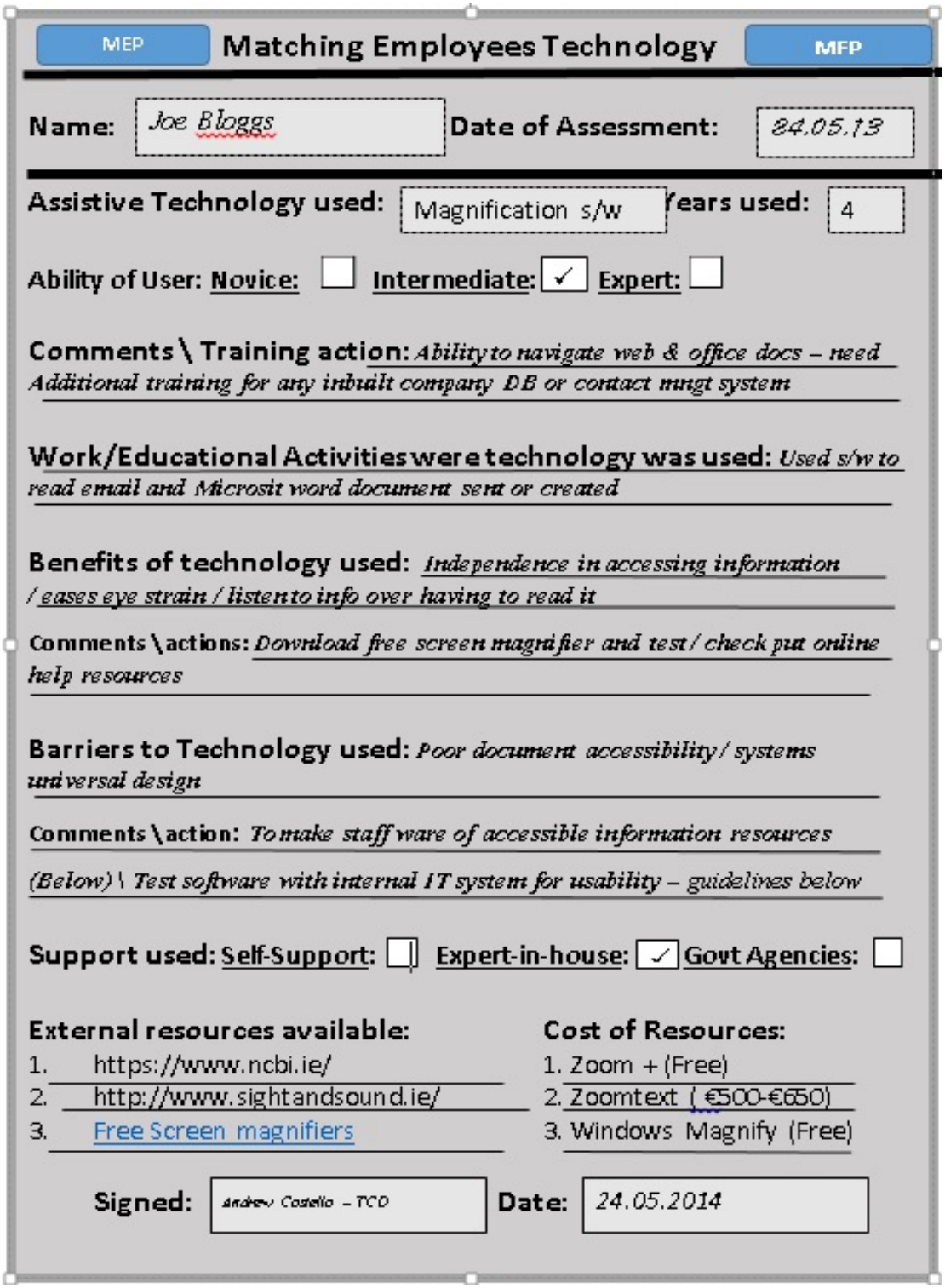
The selection of the user ability and request for training highlights the need to ensure a correct match in the human element of the user along with a match of external (or in-house) training resources. This will address some of the issues around the themes of a

lack of expert support within the working environment and a feeling of self-supporting when integrating any assistive technology into work practices and systems. It also allows for reflection on any barriers or enablers that will enhance the use of the assistive technology, for example, poor universal design of in-house systems, awareness amongst staff in creating information in an accessible format, procurement of technology systems meeting accessible guidelines, and the awareness of what the assistive technology used lets the employee achieve.

The MET also aims to provide a potential link to external resources, which may be a government agency or educational disability service, for expert help if needed by the employer. The MET highlights the potential use of open source software, either free or low cost, as an alternative, and to eliminate the barrier of cost.

The MET consists of the following sections:

- *Name*
- *Date of Assessment*
- *Assistive Technology Currently Used*
- *Number of Years Used*
- *Ability of User*
- *Comments / Training Action*
- *Work / Educational Activities where Technology is Used*
- *Benefits of Technology Used*
- *Barriers to Technology Used*
- *Supports Used*
- *External Resources Available*
- *Cost of Resources*



MEP

Matching Employees Technology

MEP

Name: Joe Bloggs **Date of Assessment:** 24.05.13

Assistive Technology used: Magnification s/w **Years used:** 4

Ability of User: Novice: ☐ **Intermediate:** ☑ **Expert:** ☐

Comments \ Training action: *Ability to navigate web & office docs – need Additional training for any inbuilt company DB or contact mngt system*

Work/Educational Activities were technology was used: *Used s/w to read email and Microsit word document sent or created*

Benefits of technology used: *Independence in accessing information / eases eye strain / listen to info over having to read it*

Comments \ actions: *Download free screen magnifier and test / check put online help resources*

Barriers to Technology used: *Poor document accessibility / systems universal design*

Comments \ action: *To make staff ware of accessible information resources (Below) \ Test software with internal IT system for usability – guidelines below*

Support used: Self-Support: ☐ **Expert-in-house:** ☑ **Govt Agencies:** ☐

External resources available:	**Cost of Resources:**
1. https://www.ncbi.ie/	1. Zoom + (Free)
2. http://www.sightandsound.ie/	2. Zoomtext (€500-€650)
3. Free Screen magnifiers	3. Windows Magnify (Free)

Signed: Andrew Costello – TCD **Date:** 24.05.2014

Figure 20 Matching Employees with Technology – MET

9.3 Intended Use

The above assessment is intended to be used in a variety of situations. Predominately, it is a tool that can be used by transitioning students from an educational environment, which has used a high level of assistive technology support, to describe the benefits of such accommodations and how they use such a support to aid them in their completion of day-to-day activities. It aims to be an assessment that a final year student may present to a prospective employer on the acceptance of a position to aid both parties in integrating assistive technology within a new environment. The assessment is not a wish list of demands but an assessment that aims to forge links to available government resources for expert assistive technology help in the field to aid the employers in integrating assistive technology and to raise awareness of assistive technology in a working environment.

The assessment can also be aimed as an additional staff human resource tool allowing current employers to reflect with staff on barriers that exist in using assistive technology and highlight any new technologies be that open source or paid to current staff. It moves the ownership of the assistive device solely away from the employee to a shared approach that is mutually beneficial to both parties. The use is an aid to both parties (where willing) to encourage and breed an inclusive workplace where such technologies are accepted by all staff and not labelled as an expensive burden that the employer cannot meet.

9.4 Review of the MET by Technology Professionals

To further analyse and review the MET exit tool and themes extracted from this investigation, the assistive technology officer from Dell Ireland, and two current third-level assistive technology officers were interviewed to reflect on the issues that they feel arise in the transition of a disabled student into the workplace. All three technology professionals were met face-to-face and gave feedback that support the investigation findings on the need for greater working co-operation between sectors to enable the use of enabling assistive technology tools.

9.4.1 Dell Ireland Technology Officer

Dell Ireland have a workforce of 4,500 employees, and in 2007, as part of several staff resources available within the company, the True Ability Network was founded. The aim of this resource is to "*help make Dell a more welcoming place for people with different kinds of impairments*" (Dell: True Ability). The team lead for this project is Octavia Racean, who agreed to meet to discuss the assistive technology supports available within the Dell organisation and to discuss the findings of this investigation, and the MET transition tool. Octavian started by commenting on the fact that the term 'disability' is not an issue or taken into account when looking at employing a user. A lot of high need employees with a disability have entered the organisation via the Willing Able Mentoring (WAM) work placement programme: "*we are aware, most of the people with disabilities that we recruit come in via certain channels, they are recommended and mentored by certain organisations like WAM …we know a lot of things about them prior to the recruitment stage*". The use of the WAM programme allows Dell to ensure the job matches the user's ability and ensure any potential barriers are alleviated before the employee starts the job. The aim of MET assessment is similar in ensuring any barriers in integrating the assistive technology are highlighted as soon as possible.

Octavian also pointed to the procedures of attaining reasonable accommodations and the use of an induction program for the employees to highlight a need for accommodation: "*there are no cast-in-stone procedures, usually the Facility Department has the knowledge and they know where to look for occupational adaptive things. Of course we have a few employees internally who can be consulted on the matter of technology; we also have an occupational therapist who can answer such questions".* This is a very progressive approach, with a range of supports being provided, but a process does put the onus on the employee to disclose and seek support. There is no employer based process that will trigger these events to occur.

The purpose of the exit assessment was discussed as a tool to increase awareness and better flow of past support between sectors and allow for better two-way dialogue between the employee and employer: *"I think it would benefit us to raise awareness of what assistive technologies have been used before, it would save time and resources in*

going through assessments. It would be great at that time to have some history on the person, obviously it would be good to keep in touch with previous employers or support organisations that have looked after that person. This is why it is much easier to go through an employment process with a government agency like WAM because they have been looked after by them and they know there are issues".

The assistive technology supports described by Octavian were mainly hardware based (enlarged monitor, keyboard, ergonomic supports), the questions focus on the effectiveness on the accessibility of in-house IT systems and the level of accessibility to give to users of such technology, such as screen reading software etc. Identifying such barriers to accessibility is an aim of the MET exit tool which would highlight the need for such essential IT work systems to be tested for accessibility to prevent access issues arising. The True Ability Network has actively promoted awareness of assistive technology via in-house awareness events on the use of assistive technology and continue to work to ensure that Dell is recognised as an inclusive workplace. It is clear that Dell is an open organisation looking to improve the work experience of disabled users. The use of the MET tool is deigned to work as an additional tool to enable an improved transition and increase awareness of past assistive use for both the transition student and employer.

9.4.2 DIT Assistive Technology Officer

Steven Long, Assistive Technology officer from Dublin institute of Technology (DIT), was interviewed to discuss the outcomes of the investigation and his opinion on the transition of assistive technology between environments, focusing on the use of the MET tool. He commented on the need for such a tool: "*There are always issues surrounding disclosure, it's always going to be one of those subjective types of thing, depending on the environment somebody is going into, depending on the individual, their personality and how they can sell themselves. It shouldn't stop you applying but I definitely think we do need something in between*".

He further went on to highlight the way the MET tool might help inform employers, and potentially change their views: *"Something is needed to help in the transition, I do think employers need to be informed, I don't think there are bad guys who on the*

moment the employee discloses, that they go "Oh, I don't want to deal with you because you're too much trouble", I think that if the information is out there, even the ones that may think that way might change their attitude slightly".

9.4.3 DCU Assistive Technology Officer

Henry Langton, the Assistive Technology officer from Dublin City University (DCU), echoed those sentiments. He was also interviewed to discuss the outcomes of the investigation for his opinion on the transition of assistive technology between environments, focusing on the use of the MET tool. He reflected on how such a tool could harm potential employers "*It's not that the employers, say "I have an employee with a disability". It's "How can I support this user?", it's not a case of fear , it a case have not been able to provide accommodations for that reason, some employers are reluctant to hire staff with disabilities because they feel that they do not have the appropriate skills"*.

He also mentioned that the MET tool could help dispel concerns about cost and lack of expertise: *"Also there is a cost factor, and if they don't have the appropriate skills it probably going into the unknown and they think "how do I support my staff if we do not have the expertise?"*.

9.4.4 Reflections

It is clear based on the above interviews that there is a real need for a tool like the MET when students with disabilities are transitioning from education to employment. Octavian Racean from DELL said a tool like the MET could help augment DELL's existing approaches and could help DELL learn from previous experiences. Similarly, Steven Long from DIT felt a tool like the MET could change the attitude of employers when they hire staff with disabilities. Finally, Henry Langton from DCU felt the MET might give employers some idea of the types of skills they require when they hire staff with disabilities.

9.5 Conclusions

This chapter introduced a draft exit assessment tool to enable exiting students from third-level education, this tool will set out enabling and possible barriers to the use of assistive technology students have used throughout their education phase. The tool enables potential employers to view past assistive technologies used, enablers and barriers to such use and support channels to aid in the use of such technologies. The MET tool is underpinned initially by the educational environment who complete the assessment with the exiting student but the tool could be reused and revisited under a staff review or Performance Management and Development System (PMDS) meetings. The chapter also details interviews with active assistive technology officers with third-level and a current support scenario within Dell Ireland. The need for such a tool and its positives in raising awareness are highlighted which tie to the findings of investigation and the need for a process to re-assess when a change occurs in support needs.

10. Conclusions and Future Work

10.1 Introduction

This main aim of this investigation was to explore the transition from education to employment for assistive technology users and to develop a framework for a transition planning assessment tool to enable the transfer of assistive technology supports between educational and employment environments. To this effect, a review of current literature within this field was examined, and from this, an experiment based on the Human Activity Assistive Technology model (HAAT) enabled the recoded reflection from eight participants via a life time history methodology. The findings of this experiment enabled the development of the Matching Employees with Technology (MET) exit assessment tool that will aid exiting students from a third level environment in the transferring of assistive technology supports they have acquired to a new working environment. This tool was then reviewed by three assistive technology officers to verify the viability and usefulness of it. This chapter will present a summary of key findings from the objectives set from this and conclude with a discussion of potential future work from this investigation.

10.1 Summary of Key Findings

This area will look at each of the chapters covered within this investigation and reflect on the key findings that led to fulfilment of the objection aims and objectives covered within chapter one.

10.2 Assistive Technology Definitions

In defining what assistive technology is and its place as both a rehabilitation and enabling support was in shown in two phases. In the first phase, assistive technology is seen as a support predominately used by disabled users but in the second phase, further definitions show the elimination of the term “disabled”, with a focus on technologies that increase access and inclusiveness for all users regardless of their state of impairment (Section 2.2). A further objective of this chapter laid out the difference

between hi-tech assistive technology solutions and lo-tech solutions, highlighting the realisation that assistive technology are items that every user is using on a day to day existence already without knowing; the cost of such items do not have to be large and as highlighted are easily adaptable without a prolonged learning curve. The key highlights from within this chapter:

- Assistive technology is defined as a technology that promotes access and the completion of tasks that users might find difficult because of a disability or a lack of ability. Assistive technology allows for a particular function to become easier or possible to perform.
- Assistive technology, although focused on a disabled and rehabilitation mind-set, should not be labelled for use within this field only. Assistive technology has the benefit of improving all users' functionality in achieving tasks. It can be seen to provide an alternative method to completing tasks, e.g. the use of voice recognition software over the typing or read/write method of creating content.
- The differentiation between lo-tech and hi-tech technologies and the need to take a user's background, ability, tasks and environment into account (Section 2.4). Without the correct assessment and setting of user expectations the use of assistive technology can become a frustrating experience that would curtail any further technology support intervention
- The difference in user ability (expert, intermediate or novice) must be seen as a key factor in using assistive technology. Without the correct support or guidance, the ability of the student to engage the assistive technology in an effective manner is diminished (Section 2.5).

10.3 Assistive Technology Literature

An objective set by this investigation was to review relevant literature that aligned itself to the transition of assistive technology and barriers and enablers that allow for such movement. The literature reviewed three main areas in this regard:

1. Reasonable accommodations barrier and enablers.
2. Assessing for Assistive Technology use.
3. A reflection of Irish and international law with regards the use of reasonable accommodations.

A summary of the key findings to each of the above three chapters will now be provided with reflection on it relevance to the investigation question.

10.3.1 Reasonable Accommodations

The term "reasonable accommodation" aims to provide tools and resources to enable full participation of users with disabilities in working and learning environments. From reviewing the literature, a number of barriers and enablers were identified:

- The cost of devices and who procures such supports highlighted a barrier to the transition to a working environment. The need to ensure such supports match the work activity to promote the integration of such technologies is highlighted. The need to avoid delays and provide cost effective alternatives via the use of government agencies highlight the lack of awareness of available support and the opinion that assistive technology is a costly support to put in place.
- Insuring goods and products used within an organisation comply with the universal design principles to enable the seamless use of assistive technologies without the need for expensive additional software or hardware. Promoting universal design principles by end user testing and accessible procurement enable the promotion of an inclusive workplace environment and provide a platform for the use assistive technology supports and disclosure.
- Reasonable accommodations in the form of a job coach or natural support as reflected by the literature show a human mechanism for bridging supports between environments. The lack of awareness or availability of expert in-house assistive technology can in itself provide a barrier to such transitions. Such use of a human based support is seen to be effective, however, reliance on such a human support, although effective, may itself provide a barrier to accessing the workplace if an accommodation is not available. The need to promote an independent self-advocacy support framework ensures the role of supporting an employee is a shared approach between the two parties (employer and employee).
- The role of government agencies as an effective support is seen to be compromised by a fragmented approach to service delivery with agencies often

in competition with each other for funds and clarity of role; this is reflected in the NDA report of assistive technology provision in Ireland.

10.3.2 Assessing Assistive Technology Use

A structured assessment for assistive technology use allows for a clear pathway in highlighting barriers to engagement Assistive Technology use. As commented on in Section 10.2, the need to match a user background, ability and activity to the technology enables the user to successfully engage with the assistive technology provided. This research provided the following conclusions in regard to the investigation question:

- User-focused (psycho–social) assessment provides a platform from both the social and medical views of disability to form a user-led approach and provide a platform for a consistent structured form of Assistive technology service provision. The use of an assessment provides a structure for both a user and service provider (educational or employment support service) to formalize goals for what the technology let the end user achieve. It also allows for views to be raised on barriers within the environment that need to be addressed in order to enable a successful integration of such supports.
- There are two formats in terms of assessing for assistive technology needs: *Unstructured* and *Structured*. A unstructured approach as seen in the HAAT and SEET models (Sections 4.6 and 4.7); these do not provide any set outcomes but aim to give broad themes to base a set assessment around. There are no set question allowing flexibility in use an adaption to the environment of assessment. A structured approach, such as the MTP (Section 4.4), allows for little or no choice is the line of questioning and can be seen as too lengthy to complete. A structured approach allows for a set outcome or score if required which may be seen as a benefit, however, the complexity and time needed to complete a full assessment can be seen as negative if using it in the context of this investigation.

10.3.3 Irish and International Law

Irish and European law underpin the use of assistive technology within society. The right to access reasonable accommodations, as stated by EU directive 2000/78/BC Article 5, has provided a tool for users in needs assessment of assistive technology support afforded such access were applicable. However, this right to accommodations lacks the necessary on-the-ground power for such directives to become a part of everyday employment policy. The key areas discussed from this chapter:

- The Disability Act seeks to ensure the needs and access to services and everyday life is protected under Irish law. A lack of a judicial remedy under this Act, as commented on by the literature, renders the Act ineffective and not rights-based (Section 5.2.1).
- Further Irish provision under the Employment Equality Act (Section 5.2.2) and the Equal Status Act (Section 5.2.3) state the provision for employers to provide "reasonable accommodation". The lack of a definition of the term 'reasonable' in relation to assistive technology leaves such term open to interpretation. The further need for a clear assessment tool based on need is relevant under this area, as such an assessment tool could be gauged against a need and cost to ensure accommodations are set.
- The need or use of Irish law may act as a discouragement to engage and employ with a disabled workforce. The term "reasonable accommodation" may alert users to a cost factor and high level of need in making work adjustments. Such accommodation without the correct support network and communication of need from previous environments may leave the employer feeling vulnerable and open to litigation if pursued by an employee.
- The American Assistive technology Act 2004 is currently the only piece of international law with specific detail on the right to acquisition and service provision of assistive technology. Assistive technologies under EU and Irish Law are confined under the wider term of reasonable accommodation. The benefit of such a specific Assistive technology Act gives a greater voice and terms of reference of a user rights in the use and access to such supports.

10.4 Experimental Design

An objective set out in Chapter One was to develop an experiment that will ascertain and evaluate if the use of Assistive Technology has been used in enhancing the educational capabilities of students and contrast against a graduate viewpoint of use of Assistive Technology in a workplace environment. The design of this experiment was outlined in Chapter Six. The chapter started by outlining the use of the life time history approach as a qualitative methodology (Sections 6.2 and 6.3). The chapter continued to outline the design phase by using the HAAT model (Section 6.4.3) as a qualitative approach to structure an interview process to gain feedback and thoughts of the investigation participants on their satisfaction and barriers encountered in the use of Assistive Technology in their respective environments. Further to this rationale was the use of the interview questions and its link to the HAAT; these were outlined in Section 6.5. The attainment of quantitative data in the form of the QUEST tool (Section 6.4.2) was also introduced to gain information under two main themes of assistive technology use (device and support). The design phase allowed for clear coded results which were shown and reported on in Chapters Seven and Eight. From the design phase, it was possible to draw the following conclusions:

- The use of the life time history approach allowed for a true reflection and a link between different periods in the participants' life and their use of assistive technology. The semi-structured approach gave the participant's time for a true reflection of their use of assistive technology and their support network. The themes asked of the user aligned to the HAAT model which enabled for a clear reflection of what assistive technology had allowed the participants to engage with and barriers to human and technical issues that they encountered between a working and educational environment.
- A benefit of the process was a working relationship had existed between the participants and the interviewer. The understanding of the participants' disability and course/work choice allowed the user to reflect on the transitional phase in the use of such a support, without having to explain or disclosure the severity of their disability. It allowed for a focus on the assistive technology supports and their life time history in the use of such supports

- The range of abilities and gender split also allowed a cross analysis of the use of the participants assistive technology, ensuring that a focus on one age group and ability cohort was not dominant throughout the investigation. The mix of ability is important to note, as barriers that effected an expert user who had a good working knowledge of the assistive technology reported similar awareness and support issues of user with less technology ability. The need for a transitional assessment is still valid regardless of ability.
- Restrictions against the design was that the number of participants was small and it was difficult to ascertain if the responses are a true reflection across all disabled users. The time allowed to complete this investigation was a drawback also, in that it limited the time to add to the number recruited. The additional recruitment of student numbers crossing a range of disability cohorts would increase the validity of the investigation undertaken
- All participants came from Trinity College Dublin, and were Dublin based. The involvement of future higher educational institutions would enlarge the student and graduate cohort of the investigation and enrich the findings gathered within this investigation.

10.5 Results and Findings

Gaining the correct feedback and views on the use of Assistive technology from current third-level students and graduate participants and the documentation and evaluation of the findings from the experiment was a further objective of this investigation. The results from the interview process were coded using a grounded thematic qualitative approach which resulted in five main themes been presented, which enabled and prevented a transition of assistive technology into a new working environment. This process was elaborated on to describe the five-pass process that was undertaken to enable the finding and results of this investigation. From the results we were able to demonstrate the following findings:

- The user of a grounded thematic qualitative approach allowed the generation of clear constructed coded results. A Thematic Qualitative approach (Section 8.2) to the design from the participant's interviews allowed for the capture of a large amount of data in a systematic process that was contributed to the investigation question. The colouring of the themes results coding allowed for the

constructions of further sub-themes that capture a wide variety of data in a detailed format.

- The results show a high level of non-existent expert assistive technology supports available to employee within a working environment. In many cases the employee is left to self-support their own assistive technology use and no integration with the working environment mainframe systems or procedures have been accounted for. Such a lack of support and lack of awareness of assistive technology benefit is at the heart of these investigation findings. Such low awareness, compared against specific expert assistive technology support officer provided at third level, prohibit the use of such technologies. The issue is multiplied if the employee ability is not at an expert level.
- The need for products and services to integrate universal design principles was highlighted by all participants within the investigation. Many of the participants used mobile technology already, meaning they were less reliant on specific "add-on" assistive technology. Having procedures and systems that are inclusive by their design would allow for a greater transition of assistive technology and reduce the need for high cost alternatives to adapt the working environment. The use of universal design principles to test and gauge the inclusiveness of a working environment were themes spoken about by the participants throughout with a need for further technical progress to integrate assistive technology in a more effective manner.
- The reliance on assistive technology and the independence it allowed all participants was a strong result coming from the interview process. Participants commented on how such a process enabled them access to complete their educational cycle and increased their own personal self-confidence to achieve goals and daily activities. The assistive technology coupled with the correct assessment and support had increased their perception of their goals but also reflected on how such independence is restricted if the design of awareness of such technology is not integrated effectively within their working environment.
- The use of an assessment process, be that structured or semi-structured, allowed the user to discuss how technology can play a part to enable access and complete a task in a more efficient manner. The lack of such a process with a working environment compounds the difficulties users have if they wish to

transition the technology to a new working environment. An assessment tool allows both parties (employer and employee) to reflect on issues around set factors such as areas covered by the *HAAT* model - support, the technology, the user ability and the activities they need to complete.

- The use of Irish law and a lack of awareness of the participants were further themes coming from this investigation. Irish and EU laws have measures that give rights to an employee for reasonable accommodations, however, the lack of knowledge of such statutes, coupled with a fear of using such a mechanism to receive such supports, was shown. The need for further employer-led awareness of a need to provide accommodation in a transparent method was voiced. A higher level of awareness on the employer viewpoint and the documenting under the respective employer work policy of such an acknowledgment and understanding of such guidelines would encourage the transition of supports and show the employer has taken the first step to promoting adaptive work practices.

10.6 The Matching Employees with Technology (MET)

The main objective of the investigation was to compile the results of experimental findings to enable the drafting of an exit assessment for transitioning students and current employees to complete their in-house support with a line manager under an existing review or PMDS interview. The result of this objective was introduced throughout Chapter Nine. The compiling and design of the exit assessment labelled the Matching Employees with Technology (MET) process came to the below conclusions of the construction of this assessment tool:

- The form aims to enable a student to bring concise information forward to a prospective new employee or working environment or used as an ongoing review process to evaluate the need and advantages of their assistive technology use.
- The form covers the main themes covered in the results phase support, activity and ability to ensure correct matching in the employer supports is made available but also giving external resources to the employer to avail of, which might entail existing government agencies, which can provide in-house

assistance or links to low cost assistive technology tools that the user may not be aware of. This enables a link in support networks between the past technology use and the new working environment.

- The form is short in its design and enables a short but concise gathering of information to raise awareness of past assistive technology use and enable the employer to plan for possible barriers, as well as enabling the accessibility of the working environment.

10.7 Future Work

This investigation looked at barriers and enablers of assistive technology using a small cohort of students. Below are areas of further work that would continue this work:

- To get further feedback on the effectiveness of the Matching Employees with Technology (MET); a future roll-out and piloting within an existing employment area could be looked at. This further work could engage fully with the respective management structures and view current existing employment policy along with any potential employee requesting or presently using assistive technology accommodations.

- Future work coming from this investigation would be an extended pilot involving a greater cohort of students across separate higher education institutions. Increasing the use of the MET amongst a greater cohort of current education students would increase validity of the study and allow for a greater integration of the MET amongst a wide range of disability cohorts.

- Integrate the MET assessment to allow graduating students to transition such recommendations and use of assistive technology to a new environment under an online e-portfolio platform would allow for such recommendation to be available for the exiting student when needed. The current Trinity College Dublin Genio funded project aims to engage in such a tool. Further work from the finding of this investigation is to deploy an online MET tool for student use. For further information on the project please refer to: http://www.tcd.ie/disability/career/Transition-to-Employment.php

- Engage with the NDA and the Department of Justice for improved awareness and publicity surrounding the employer's responsibilities of the availability of reasonable accommodation. Such awareness linked to current government disability support agencies would publicise the effectiveness of the assistive technology approach and reduce the stigma of employing a disabled user.

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Appendices

Interview transcriptions –

Red=support purple= independence blue = ability grey =law green=technology brown=background assessment =light blue

INTERVIEW 1: SF1

AC: Hello my name is Andrew Costello; I am a final year student in my masters of computing in universal design assistive technology and universal design in the DIT Kevin Street. I'm here today to interview one of my participants who has agreed to into be interviewed on their reflection on their use of assistive technology in their education cycles to date, how it's affected them etc. I will now introduce SF1, thanks for taking the time today, maybe we can start off by telling me a bit about yourself?

SF1: Okay, Well I've just completed a Ph.D., where I looked at the educational experiences of blind and visually impaired students. That took six years and supposed that this the most current state of my education. Prior to that I completed an undergrad and postmasters in another universities.

AC: how long have you been registered with the disability service in that time?

SF1: I've always registered with the disability service in the universities because I felt I required support, particularly around the use of technology.

AC: Your disability cohort/type not to get into it too deeply. Maybe you can explain your disability or your impairment and how it affects you?

SF1: I have a vision impairment and mobility impairment; I have rheumatoid arthritis, which affected my eyesight so they are actually connected. I am categorised as registered blind, so I have very little sight in one eye and nothing in the other and my mobility impairment affects my ability to walk. It has also impacted my hand use which effects the use of my hands for computer & my ability of walking and things like that.

AC: Thanks for that. Can you explain what assistive technologies you have used, encountered or interact with?

SF1: Well, I suppose the main one I have acquired for most of my education is a screen reader of some sort. I have used jaws currently I also use Zoomtext with the speech part on as well with very large magnification, because still I have some working sight. I'm inclined to try to read as well as listen, I suppose that may change if and when my eye sight deteriorates further. I think most people that have some working vision will try to use what site they have.

AC: Have you received those devices via college or from an outside organisation?

SF1: I have also always received them through the College via the disability services, I've recently started using Dragon voice recognition as it might be an option for me for future work because my hand is not working particularly well and yet again it was via the College I received this support, I had a computer before going to college but I just bought that independently myself and downloaded a demo version of Zoomtext or whatever, just to have something.

AC: it was when you hit an educational cycle or postgraduate or undergraduate work as well is where you came into contact with the support?

SF1: I suppose I was not very good with technology during my undergrad. I actually never used a computer, I used a typewriter for all that stuff it was when I was doing my MSc, I realised I could not continue just typing everything myself, so I had to start using computer technology and all that. I suppose I recognise that while I had a computer at home which didn't have the assistive technology. I wasn't using it because I couldn't actually see this screen adequately enough, if anything went wrong, I panicked. My reaction was always to say what I have done wrong. That's because I could not see what was happening.

AC: Moving on to order more of a broader question like to get your views on what is the term "disabled" means to you what you feel, or how it impacts you?

SF1: For me, I recognise that I have impairments and therefore I am disabled in certain instances. For me, I often think I'm disabled by society rather than me been disabled, even though I would be classified as a disabled person. It is the fact that it's the way society is designed means that I cannot do particular things because of my impairments, but if things are designed in a different way I can do those things

AC: Are there barriers that you come against?

SF1: I feel that they disable me rather than rather than me being disabled. I am well able to to learn. It's just how people present the materials which determine whether I can interact with it or not.

AC: Your participation or your activities the barriers are in place by the environment, society as whole to clarify?

SF1: absolutely also by individuals within that society. Also how people perceive me disables me. People see my impairments and automatically think I cannot do particular activities, so that's disabling.

AC: turning to a different point. What does the term assistive technology mean to you?

SF1: for me, assistive technology means technology that I am required to use in order to access a lot of mainstream technologies in a way that other users don't have to use. They can use the mainstream technologies without the additional assistance.

AC: So you see them as being separate mainstream IT or technologies? ,

SF1: Up to now they have been. I increasingly use which is fantastic see them built into mainstream technologies, Apple have done. For example, I can use an iPhone the same there were way that you can all have to do is click another button and have the voice, so it is changing, which is great, which would mean that increasingly from me, I won't have to buy specialised assistive technology of two very recently. If I needed to read something on screen I have to buy Zoomtext or acquire something like Zoomtext such as Jaws. Increasingly I don't have to.

AC: So you see them as ubiquitous, part of the devices, saving you having to buy extra add-ons , been trained upon and supported in, it breaks down barriers is that the affair assessment?

SF1: Exactly up to recently I perceived assistive technology was seen as something for disabled people. For people who were designing technologies weren't taking that into account. They saw assistive technologies as something mainstream technologies were not doing, that's changing.

AC: So it's hopefully emerging as figure down the path working its way into inclusive design:

SF1: Yes i can see it moving that way hopefully.

AC: how do you approach technology; has been fearful, as a friend, as an aid for something that's the opposite of that you would resent?

SF1: I suppose I could say it depends on the day and what you are trying to do and some days I want to throw it out the window, but I try not to because i could be is serious trouble! I suppose over time. I've got more comfortable with technology so I don't approach it with complete dread of fear like I used to come because I used to, I used to hate turning it o, make me feel ill, but now it's a tool I use to enable me get on with my life to the best of my ability. So I actually do see it as an aid maybe not quite as a friend. Well, I suppose it depends. on the definition of a friend! I'm not terrified of it. I still get frustrated with it because it's not doing what I'm trying to do at the cant always find only easily what the problem is. I'm using assistive technology & I can't get it to do what I hope it should, it does because it's a glitch between the technology and the main system.

AC: you spoken about the using the technology as an aid but previously you are anti-technology or even technophobe?

SF1: absolutely. I was terrified. It was not what it could do, but I always felt I would break it. I knew it was expensive. I had been given the computer by college. I was terrified I would break something that had been given to me. If it was my own I would not have been so bothered by it.

AC: What has changed your opinion to a more positive view?

SF1: I suppose I've had to learn to use the technologies, in doing my coursework there was not an option doing it any other way. I needed to be able to use the technology. The support I received within college was a huge factor in enabling my use, If

something went wrong I could ring and get support. I learnt unless I did something really stupid I wasn't going to actually break it unless I dropped it, which is not done to date! I was unlikely to break it, but definitely getting more familiar with the assistive technology I could actually see what was happening on the screen.

AC: Increase your confidence over time?

SF1: absolutely. I could see what was happening. Most of the time so therefore it wasn't a problem

AC: you can see the endgame?

SF1: Exactly

AC: moving on to my next question has your use of assistive technology changed your approach to technology?

SF1: Absolutely, because I've used to so many pieces of different technology now it's changed my view of technology because it's the first thing i use, if I need to know something I can now Google it. My friends comment on my technology use, it is part of what I do now. But the fact that the technology has got smaller and lighter helps. I have an iPad I can carry that around me in a little rucksack on my back without doing myself damage. Where else, even the laptops they can be too heavy and awkward for me to carry around on a daily basis, or if I'm going to a conference I wouldn't be carrying a computer, but I can carry the iPad and I can interact with it just the same as the person sitting beside me. Okay, I changed the view and resolution, and I can plan the voice but I can still do anything that anybody else can do. So to me, you know that that has changed me. It improved my view. There are still challenges like PDF if tagged incorrectly where the screen reader cannot read it. If you're blind severely impaired you cannot see properly, so there are still challenges. This can be frustrating especially with academic work as most academic articles come in PDF format. I need them converted into word, or whether I need to get somebody else physically to create the alternative format. That's a huge challenge and delay. Things like that. I still find frustrating and still trying to get around.

AC: is your assistive technology hindrance to you or do you see it as a negative within your life?

SF1: well, I suppose yes at times. Yes, to the extent it doesn't always do as I said, work compatibly with the mainstream side of the technologies that trying to work with. That can be challenging and frustrating, hindrance, but the fact they are increasingly part of mainstream technologies means that it is easier to use and less of a hindrance. Eight times out of 10 they are not a hindrance their help

AC: would you say the technology is matching your need?

SF1: the majority of the time it is matching my need, but then again needs change. That's what people have to be constantly aware of and including disability supports within college just because the support suited a student within first-year doesn't mean it well suit them in second year, or third year because as I said, needs can change and

you need to be able, in needs to be in needs to be fluid enough reactive enough to change with the student and to say right if the support is not working it can be change

AC: it's an iterative process and need to be revisited?

SF1: exactly. It's not this is what you're getting and this will see you through. For some people, they won't need anything else, for others things change, I suppose as you go through academia need changes. For example, what suited a first-year undergraduate may not suit a postgraduate research student. So if they are continuing within the same institution three for five years on their needs have changed, whether their personal needs have changed are not their requirements have changed.

AC: do you feel that the support network in place within the education system to assisted this change or do you self-support yourself?

SF1: I suppose I've always had to identify the changes and then go and see what I can do rather someone else coming in saying you're moving on to a different stage in your life. Let's sit down what might be required and how best the technology can support you in that the transition. But then again, maybe just that's just my view

AC: just to clarify this point you would feel it would be up to the student who is going to interact with the technology to make the first step in choosing the technology they want to use and then trying to find support to acquire the technology?

SF1: I think what I'm trying to say is that that's how I have found it and that's okay. If you're a student that is proactive and understands that they need this and I'm going to ensure I get it etc , but I'm not sure every student is like that and sometimes you don't know what is out there, so it can be challenging and you know it's a matter of support, supposing feeling that this does not work I can go back to somebody and say okay, I tried this, it hasn't worked. I still need to be able to do a,b & c. Can you can you suggest anything else? What it also means the support services are able to come to the person and assess if the supports put in place have worked or not, and the gaps in support that are not working?

AC: it's a bit of both approaches then?

SF1: exactly it should not be down to one person

AC: just to continue on the theme of using your own technology. Have you ever come up against barriers external to your own ability in using the technology, have you ever been in a position where you have not been able to use the device due to the environment you are using it in?

SF1: sometimes you can go into a room and first of all, you don't know where the sockets are so if you need to plug-in, it can be as simple as that. That can be hugely challenging. You go to something and suddenly people start putting up PowerPoint presentations & you haven't received them beforehand. There's nothing I can do physically in that space to see PowerPoint presentation. If I'm going to a conferences I always request in advance the slides I made available to me. Sometimes they are, sadly, sometimes not. For example, I went to to quite an important one within the last

year within Ireland. It was run by an offshoot of the Department of education. When I made the request there was complete panic on their behalf and I discovered afterwards they never had this request made before and they didn't know how to handle it. Because this was something that was going to get a lot of publicity on the day and they did not want it getting out beforehand. I had asked for the slides to be made available, but the panic throughout the process, I got so many phone calls in advance to try to resolve it. I thought to myself, what is this such a big deal? If I wasn't aware and determined to try to get them i would have stopped. When I tried to get them first I was told no. Some people would think to themselves I'll just leave it, but I said no. I want to get them. I mailed them to tell them my disappointment and made this request on numerous occasions, both here and in Europe, and every time my request has eventually been dealt with and I was always given the accommodation. That's sent them into a spin and they recognised the legal side of things they were on a slippery slope if they did not provide me with their accommodation.

AC: just to clarify that point are you stating the awareness of staff is lacking to what your needs are with technology and how you interact with it?

SF1: absolutely. They don't think that somebody can't see or if they needed a different approach. If it sent to me I can tailor to meet my needs then. I can change the font or whatever else or I can listen to it. If I get a presentation in advance I listened to the PowerPoint's the day before to understand what they are going to be talking about, so I don't have to be constantly following all the slides as I had the general idea

AC: have you ever been discouraged from using technology as a way of accessing information? i.e. have you ever been told, don't worry about using your assistive technology I can get a human support in place?

SF1: I suppose not really no, sometimes the human support is necessary, going back to the PDF issue where they cannot be read. The human support has to convert it to help me. I've never been told not to use my technology. I'm not sure I would appreciate it if I ever was. But they certainly would not appreciate what I might say to them!

AC: how do you think their awareness of technology, i.e. your supervisor of MSc or your academic colleagues of assistive technology?

SF1: they have not a clue, not a clue. For most of my Ph.D. work sent to my supervisor he would print them off, add in hand written comments and send them back to me and then say this is getting back to the human question "you do have somebody to read this for you, don't you?"!. I got so sick of trying to get him to do it another way, you can only take so much.

AC: To clarify and poor lack of awareness, non-existent?

SF1: absolutely. Before my viva everybody coming into their five can take a copy of their thesis into their viva as a reference to, my supervisor said to me "where is your print copy of your thesis?" I replied "why would I have a print copy of my thesis, I can't read a print copy! He set me into a complete panic as a result by the examiners might ask me to reference my thesis. I spoke to my intern and he's a little bit more clued in there's not a hope in hell we are going to ask you to read, print. You know,

some days you think what planet are they on

AC: Does such lack awareness club affect your ability to perform?

SF1: well, it can at times I sit in on seminars in the school I am in and practically all the lecturers know that I can't see none of them except for one send on the documentation in advance of the lecture in six years. And like you say what's going on here? You know what sometimes I think I'm not even going to ask f for it. It means I'm not always inclined to get involved in things within the Department because it's going to be visual, and you know in advance you're going to have problems accessing whatever the material is. Some days I can deal with some days I can't.

AC: The material that you talk about could be made accessible with awareness?

SF1: Absolutely the barriers are external, though not my problem because I can't access them. The issue is there not available to me in a format other than sitting in a room and seeing what on a screen in front of me. Doesn't matter where I sit in the room. I cannot see the screen. When I'm doing presentations for conferences I do my presentations inPowerPoint. I can't read the presentation , I use it because if I forget what I need to say I asked the audience to advise me . Normally when I do that there is a gasp from the audience suddenly when they realise "she can see what's up their". I'm enabling the audiences view for themselves; I'm not assuming that there are just going to listen to what I'm saying. I recognise some people take information in better visually.

AC: Moving on the question around support and your support network, how you supported in the use of assistive technology financially, training, people, friends and family. Do you ever use free technology?

SF1: well, you can ignore my family. They have about awareness as the academic people here do. They haven't a clue about anything, they do not support me financially either. That is the no-go area. I suppose increasingly I talk to friends who are visually impaired, I'm on a list where people sending questions about technology and getting them answered. Even though it is an issue I have not come across, they might recommend a free app that I could use. Most the apps I got a free. That way I discover new technology. As I said, a lot of it is because I've had to get familiar with technology and because I'm trying to ensure I completed my studies. It's the only way I could do it.

AC: how would you be supported within college?

SF1:. The disability service, most of my friends that are not visually impaired know very little about assistive technology type things or things that may be have been beneficial to me they, would not know only mainstream stuff. If I asked them does that work well with voice something etc they would not know what I'm talking about? That's what good about free apps. You can download it and see how well it works without the risk. If works. I keep it. If not, I delete it.

AC: Have you ever been anxious about asking for support around assistive technology, previously you commented that you were technophobia to a certain extent, and to get to where you were you obviously engaged with support within the educational

environment, have you ever felt I'd better not ask that question, or ask for support?

SF1: yes, I suppose it's back to how engage with an individual, some people you can ask the most ridiculous question, and they won't take you feel stupid others. You can ask what you feel is a sensible question, but they make you feel about 2 inches tall. So a lot comes down to that, I am. I have had occasions in the past when I have not asked for support, because I anticipated and negative response from the individual I would have to interact with. I've been fortunate. I suppose I have a particular friend who has been very supportive, who is not involved in disability support services. It is a problem he can help me out as well when over the years I was too anxious to ask the people who may actually know, over time, I just got more thick-skinned overtime and I will couldn't really care what people think of me. It reflects just as badly on them for reacting in a negative way as it does me. I think asking for support enables me to become more independent as I can and I have had to learn. But that comes with old age!!

AC: do you think within your educational environment. You were assessed adequately for the technology. You were given or engage with? When you sat down with the service was there was a process in place to ensure that support in place to match the technology.

SF1: I was very lucky since i came to TCD that I was adequately assessed. The person who did the assessment is somebody I trusted. She was pretty clued in that I had more than one disability. Unless I had contacted the service to advise them on my needs had changed nobody would have checked in. Okay, you have to take a certain amount of responsibility yourself. I'm not saying you don't, but you also have to feel that you're not going to perceived as a nuisance or always wanting something else if you go back and that does not always come across
AC: in your use of the assessment/teasing out your needs. Do you think it has been a successful match, due to the fact you have met with a disability service and they have provided devices on your behalf and you have engaged within that process from the initial stage, do you think that process is a successful process or a successful match and has helped you achieve your goal?

SF1: yes, a lot of it comes down to me as well. I'm very determined and very stubborn and pig-headed, so I wouldn't lease and that was not working for me I would have to find a solution. That is on the case for everybody.

AC: the assessment that was carried out by the disability Officer or assistive technology officer. Do you think it's a helpful process?

SF1: it a very good first step, it worked for me but when I was doing that assessment I really didn't know, thinking back, I think it was before I started my Ph.D., so I didn't really know what was required of me doing a Ph.D. So while the assessment more or less worked for me. I think it was because a certain element worked by accident as I did not know exactly what I needed by technology at that point, as I did not know my Ph.D. requirements. I'm sure a lot of students coming in don't actually know what is actually required from them. You do an assessment nearly based on what you have used before and what worked, not what you going to use it for. While it is good I'm sure it can be improved.

AC: just to clarify this remark ties to support needs to be a constant process, not just a one-stop shop.

SF1: absolutely for students starting at undergrad. The first couple of months are usually challenging and stressful, trying to find your feet, in a totally new environment, all these new ways of being thrown at them in between Christmas and March there are actually have to start trying to engage with the device they've been given. Suddenly they realise it's not working and I'm not in to what I'm asked to do. They need to feel confident to go back and advise that they did not realise they had to do a,b or c and the technology that I thought would work is only able to do a.

AC: they need a process that they can revisit?

SF1: a follow-up assessment is needed maybe in light of the course or the field of study they are pursuing

AC: moving away from the support side of things, have you ever used your technology outside of your educational activities? In leisure activities

SF1: no, because my phone has a voice over and all of those things and I use it constantly, I have a Kindle app on my phone to download books, it's the voice-over that read its, but a pleasurable activity. Its part of my life, I can't read print any more, for me, I can turn voice over on and off had a flick of a button and it's grand if I'm out and about. I can read a text message, so I click on the voice-over and it will read it to me. I use technology when and where I need to use it, regardless of the activity. I used not to, but that's part of the process, I used not to use my cane, but now I do. You have to learn, you have to get confident enough to use the tool to enable me to do as much as I can. I can check when the next bus is coming for example; the voice-over enables me to do this.

AC: I understand you are becoming to the end of your Ph.D. Can you see you use your assistive technology further down the line within a working environment or research environment?

SF1: if I go further in whatever direction I go in technology is an essential part of my life, technology is essential on a daily basis for me, so I will always use it.

AC: how do you feel around support outside of your educational environment? For example an employer, how do you feel they should support such devices?

SF1: I think the need to be made aware of what the technology actually does. I think a lot of them actually had no idea what it does and get totally freaked out by somebody using, say a screen reader. Putting such technology put on a computer because they feel it may impact on the performance of the other computers, I feel that there is a lack of awareness of assistive technology with people in society generally. They don't know or recognise this just an enabler for that one individual.

AC: moving on to another area, are you aware of Irish law provisions in the use of a assistive technology and reasonable accommodations?

SF1: I am about reasonable accommodations but they generally come with a but, and it's how the individual determines what reasonable is. Some people will be quite happy to accommodate you to the best of their ability others will not because they will feel its somebodies else's problem, I shouldn't have to do this. I recognised it is there in legislation, even disabled people themselves know little about what's in the legislation, never mind people in society.

AC: to clarify are you saying that the legislation is not being communicated enough?

SF1: it's not communicated well enough, it should not be just a paper, and it should be enforced. It should be something that they actually have to do to the best of their ability. I know there are exceptions, but there are so many loopholes in legislation. People can easily say I can't do that because it's going to be too expensive. They don't even look for an alternative. In my own studies I have heard some are my participants saying that they went for a job interview, I had to tell them I needed jaws and I did not get interview or the job. A lot of the time they felt it was because they required assistive technology.

AC: do you think employers have any understanding of such regulations. Just to clarify?

SF1: very little unless it brought to their attention, some places do, I know of some employers that are very tuned in and will support of disabled people, but generally I don't think so.

AC: what strategies apart from this technology are reasonable for employees to accommodate? To clarify, do you think other strategies Apart from technology are reasonable?

SF1: I'm sure it depends on the individual. I would definitely say somebody comes in with a guide dog. For example, the guide dog needs to be able to go out during the day and doing its business, so they have to make an accommodation somewhere to have a place where the dog can go or if somebody comes in with a wheelchair. They need to access the physical environment. It's not just technology that's one area.

AC: moving onto my final question, would you encourage future students to engage assistive technology if needed?

SF1: absolutely being should use as much support as they can, getting familiar with that technology they're using. Ensuring that the assistive technology they have is working to the best of their ability. It can be hard sometimes to engage in supports all the time as you feel you are being separated not included, but I definitely think if you can engage with them and get on with them build a relationship, try to figure out what works and what doesn't work you have a better chance of getting on long-term.

AC: thanks very much for your time

SF1: thank you. I hope I was helpful.

Interview 2 – GM1

AC: This is my second interview as part of my MSc process. I am here today with GM1, who has been working in the employment area since his graduation. He's going to give me is opinions on using assistive technology in that area. Thanks for taking the time today to meet me. Maybe you can tell me a bit about yourself, your background?

GM1: okay, I'm an Irish American I was born in Chicago grew up in New York, I move to Leitrim in 1998 and I went to local schools in Sligo. In Ireland the Disability supports to not kick in until secondary level. In contrast to the states where I had full disability supports from the age of four, but when I moved to Ireland there were no such supports at primary level at all, at secondary level and with the passing of the disability act it forced schools to implement supports. That only really kicked in the last two or three years. I was lucky in a way because my dad is into technology, I was told to use technology. I was taught how to use technology when I was 7 within the states.

AC: can you tell me about your employment history, where he worked, etc.?

GM1: my first job I pay taxes on was when I worked as an actor funnily enough, I worked on a couple of films after college. That was from the disability point of view in retrospect, probably more difficult than it was worth it because I was trying to see where I was supposed to go etc., etc. that was my first job; I also had jobs within the theatre during my time in college. I was a technical officer on the course, it's was a BA in theatre and drama studies. It was established in 2008, my job was to tell the new students and tell them how to use some of the theatre equipment, how to be safe, etiquette, plan, and all that type of stuff. I was also an examiner on this course. I did that for four years. I also work within Third level education German dept, they had a show and they decided they had an oral class they had to do. To help the students with the language they would do with German show, so I was hired into the technical bits there as well.

AC: you have strong technical background

GM1: The most recent work I did was as a researcher in Dublin

AC: Your disability and or your impairment can you give me a bit of background on how that impacts you

GM1: I'm severely visually impaired, I have a Genial trachoma from birth, I have

dislocated lenses, which means that our flight is a problem, my lenses don't covered the full area over my pupil, so I have like that come straight into the back of my eye, because their dislocated. I have cataracts in both eyes, which are growing. As I got older I wore tints on my glasses. As I got older they have got thicker. I used not to wear lenses before. If you see me for four years ago I will not be using lenses.

AC: Is your impairment progressive?

GM1: it's a degenerative illness

AC: to aid you with your vision you have used a number of technologies? Assistive technologies could you give me a bit of background?

GM1: yeah, of course, in 2004 the first of the white MacBook's came out, which had an accessibility feature that was built in. I started to use that, which was the first real assistive technology that kicked in. I got some stuff from a government agency as well, they gave me a calculator that is about the size of this keyboard which is great but I did not need a calculator that is that big!! Most of their services for those who were completely blind, or nearly completely blind. I still have vision and I can walk around. Sometimes it depends on where the room is because my disability is broader and wide ranging, some people with my vision can't walk at all, or fall over easily.

AC: there is a big difference, person's specific?

GM1: it is person specific the Government agency. Theyare trying to thread a very difficult needle, they're trying to look after a load of people with a variety of needs. They are buying in a load of equipment that will cover all the bases. No dig on them their great people, but a lot of the technology is not very useful. Apart from two things they gave me a telescope because I needed a telescope to read the blackboard. I was sitting the front row blackboard in close and used a telescope to read the board that was great. I they also gave me the bar magnifier, it was the simple things really that helped. The computer tied over the rest of it when I was given permission to type in made life much more easily.

AC: so your main use of assistive technology was the use of Apple products? Along with the in government agency help stuff, but they were not really useful?

GM1: most of their technology stuff was Windows-based if not all of it. The Mac thing started in the New York Department of education used Macs that's what I started with. If you started with one piece of technology at the age of seven you are not going to change that 10 years later. Everybody uses what they know.

AC: have ever used. Any Windows software?

GM1: I have tried I had to do ecdl's so I had to use one

AC: have you ever used any Microsoft assistive technologies?

GM1: I've use Dragon speak

AC: how about magnification software?

GM1: no, I never use that just Dragon. I used a standalone CCTV. But now I've not used much window stuff.

AC: that's fine. Just try get a broader view of what stuff you used. To move it on to the crooks of the interview. Can you explain what the term disabled means to you?

GM1: the thing about that term is that it means all things to all people. When I hear the word disabled I think of the word levelling the playing field. Some people think of a wheelchair user. That's created a problem by creating a broad term for a wide variance in physical and mental disabilities. We should probably find some different terms. That would be my view of it. I've never been offended somebody said have you got a disability, some people do, it does not bother me.

AC: do you classify yourself as being disabled?

GM1: no, I would say I have disability not disabled as a term would always tell me that I am not mobile.

AC: in the jobs that you have done previously. Would they have classified you has been disabled?

GM1: no, I don't think so. They would have said to me you have an impairment or disability. Some wouldn't even be aware that it's a problem. They were just go can you do what we need you to do? Then go and do it. If you had a problem because of x or y they were usually come to some arrangement, but not always

AC: how do you approach technology with suspicion, fear, what's your feeling when you say assistive technology?

GM1: I love technology. I think it's one of the few things that if you have disability physically or mental whatever technology allows you in some cases, not just level the playing field, but surpass your contemporaries because half of them don't use it. It makes life much easier when you know how to use it. It's a two-way street with technology. You can't expect machine to do everything for you. He's got to work at that as well. If you're willing to work the technology, make it work for you. You can go really far. If you just sit in front of that and say why the spreadsheet not doing what I should do, you won't go anywhere.

AC: do you think assistive technologies is down to the person using it or the use of such technologies are have other factors that enable their use?

GM1: you mean, do you think we should have better training?

AC: yeah, those kind of areas, support of friends and family. The culture of the institution are you worked in?

GM1: that might work, I have always wondered about that. I have friends such as Phil, Phil uses Windows. For instance we used have huge rows, I would show him things on

my Mac, and I'd say, look how simple it is, But then he'd go look at this on my Windows it's great. People are naturally contrary, he won't always be able to get consensus, yeah, you do have to allow for people differences. Maybe they should more people trained like yourself that can understand both platforms. You can understand Lunix, Windows and Mac that's not common among technology officers that I have come across, there are very few. A lot of it is to do with the person shown you the technology if the only understand one platform then they got only going to teach one.

AC: the supports do you feel the procurement of assistive technology. Even if you're confident, do you feel there was a need for support, you mentioned your father has been an important role in engaging in technology. Do you feel you having support who understands the problem, show them initially, even assess is an important role, or do you feel it's down to the person themselves to take it on themselves as a pure individual?

GM1: I think as a pure individual, it would lead to people falling through the cracks personally, I just do. If you leave it up to people that don't do it is difficult. You need somebody like a point man or woman that would go into schools. It has to be done at schools level is first , you can't have a situation where somebody comes up to you at third level and never use the stuff before, and are trying their 20s trying to get their head around the stuff. It becomes part of their natural routine. The kids today are all on Facebook, for example, which is scary, but when they come to their 20s will be much more comfortable with technology that I was or you were. You need to make them use the technology at a young age. So when they hit employment age of 18 they must better set for it.

AC: what the term assistive technology mean to you?

GM1: I think of being able to reverse the screen from black on white, white on black, to be able to zoom, get the screen to talk to. All the appearance side of it that assistive technology to me.

AC: would they be different to mainstream technologies?

GM1: no, none that I would see. There are a lot of apps are a lot of programs or even such OS's. They have all integrated assistive technology into the general running of the operation.

AC: there kind of seamless?

GM1: it should always have been that way, the guys that make assistive technology have made a fortune an absolute fortune. They knew that he wasn't integrated into the system so they could charge for every single license, but is that what you really want?

AC: has your assistive technology change your view our technology?

GM1: I think it's seamless & did not change my view of technology. In one way it tells me that I used technology more than what is healthy. I sit in front of a lot of machines every day. I'm not sure that healthy were not sure what that will do in 20 years' time to us. It's the price you pay for access.

AC: is your use of assistive technology a necessity?

GM1: yes, of course, if I was to remove my use of assistive technology. I would be regressing basically in terms of my ability to function in the world to 1998! That's what you're talking about, for me it's integral to how I function.

AC: Would it be stagnating?

GM1: pretty much degrading possibly

AC: Would your isolation will increase?

GM1: yep, I find things that are printed in text difficult to read. It would be a serious problem.

AC: have you ever seen assistive technology as a hindrance?

GM1: I've been frustrated before. This is a personal problem if I need to get somewhere reading signposts or maps is not just going to happen. I've got to take out a map and programme and follow the commands. That's very annoying when you're walking down small streets and you have a tracksuit Mafia over there!! There are times I wish I feel why do have to do this. But that of the technology fault that's my disability. But overall not really, no major points when I go I really hate using this. It's part of my life.

AC: just to clarify some and I go all know I have to use this now, it enables you?

GM1: a complete plus.

AC: have ever been discouraged from using your technology what i mean by that is that I get a human or a fellow co-worker to complete the task? Instead of using the technology

GM1: that has happened once or twice I got to the point where I are some not to do it because it did badly that reflected on me. It's one thing viewing a disability to akin to opening out door for a wheelchair, opening the door for a wheelchair is very simple. If I need something done I want to do it myself and you said you're going to do for me. How would I know you are going to complete a task to the same ability? I won't you make a mess of it, and it has to be done again, it's very nice for them to ask charitable way Christian part this country. That's fine, but I wish they would leave it out. I don't need it. There's no point because they feel bad because they did a bad job and I feel irritated because we have to do it again.

AC: do you think such an approach creates further barriers are enablers?

GM1: it's a personal thing I don't like people doing things for me because in a very independent person, I preferred to do things for myself. Some people do find that very helpful and depending on the nature of the disability that might work for them but not from me. There are very few people I can do what I want them to do usually friends

who I have working relationship with.

AC: in your employment roles how were you supported in your use of technology? Financially support wise?

GM1: the last post I held in Dublin , there was a lot work on computers and a lot of work on primary text and we ended up at a problem very quickly. In the post they have a brand-new Mac room for the public to use, they come in and pay their token and they can print out your family records, but the main database is only accessed via Windows computers, which was a huge problem which never went away. I tried it to get them to flip it to one of the macs, but that did not work. The workaround which was frustratingly was I would go to the desk and ask Sally to look at the database and print off the 15 records which I would then scan to electronic format to read.

AC: the support within the area. It was a workaround, but did you find out approach enabling?

GM1: it was a stupid approach by them. It was done because they wanted me to do something to do something fast working with primary materials, I had an hundred 50-year-old book, and iPad on the keyboard. I'm typing in death cert as I see them to pull out that and make the database for them. Every time I had a question we need to refer to the database. But I had to create manual lists that actually slowed my work down. A better solution would have been for them to say here's a mac it's flipped or put parallels on. One of them had parallels on them, but I could not use it. It was ridiculous. I had six months to do a job and it would have saved them more time in the long run.

AC: their awareness of your technology or other settings you have worked in?

GM1: They did not show much technological support they just gave me a task and wanted me just to complete, off you pop. I had a point man who was great for me and he supported me, but he was not a technology guy at all. He looked to my iPad and went "that very fancy". He wasn't technical at all. Their awareness of technology was poor and their awareness of assistive technology was zero. There are nice people, but it just didn't get it.

AC: did this affect you in anyway?

GM1: I expected it to be honest, the nature of the organisation's is old. When that they had macs I was amazed just by the fact they had them. I expected institution to be backward.

AC: any assessment process involved in much of the technology?

GM1: well there was at our initial meeting, the kind of took some of that on. I was advising them that I could not use the Windows machine, they went okay, but you might not need it really. The times I did need it was painful. It meant I had to use a human resources not a technological resource. The woman was very willing to do it, but it was a bizarre workaround which use more energy and paper and stole her workload down. They were great with email. All communication was recorded via email which was great for me. They wanted nothing on paper

AC: just to clarify how they operated within a set way? Whether any flexibility, accommodations.

GM1: not sure they work for someone like me before. They were kind of teething as well. My other colleague who works in me do not have a great time either. I knew I was building a database and building it in such a way so I was able just to get it done. I'll be going back there on another contract I'll be saying, look "we had it this way. Last time and this time I need to correct accommodations". The way I would say to them is that it's going to save you time and money.

AC: to clarify for the sake of the interview, the assessment was there any?

GM1: no, there was no special needs assessment or accommodations assessment

AC: so you self-supported yourself?

GM1: yes, I had to push it

AC: have you ever been anxious requesting assistive technology supports

GM1: not within that job because I knew they could not fire me, but in another job, especially with the old institutions, they might think this lad is a problem. Let's get rid of him, there's no law that would say they can't. They can technically get rid of you and say that's not discrimination really we just found a superior candidates when everybody knows why. And that is a serious problem. There's no education with employers whatsoever. Zero.

AC: do you think that stops people with a disability in general, getting employment?

GM1: completely stops them

AC: the personality you must have had to ask for supports do you feel your producer in a vulnerable position?
GM1: you feel you're giving them a position to stop you moving on. In my circumstances, the person may come to me and asked me to work on a project. When I was working for the college, I just gave up. They just said the college still have the appropriate money for your supports. I found the support on my own, build workarounds by myself

AC: he were self-supporting yourself, reliant on your own self. Financially how do you buy software?

GM1: I pick up bits and pieces ever so often myself. I do not buy huge expensive programs. I pick up little things. Even the list of apps. Maybe the some of them are €20 max.

AC: your awareness of technology is high, and you know what's out there. Do you feel if you weren't technical? How would you approach it?

GM1: if I was not technical. I could not do those jobs, seriously. When I go for a job. I know more about the technology and the guy and talking to. It's usually a guy and unfortunately. They usually older guys as well. They usually don't get it, or don't care. So you usually have to go around them, and as I have technical grounding I can get around these guys, but the fact you have to walk in and think about these factors to get what I need is wrong. It shouldn't work that way. The lack of caring. They just don't want to know. These are the same people that are going against the quota system on boards. These are not people who are thinking progressively. At conferences I've attended. Do you think they should be training for employers about disability supports? Our gang was say yeah and the employers would say no, that's a lot of hassle. Don't they have the social welfare to keep them happy? What is going to do, put them on the social welfare train for the rest of their lives?

AC: so it was not inclusive at all within the college employment roles?

GM1: not at all. The cost of such a barrier. Maybe they should create tax breaks for such use

AC: the cost is a barrier then to enable them support disabled people or as talking about in this study to aid their transition from different environments? In your views. Do you think such a role would help/aid or the gulf is so big it's never going to work?

GM1: no, I think there's a lot of employers that would realise that when they employ disabled users that they work really hard, they have a lot to prove. A lot of employers might think these fellas work really great, because they their use to being below everybody else, but now they have an avenue to get some money and progress. They want to go up the ladder. They want to get their as fast as possible. You need that as an employer, you need those people.

AC: the level of support to make that jump?

GM1: that's the problem. A lot of that disabled users will have to do it themselves. If they're lucky might end up in one of those programs such as Google that's only for science and enable such transition. There are great they run them through a management induction programme. Maybe such problems within the Smurfit business School on disability awareness would increase the numbers of disabled users. There is a myth there that disabled users cannot function. They need to be institutionalised, a lot companies within this country do not use technology at all. They did a survey at quarter of all accountancy firms still do a lot of stuff by hand, by hand. You know accountancy. I have always felt is the backbone of any country, they deal with all the the money. Are you telling me one in four accountants still do things by hand?

AC: are you aware of the original provision with regards to a reasonable accommodation

GM1: yes, and I've pushed that Law a fair bit, it needs to be adjusted, there are no penalties. There are some penalties with schools slap on the wrist, but there are no penalties for employers. If I go for a job and I'm refused because they've made the consideration that my visual needs are costly, I should be able to say to them prove it. Show me how to costly, explain to me. If they don't do that I should be able to bring

them to court, I should be able to state that this discrimination, it's mad. You just cannot say no.

AC: the use of equality Tribunal's that route?

GM1: we should start using penalties, it a crazy situation where we have kids going to college getting Masters Ph.D.'s, etc., and there stuck on disability allowance and they have brains. They can go on function and work. Somebody told me yesterday that there are 65 Ph.D. degree in Trinity in disabilities. How many of those have got full time employment? There are 65 people that you need because they are very top of the academic ladder.

AC: do you think the employment step to make that jump. They don't want to make because they want to stay within the environment where they going to be supported, used to. Instead of making a jump to a full-time employment position?

GM1: a comfort zone is part of it. But there are no full-time jobs any more. Everybody is on contract, you have people working here for 40 years on a permanent part-time contract that crazy. The civil service are the worst offenders of the lot. I remember saying to the revenue Commissioners over Christmas that I needed my tax information by email as I can't read print. He said I don't have the facility for that, I said that you don't have the facility to send an email? I read out the law to him but he just said I had to speak to a supervisor when he transferred me then the line went dead, this is what they do.

AC: my second point in your working experience did your employer have ever any experience of those regulations?

GM1: no. In my last employment they knew about the disability act, but they asked me what I knew of it. In my college employment they knew a lot about, in the college in question they had been hit over the head with it

AC: Do you think there should be increased understanding of the provisions under law and the use and availability of reasonable accommodations before you have to go and for ask them?

GM1: I think you should be able to go into a job interview and you shouldn't have to say I have disability, so I need X. We should be at the situation now that if I go into an employer that they are aware of a range of services that are available to you, the way cover health insurance. It should be part of their thing, assessment.

AC: available to all staff?

GM1: yes, if they want to bring in talent, they should have reasonable accommodations for them. Should be part of the job and simple. You walk in and ask somebody we have a whole system setup here for you. Depending on your disability cohort and whatever you need, you can avail of, see you Monday.

AC: it's back to people feeling anxious about asking for support

GM1: yeah, I'd say people are very anxious asking for it and employers are very lazy about it.

AC: your knowledge in your case, your IT background was grounded and know what to ask for because you knew the solution

GM1: I was lucky in that regard

AC: overall, do you think the use of assistive technology is a positive support?

GM1: yes, I do it in many ways the disability service or particular the assistive technology side of things should be integrated more than it is now. Its not reflection on you. It should be that as a first-year student comes in here states the problem, you provide the case and his second bit that you need more staff to follow up with that kid. It wanting providing the technology, but you need to follow up to see if it worked. It's not my money pretty much it comes from EU and Irish funding, it is not just like here is a laptop and that's great, it's supposed to use it to enable you and get on with it and we need to be a little bit more hands-on with that.

AC: it's a constant process, ongoing?

GM1: it's not your fault, it's always one fella, and you're dealing with a large number of students how are you supposed to keep track of all their needs. You might see them once the numbers cause a problem. The process needs to be ongoing within the employment area is well, a little bit anyway. I have a friend who has just set up an accountancy firm and they have this brand-new software that any new apprentices must be able to use. The software has a bunch of accessibility features within it. So in that situation it is fine because you just logging on and you're clicking the accessibility function and go off and do your own thing. You could even ring tech support for help. That's not for every employer, though it depends how technical the job is. For example, the Department of our culture. No, I defently think the assistive technology office should be expanded and maybe even split from disability because there is a difference. This is for very practical support and the office upstairs is very much a policy based environment. They should be separated maybe overlap a bit. It used to be policy, then technology to execute. Now the technology is executed by itself without policy because technology moves.

AC: thank you very much and thanks for your time

GM1: no problem

Interview 3: GM2

AC: hello this is my third interview of my dissertation in assistive technology and universal design. I am here today was my third participant who is going to describe his use of assistive technology in the employment sector, may be some the barriers or the enablers and his views on uses technology within the sector. Thanks for coming down today to meet me, to kick off the interview could you tell me a bit about yourself?

GM2: okay. Well, the reason I'm talking to you is because I'm blind, completely blind. I can't read print at all and use a cane to walk around. I could just about see light and dark, I'm in my 50s now, but I joined my pace of work when I was 24, as a computer book or programmer. I was registered blind that time as well. My undergrad was in science which is just scraped through and I did a course in computer programming in London before I started in my pace of work . That was back in the 80s and at the time there were blind programmers in Britain, but none in Ireland and there not much experience in this country in the field. In Britain they used a device called optigon, it was effectively a little camera that you ran over screen or print out and it produced a picture, letter by letter which you could feel with your finger, it wasn't Braille output. It was a picture and was extremely slow, about 20 words a minute. That's what i used for the first few years. That meant I can only read a small amount. It was just reading back computer code. I used to write programs in Braille and once I was happy with the code I would retype them out on a typewriter and send them to pure out to be data entered. Is the date before everybody had a terminal on the desk or could use the synthetic speech. As time moved on to the 90s. The first synthetic speech programme came out from IBM, that could read text on the terminal and was an enormous productivity boost, from 20 words per minute up to a few hundred words per minute. It was voice output over headphones, a first example of a screen reader. It is much quicker than the optigon device. At the time I had to request people read manuals onto audiotape and listen to manuals that way. Things have changed dramatically since then, a lot of material is online and in electronic format.

AC: was the IBM software, did that read word documents

GM2: that was back in the 80s, so there were no email or a la thing called word processing. So it was only reading computer programming source code. I think if I can remember correctly, I did not have access to word processing until the late 80s when PCs started to emerge and when the synthetic speech came about. It was always screen reader type's technology, the assumption being if it on the screen could I read it. Initially when PCs came out they weren't networked, when eventually they did enable me access mainframe material, word processing, email, and of course the Internet. The things we take for granted now were not available originally.

AC: to take back of few steps can you explain what the term disabled means to you?

GM2: have gone through different phases of thinking what it is meant. I'm inclined to think it is more of a political status. I used to completely agree with the social model of disability. The idea that disability is of social construct, and if you take the population is of a range of abilities, is its society order system that disables people. I think that's the way I were largely view it, the only trouble with that is it really says to me, the individual that it's somebody else's problem, not mine whereas I do think though I should be doing something to accommodate towards myself. I know this was the medical model and the idea of rehabilitation. I think the social model is good for policy-making. I think an individual with this the disability there is a danger of assuming it's somebody else's problem and not try and find ways of coping yourself.

AC: would you view be mixed?

GM2: yes mixed but the social model makes from a policy point of view, but from a

personal development point of view kind of view ignore it, see what you can do yourself.

AC: what do you think assistive technology means to you?

GM2: I thinking assistive technology means non- mainstream technology. You need something extra over and above to give you access to something. I've always felt be much better if the technology i wanted to use would be more mainstream. In some ways it's become like. For example, iPhone or the Apple range of products shipped out of the box with. I suppose you can call of assistive technology, which lets you use it. The iPhone has voice-over technology built into it and screen reader technology. You don't need to buy anything separate. The trouble with separate things is historically it's a bolt on. It's an afterthought, it does not interface well, and it's expensive and doesn't work very well. It built into the mainstream solution, rather like the Apple stuff. It's far more chance of reworking and it's also cheaper or free, there's no extra cost. I also find a more acceptable, having said that, you can't get around. For example, if you want to read Braille from a computer screen via the Braille device, you have to have a separate device. My main beef with assistive technology in the past has been it's been expensive clunky, costly. Not very functional as well, poor interface.

AC: would you see them as barriers?

RM absolutely as barriers, historically, I might say I want to use the Lotus Notes, then the issue would be you need to get a screen reader, but maybe none of the screen readers are able to read it correctly, so you'd have some company just picking a company like Microsoft or IBM would say you have to use the screen with my product, but another company or device would say no, you have to use another screen reader. This is essentially that it taken the view that accessibility is somebody else's problem. The various assistive technologies providers have made varying attempts with varying degrees of success. So you could spend and waste a lot of money on a number of products. The worse problem regarding access is trying to find out if something is usable and if so how to use it. If you didn't find out or the provider may know claims on the level of accessibility which systems would work with you could waste an enormous amount of time trying to find the best way to coax it to work. For example, just think of a screen reader. He used to be the case that you had to choose which screen reader to use, what setting you had to use in the application package, what operating system and what screen reader settings and then trying to learn what commands to operate, which was time-consuming. That was the main barrier for me using assistive technology. After all, that if you i found a product that works you then have to learn how to work with it.

AC: how do you approach technology, suspicion as a friend, fear?

GM2: no generally I would be positive towards technology, I enjoy learning something new. However, the one caveat. You can waste a lot of time trying to get something to work. If, for example the software i' using at the moment, SPSS, their documentation refers to accessibility and using it with Jaws, but it took me a considerable amount of time to discover that actually the file with using with Jaws was useful with altering the pronunciation of words only nothing to do with them making the screen accessible and largely wasn't. The only way I could use it was to prepare all my data in Excel import

it into SPSS run the commands, exported and then looks at it again in Excel. All the functions shown in class or online were unusable. It took some time to determine that.

AC: Have your use of assistive technologies changed your view of technology?

GM2: I think on a whole things have improved over time. At the moment I use NVDA, which I find very good. It's free and open source. The fact that it is open source has been a great benefit was able to facilitate NVDA to display an Irish. With the use of espeak another open source software. I was able to get to speak an Irish. It's not just that it's free, but it's open source as well so I can contribute to it as well and it benefits the system. That type of software has changed my views; you can actually influences by working on it.

AC a collaborative approach?

GM2: yes, I collaborative way. Instead of a money making approach. Trying to find out what works and have worked is the biggest barrier. With the Internet, you can now use Google which you couldn't do years ago. Separately, there is forums and discussion groups which you can pose questions on. Even steal you might take some time to get an answer or even contradictory answers, but it's a lot better than what was.

AC: I think this question is easy to answer. Is your assistive technology and necessity?

GM2: absolutely. I could not use this computer without assistive technology. The use of speech and Braille are technologies I use. I can't see the screen at all.

AC: does that enable you to participate within your daily activities?

GM2: absolutely. I use an iPhone with voice-over. Which gives me access to the phone fully enables me use email, text message, GPS for the where are you type questions. I do a lot of work online; I use Word, Excel, Internet as the mean sort of accessing information via a PC. It's vital that the assistive technology works well. I couldn't manage without assistive technology working well with the system. At the moment as I say, it may need a screen reading software is my primary way of operating.

AC: Have you ever seen your assistive technology as a hindrance?

GM2: certainly, when various versions of screen readers didn't work with certain applications that was a problem. I'm thinking of things like Lotus Notes or SAP. I wouldn't say they were fully inaccessible i eventually got them to work, but it was a struggle. That was within my employment environment, it was a slow process to get it to work. There was an internal intranet within my place of work, which used Lotus Domino. It first few iterations were wholly on usable, it gradually morphed into something more useful and the time I was leaving my paceof work, it was pretty good.

AC: can you describe any barriers within the workplace you came up against?

GM2: what's happened in recent years standardise desktops PCs within organisations. The IT support unit want everybody to have the same system, which is a barrier. Alternatively, you have a remote system or a closed system where you're effectively

logging on as a terminal. Your PC or desktop is sitting up in the cloud, promote terminal services type thing. Those terminals service systems are inaccessible to screen readers per say. That and a standard desktop, what used to happen was that if you wanted to try out a new piece of software you have to go through enormous hoops to persuade the IT area to allow you to install it. You would worked perfectly at home, but within a work it was impossible. You would have to go through an elaborate testing process to ensure it didn't this disrupt anything else, that was an issue. Now there are some workarounds. For example, NVDA has a mode for working on portable mode like on a USB stick, but of course the security had disabled the use of USB sticks. On the other hand, the way it was written if you managed to get onto a network drive or share them. You could get it to work without concerning the IT support area. So I managed to get it to work by burning it onto a DVD, finding one system in work where you could read a DVD and then getting it across onto a drive accessible to my PC! It was around the house type of way a covert operation.

AC: have you ever been discouraged from using your assistive technology from accessing information? Have you ever been in a work situation, and they say don't worry will we get somebody else to read it for you, i.e. replacing the technology with a human?

GM2: not exactly, but had had situations where I've needed stuff to be scanned and the quality has been poor was too much trouble. If it was a short document I might get somebody to read it. Or you get on to the person who created the document and ask them if they could send it by email. There are things I've found when I was manager of the architectural systems department and I had to produce a lot of reports I could create a report no problem in Microsoft Word. I was always a bit nervous to see what the final product would look like this, so might get a an assistant to QA , just in case stuff was unformatted. In general, workplace support staff were supportive, I do not have objections to use my technology or any real issues to its use.

AC: how were you supported any use of your assistive technology in your employment i.e. financially, training and support

GM2: when I started off with the optigon product that was a grande project supported the rehabilitation board, which is now morphed into the national disability authority. That idea get training course in, that was very well supported initially. As I moved on from using that to screen readers, some of the supports were paid outright by my workplace support team and I used a government agency adaptation grants. I fortunately never had to pay for stuff myself. I never remember getting training in the screen reading software, but luckily it was relatively easy to get into it enough and to teach myself.

AC: self supported self-taught process?

GM2: self supported, but what happened was back in the late 1980s, there was the number of people in Ireland using AT technology so we formed into a self-help group under the Irish computer society called the vision impaired computer society was our name. We ultimately able to set an email discussion list and pose questions to one another, as things progress with the Internet there was a lot of online support. If you have a problem with NVDA, you can post a discussion to groups or email lists on how

to do this.

AC: support within the workpalce and knowledge of the technology - can you talk about this?

GM2: there wasn't a huge experience and how the technology itself worked, they would be very good support in Windows system issues that sort of thing, if you got a particular error message that wasn't out of the software something to do with the system. There was good support that way. For example, look at your hard drive, get a new PC,good support that way. I wouldn't say there was much experience on other stuff. There were a number of people using JAWS and the support was to ring me. So I became the support!!

AC: interesting point! Were you ever assessed to use assistive technology, did anybody ever sit down and look at your tasks and what technology you need it to complete them?

GM2: not within my workplace no, I did a long time ago , I did do tests with the Irish government agency OR UK government agency in the UK, that's when I had some vision, but it was decided at the time that my poor eyesight stop me from using any magnification software, so had to start using Braille or the optigon. That was a more generic assessment; there wasn't any workplace type assessments after i got started.

AC: as technology moved on a new technologies moved. That was down to yourself to find a solution?

GM2: that was completely down to me, there is nobody in the IT department to tell me, do you know about such and such. It was myself who found out about it, because myself up-to-date blogs etc firstly, I didn't think anybody in my workplace would know and I felt it was up to myself to support myself.

AC: do you think if there was a more knowledge of such enabling devices, but that allow more people to access employment?

GM2: in fairness the government agnency they have a technology unit, you can ring them and they'll give you help. That was something that didn't exist when I initially started in my job, there were no such technologies available. If I was looking for something that will be part of my solution, could have a list of people and organisations to contact and and the government agency in question would be one of the first ones.

AC: so you're self-supporting yourself to clarify to get a solution to your problem, which is fine as you said you think that's important step for anybody to take, the lack of non-existent support of the IT department to you feel that causes a barrier for that kind of use? Or even new trends to accessing information

GM2: it puts the onus back on the individual, like myself, it's more, a person without a disability does not have to do. But I felt I had to do it myself. It would honestly be far much better if there was somebody within the organisation who would be proactively realising this need, or a new application, this third party application has accessibility

issues, but there was nothing like that inmy workplace at the time.

AC: to clarify, instead of having the problem exist. You could try to have the technology accessible before they come into the organisation, so not creating a barrier.

GM2: there has been number bits of legislation that have tried to do that, not with 100% success, section 508 in the US for the employment equality act here, you would think that would mean accessible procurement which automatically have clauses that it software must be fully accessible to people with disabilities? If those clauses are there, they don't seem to always work.

AC: to finish up on the point. Do you feel and assessment for a need technology for all staff which would include assistive technology is a benefit is viable option? As you would sit down with somebody within your educational environments that have looked at your activities needs?

GM2: think such an approach would help; the purchasing practice should also ensure that any technology coming into the organisation is accessible. I know that's easier said than done, going back on my example earlier of SPSS they gave the illusion that the product was accessible with a little add-on for software for JAWS. I didn't read the exact wording, but it didn't work! That's just an example; it would be great if there was a policy from the top in organisations that taught proactively in this, let's design a barrier free workplace. For example, everything we purchase or do is up and of a universal nature, including support. I don't think it's at that stage yet.

AC: have you ever been anxious in requesting assistive technology support or accommodations?

RM; I don't think I was ever anxious. It's probably more complicated than that. If there was a clear solution that I knew would work then I wasn't anxious but if I was not 100% and you had to purchase to see if it would work, then I would be anxious. For example, getting a new screen reader version things have moved on a bit as you're able to get demo versions, but originally it was hard to get demo versions and it was a long process to see things were accessible. That increased my frustration as I am would have to go through a month of investigation to get to the point to know that it would work, that was off-putting. Once it was clear that version x-of would work then I didn't feel under too much trouble. There was the Fas work adaptation grant and this was a route into getting technology.

AC: where your work colleagues aware of such supports available?

GM2: to a large extent they felt that I would know where to get support, they left it up to me to find it out. I was in the fortunate position that I was able to do that. But that would be a lot more intimidating for somebody starting off without the knowledge. I got a lot of support initially as I said from the government agency and got training, but for somebody moving into an organisation for the first time it will be much more intimidating.

AC: did your work colleagues understand what your assistive technology device that you achieve?

GM2: yes, I think they did. They would have realistic expectations, though. They thought a scanner would work perfectly every time. So you would have some level of poor expectations. They would send me some graphical PowerPoint slides and expect that I would fully understand them. The use of PowerPoint if used with just bullet points it's usable. But it's all just pictures with very little text or the text is in boxes and you can see the boxes, then it's quite hard. I used to always try and explain. Staff will often ask me if I could use that document, with the use of PDF I'd often say it depends on how it is designed, not the technology.

AC: their expectations were unrealistic?

GM2: yeah, they often thought any auld electronic document would do. I can understand if somebody is not well up on IT what's the difference between scanning stuff into a PDF document and getting a perfectly formed PDF document from our for example, it may seem to someone who is not familiar that there is no difference.

AC: do you think those differences points that you make are something that can be approached by support wise or organisational culture?

GM2: I think the concept of what constitutes an accessible document and having some understanding of that is possible, unfortunately this can be extremely technical and difficult, but if there was support out there for the same word document, PDF that there were guidelines or design criteria to reference against it would help. People used to ask me about PDF and I used to send them a link to PDF accessibility page which their eyes were glazed over when they try to read it! It's a hard technical thing to explain, but to even understand the concept that you can have and a fully accessible and totally unusable PDF document. If you got that message across would be helpful.

AC: if is back to supporting and awareness?

GM2: I think support and awareness is varied.

AC: awareness about how your technology can adapt to certain formats, having tech support understand or aware of such issues, so it's not only left to yourself, so you're not the one giving the training. The culture of the organisation would be inclusive?

GM2: there's another problem as well, I remember another girl who worked in my workplace who was using an online directory of people's information, telephone numbers and all that and she was trying to use of JAWS. I managed to get it to work, but it wasn't obvious so training and that what would have been of great benefit to her. I manage it myself, but I am fortunate with an IT background, and that an example where you got something that it is effectively accessible, but because you don't know how to use it or consult a user manual to let you know which can lead to quite a gap. From her perspective, it was unusable as she could not get the support. I just had been lucky as to stumble over more or less. Just because something is accessible doesn't mean they can use it if they don't know how, and that's part of training.

AC: do you use your assistive technology outside of work activities?

GM2: absolutely. I use my A.T at home as well for reading the Internet working on a few external projects. It crosses my day-to-day activities all the time, I can't complete my day without assistive technology, anything I do on a mobile phone, podcasting. But my use of assistive technology is essential.

AC: are you aware of Irish law provisions in the right to access reasonable accommodations?

GM2: I was under the impression that there were a number of laws around the equal status act and the employment equality act and the disability act. My impression of them all was rather weak; they had words on them, such as in far practical, get out clauses. I used to say to people in my workplace "you know that this is a requirement under the equality act"? Knowing too well that if I took a case that I would well, lose! But just saying in the fact that it was a legal requirement would help my case!

AC: do you know if your employer had any understanding of such requirements

GM2: I say, not (laughing), I was a disability police!!

AC: my final question is, overall, do you feel assistive technology for disabled users is a positive support?

GM2: absolutely, absolutely. In my case, it's a necessity. I couldn't work without assistive technology. As I've discussed is not necessary that easy to use or even pick out the correct type of technology. For somebody who starting using it for the first time it can be quite bewildering you need some support in finding out what to do. There's a lot of contradictory information on the Internet, so you need support for this. But in my case it's essential.

AC: thanks very much for your time. I really appreciate

GM2: no problem at all

Interview 4: SM2

AC: okay, this is my fourth interview and today I am SM2, who is finishing up as a Ph.D. student here in TCD. Thanks for taking the time to meet with me today. Could you tell me a bit about yourself, your course background and pass education etc.?

SM2: after completing my masters in psychotherapy in Belfast. It was a natural progression according to my supervisor to develop the piece of work that I've started to Ph.D. level. Before leaving Belfast I went to a psychologist within the disability service. M She gave me an assessment, from that assessment I knocked on your door.

The assessment in terms of disability came under the broad category of dyslexia at a mild level, such as reading and spelling some sort of word recognition. So I came here to complete my Ph.D. and it is part of that reason why I met with the disability service.

AC: to identify further support to help you in your studies?

SM2: she said when you get there; they probably will have support that benefit you in your academic pursuit. That's how I started using supports

AC: can you tell me a bit about assistive technologies the service has helped you with?

SM2: initially, I got a laptop and training. On that laptop I received the read and write program. Initially, Andrew I remember coming down here to do some classes on my type in my word recognition. That started me out, I've used a laptop since and then I came back to get ergonomic supports. I've actually gone away and really engaged with those support as well. I did actually develop a strain continuing the using a normal mouse on the laptop. They were the main things I've used. Remember, I spoke to you as well about lighting, which was really helpful. I went away and I bought some of those as well, additional lighting to help you with my eyes strain. The software I used was the read write program. In fairness, I tried it but was down to my own laziness that I did not really pursue it, maybe down to the fact that I'm not "disabled enough". My dyslexia wouldn't be significant. I sat comfortably with that diagnosis, the read and write program was there when I needed.

AC: your course that you completed, field of study within Trinity is psychology based?

SM2: it is. I've completed the masters in Belfast and then I took on the Ph.D. here, I was looking at behaviours and sexuality. It has a huge psychological side to it and therapeutic background looking at the whole concept of sex addiction. It is a pseudoscientific concept that has clinically validity.

AC: I'm going to move onto the crooks of the interview, what is the term disabled means you?

SM2: initially when I see the word disabled I see somebody would physical disabilities. Somebody with a wheelchair, somebody need physical assistance getting from a to b. From my experiences here I've expanded my view of disability. Disability is not just confined to physical, but honestly, does taking people like myself who have learning disability , cognitive disability my own training as well has helped me look at emotional disabilities, and how the learning is affected by such an impairment or difficulty . I'm learning myself, expanded my view .

ac: what you think the term assistive technology means?

SM2: again, because my experiences here with you and the service I have learned to understand what this term means. There are some technologies, whether it laptop or a mouse or a even a piece of software that will help me or assist me to progress equally against my peers who have no disability.

AC: do they level the playing field, gives you an advantage?

SM2: I would say it hopes to level the playing field, whether it does not is another study. From your point of view that is your intention to level the playing field so I'm not disadvantaged because of my disability . Whether that happens or not is another question . That would be my understanding of the term , technology that assist me to live a better life , enjoy quality-of-life , advance my learning in some way or another .

AC: how do you approach technology in general with suspicion, gets stressed over, fear, as a friend, or an aid?

SM2: my view has changed over time due to my experience , before I started back and academic work at masters level I have not been using much technology , I had a fear of it but over time, with help I actually began to become more confident with it, see the value of . It was a necessity, but now I actually used it quite freely and use it. I've come to love , free and advantageous are very much part of my life that I could not do without .

AC: An enabler then?

SM2: every single day at my desk working using the assistive technology with email, websites, it's part my menu.

AC: has your view changed over time?

SM2: I've radically changed from being suspicious or afraid of it , even feeling incompetent around it to seeing it has something I really enjoy, not just value put is but is absolutely necessary

AC: that leads onto my next question has your assistive technology laptop or the ergonomic supports or the software has it helped you engage with that technology.

SM2: two things. It has been really helpful on a practical level, a simple support like the mouse has eased the pain that I felt , the lighting has helped me preserved my own sight. On a higher level I appreciate the technology and are a bit more knowledgeable about it now, I don't take it for granted that it's the only mouse that can be bought or presented in a shop, there is a wide variety available and pass that information on to other people.

AC: is your assistive technology a necessity for you?

SM2: Going back to my own experiences of disability in terms of how to scale miners probably a mild disability which take into account. If I didn't have the assistive technology, I probably would survive but the assistive technology has made it easier and given me support within Trinity with a contact in terms of you that I can call to if my computer is not working on my software is now working . It was certainly comfort and reinsurance something that enabled me with a new confidence

AC:: just to clarify the technology would not be a necessity , but it is something that you prefer to use ?

SM2: very beneficial, very beneficial

AC: have everything assistive technology as a hindrance?

SM2: no, not really. Just getting used to a new device to start you wish, you can have the old stuff back when you persevere the value of is comes about. The read and write program I lapsed in. I found it difficult to discipline required to stay with it probably didn't develop well sufficiently. So starting any new program is difficult in coming here is difficult in the beginning. My God, I'm admiting to a disability. What does that mean, even the label, you take out the embarrassment associated with the terminology. When it dyslexia and it mild people might dismiss it as being nothing. They may be things that might see has a hindrance on a practical and emotional level.

AC: leading on to my next question are there any barriers to your use?

SM2: my own perception would be a barrier. Before I started using the technology I would be a high achiever, and then I was sitting that side-by-side with the term disability. I was thinking how do the square up? I looked at it as a service, have been assessed by a psychologist, so I had a need. So if it is just go and see what can happen.

AC: have you ever been discouraged from using your technology by getting somebody else to do for me?

SM2: generally no, if I had problems with laptop, technological problems beyond my scope and I know I can come to you. If it's within my own remit I would stick with it. For example, my typing skills were poor. I was thinking what I get somebody else to my typing, but I persevered with it and typed out my entire thesis.

AC: how you supported in the use of assistive technology, financially, support wise training wise- can you explain your support network that enables you use?

SM2: well, my primary support is properly here within Trinity is probably you. When I need advice, information I have a problem with my device you're my first port of call. Financially, you are also able to give me that software, the light, the laptop. That's it.

AC: so the main support is within the college environment, family or friends do they come into the equation with supporting of your technology?

SM2: no, they don't come into the equation.

AC: if you are not able to sell them yourself, you come back to the disability service as your main port of call to have resolved or get new technology?

SM2: that's it, second place no, they don't come into the equation. For example, if you recommend something to me I would actually begin to explore the possibilities out there. To go back to the example of the ergonomic equipment, I looked at a number of types of solutions online, then I had both support from you in the service and the support on the web.

AC: self-support and use me as a bit guidance towards the solution?

SM2: that would be right; I would use a mix between myself & the service

AC: would you like to know more about potential assistive devices by support staff. Kept up to date with new technology?

SM2: yes, I certainly would. Because I suppose it's only when I was given this label of being dyslexic that in fact that this whole world of assistive technology opened up to me. As a general pedestrian I would never have known about this, the awareness would have been low, so knowing more about the technologies would be great. Anything that makes my life easier is of great assistance.

AC: have you ever been anxious about requesting assistive technology supports?

SM2: yes. At the beginning when you come into a new place you think yourself; how am i my going to ask for this support, how am I going to be perceived, I look fine, I speak fine , I present fine . People might look at me suspiciously. Why do you need extra help for assistive technology - so it internal to me, but over time that's passed.

AC: do you think you are adequately assessed for your assistive technology needs?

SM2: yes, thinking back my assessment really happened in Belfast. That was my initial assessment. If had to revisit or make it a suggestion. I should have asked for a re-examination when I came here to Trinity to ensure my needs and confirm my initial assessment matched correctly. I presented what I got from Belfast and that was taken as read.

AC: in your assessment of technology when you got a supports were they discussed. Your needs and past history of technology were they looked at. Was the assessment & support put in place like the laptop or at the ergonomic stuff like read and write software, was that adequately assessed?

SM2: that was the next level or layer, I came to you and I told you my background was, the needs were and you went through it to test here. I remember sitting down, and through our multiple choice question. And that raised for you. Issues and from there you gave me XYZ. That was satisfactory.

AC: leading to my next question, do think the assessment matched your needs?

SM2: oh yes, I was delighted to meet with you, the support made life a lot easier.

AC: do you use your assistive technology outside of your education activities?

SM2: I do. I suppose where does the line end? I do. I use my PC and software for other projects and have found them of great benefit.

AC: do you see using your software when you leave the educational situation? The technology to help you aid dyslexia, I understand that the mild disability. Could you

see yourself using our technology where you have no support?

SM2: I can now actually know that you raised the point that I need to go back and revisit read and write, but the others slightly ergonomic equipment all the time. If not within Trinity and I don't have access to you as an adviser. I hope I would be able to search out myself and find out what's available and how it can benefit me. My level of awareness has certainly increased from being here which will feed into my continuing use of it.

AC: are you aware of Irish law provisions right to access reasonable accommodations?

SM2: in a very general way a country like Ireland or in the Western world will pay lip service at the very least to people who have my kind of needs, but not fully aware of it exact detail of it all.

AC: to understand what the term reasonable accommodations means?

SM2: no, I don't really understand that it in fact it's somebody is in employment that they should be reasonably accommodated, but the term I didn't know it was enshrined into law. I would expect it would be. I have a vague understanding of it!! I could not quote the exact statute!

AC: would you hope employers have understanding of such law provisions?

SM2: what I hope they would?

AC: put yourself into a situation, if you are starting new employment and you walked to the door and you feel you need some ergonomic equipment would you hope the employer has understandings and how to accommodate you? Without the accommodation you might drop your productivity, possibly. In meeting your employer or to some evaluation like you PMDS would you hope they have an awareness or understanding?

SM2: I would, but it's great to hope. I would hope there would be in an appreciation the needs of every employee, especially those who have some kind of disability. Realistically, Andrew, I know people tick boxes and employers will like to say we promote the ozone layer. & the green layer to disability campaign and every campaign that's politically correct, but in fact the level of accommodations may be minimal. I'd be very cynical about people ticking boxes and telling me they have XYZ in place, and say they might, but in practice my experiences is that the it does not ring through.

AC: to clarify, you will be doubtful?

SM2: I would be very cynical and I said before, I would have to see to believe it.

AC: you would have to fight your corner to get the accommodations?

SM2: probably i would not even feel comfortable to fight my own corner as I would not would want to put my head above the carpet. I'd be happy that I just had a job and I'd be afraid to be seen as treated as disabled, maybe seeing me as a fraud. All of those

issues were coming to play.

AC: again hypothetically speaking, within your educational environment you have been sat down &assessed for assistive technology needs and received supports if that situation was place for all employees would you still feel that the approach would be more universal, because everybody had the same questions wasn't out of the norm. To think that approach would help? Having an assessment tool of some sort of evaluation or staff meeting that you could discuss some needs without you having come into the employer.

SM2: that would be idealistic, heavenly, if that was the kind of working situation were in. Its playing tp people strengths, it's conducive to very generative production, happy, employment, but sadly if that day happens pigs will fly!

AC: would you encourage students to engage with assistive technology services?

SM2: I certainly would, any issues in my life or a student's life where they is a vulnerability or a weakness they should in fact number one identify it, if it's a disability area they should seek out the support and talk it through, get assessed for Technology . Even if it's minimal I think it can help people and it gave me the confidence to acknowledge it and overcome it and move forward

AC: do you think you to clarify the support you received that students should try to take with them or transition them to a new environment, employment or even to a new college? If you had the need of course.

SM2: anything that can help is always good, so creating an infrastructure that assistive technology orders structures of support is so necessary so actually benefit, quality-of-life and productivity.

AC: thanks much for your time. That's really appreciated, your comments and feedback have been great.

SM2: no problem, thanks again

Interview 5: SF3

AC: hello this is my fifth interview of MSc in computing and i'm here with SF3 today who is going to talk about her experiences of using assistive technology within an

educational environment. SF3 is a final year undergraduate is in the last leg of completing her studies. She has been registered with the disability service since first year Thanks for taking the time to come in today and have chat about your use of assistive technology. To kick-off could you tell me a bit about yourself, your course in your background?

SF3: hi, I'm studying German and Irish TSM - to subject moderate ship, I'm majoring in German and I'm in my final year. I really like languages but I also had an interest in science and maths. One of the reasons why I chose languages was I thought I would not, have to use technology!! I didn't want to be dependent on technology.

AC: could you tell me a bit about your disability or impairment or as you classify it?

SF3: I have albinism, that's a lack of pigment or absent of pigment in the eye, hair and skin. That leads to my vision impairment. I was actually born blind, which is typically babies with my condition, they normally develop sight after two months, but I didn't develop my sight until five months. That's why I have severely short sightness, I am also severely one eyed dominant. I only read with one eye even though I can see was my right eye. I would be classified as legally but blind, however I am able to read small font, by up to my just is amazed, I can read size, font 10 when needed. I also have photophobia, which I can get from glare of the computer screen; I also suffer from involuntary eye movement which slows my speed reading down.

AC:
it against. so you're disability has been with you since birth?

SF3: yes, I think I see perfectly but I have no comparison to gauge

AC: is your disability progressive or stagnant?

SF3: the visual impairment side of things has been stagnant but there are secondary things that have developed because of that (visual impairment). For example, during my second year I was on Erasmus in Germany where I developed neck and shoulder issues by lack of posture due to my vision impairment. Both personally and academically I have to read text so close, which is difficult. This was a direct result of my vision impairment, but is not my vision has not deteriorated.

AC: what does the term disabled means to you?

SF3: for me it means having to be dependent on other people reliant on other people for equipment, so there is a kind of dependency. Your dependent on other people's been understanding.

AC: what you think of the term disabled in a positive or negative, should it be used at all?

SF3: it a negative term I have been stopped from doing anything, it just compromised away and do things. It really interesting when I was in Germany, I would have been classified as 100% disabled, you need a handicap to be entitled to anything , but I don't

think I'm disabled pass be entitled to anything. I would associate disabled with more around mobility.

AC: just to follow up and clarify to you recognise a difference between the terms medical model and social model of disability?

SF3: no, but I can imagine, I imagine that disability and in medical sense would be limited mobility compromised ability. On the social side of things, not really hundred percent!.

AC: what assistive technologies have you used and engage within your educational environment?

SF3: I look upon assistive technology as technology exclusively for people with a disability. The CCTV I havea clear view plus which I can stick a book underneath and it comes up on the screen. I've always had them all the way through my education. I didn't really use much until my back problem flared up. It allows me move the screen up and down and used it clear view plus as a monitor for my laptop. I found that I was also looking for a solution to write with, I could not use the clear view plus as that would put my shoulder out, I'm right eye dominant the left-handed. Some I've also used Eclipse with any assistive technology area. That allows me to read stuff, but not take notes, the nature of my course you need to be able to make notes. But then I think the distinction between assistive technology and mainstream technology overlap. The way things should go should allow technology things are inbuilt, stops you from having a cumbersome device they like the iPad or even a Kindle.

AC: what was any other stuff you used?

SF3: yes, I use Zoomtext magnification software. Use this during the summer when I was on an internship. It was brilliant, I didn't really need a screen that came out, I could zoom text larger. The only problem I have Zoomtext is that it freezes, I have warmed more to assistive technology because I've had to, I do see the benefits, it stops me from being in pain. I do associate with having to spend more time on things.

AC: just to confirm the three bits of technology you've used had a clear view, the eclipse within the library areas and the Zoomtext software.

SF3: yes, that's it

AC: did you use any of the software within secondary level or primary level?

SF3: I had device within primary school, CCTV. The one I had was two separate machines, they were big machines, not very nice to use.

AC: what about secondary school?

SF3: I got a new device in 5th year, it had a camera on it and it was attached to my laptop. I started having problems and maths and chemistry, I had useful handheld monocular but that could only see 2 figure at a time I needed to see the entire equation. I think device was called the Opti-verso, I didn't warm to that either. As the class was

only 40 minutes long and it took so long to set up. The solution would be that the teacher would just write down the equation from a before class.

AC: Now that you went into third level you've engage in Zoomtext and the eclipse. What is your view of your technology?

SF3: more independent definitely. But I would be kind of weary of assistive technology because I feel that made by people who perceive what people should have. It's not made a lot of functionality with, like with the CCTV and eclipse, it does not allow me to write on. In theory it works but there are always problems. Things are getting better, but I'd be more positive towards technology that is geared towards mainstream, ergonomically better.

AC: just to clarify what you think assistive technology means the term?

SF3: in theory it's designed to make technology more inclusive, to make things easier and include more people. I do think in a few more years, I do think this will happen, but at the moment. It's because I'm coming from a background of been independent of it to becoming more dependent on it and I get frustrated with the glitches and still have issues, it's all new. Small things like speed and freezing of stuff.

AC: has your experience of assistive technology changed your view of technology?

SF3: yes definitely would have been very weary of computers and stuff.

AC: technophobe?

SF3: yes

AC: how do you approach technology as a friend with suspicion with fear?

SF3: it has changed, I used to be really opposed when I was nine my parents made me touch type, they kind of first saw how technology would benefit me, even than I saw as a benefit, especially when in third level and in second level where I typed three of my exams during the leaving cert, its invaluable. So now I would be curious, tiny bit weary, but I've gotten so much better. I wouldn't put all my faith in it.

AC: your approach to technology has improved over the four years? Maybe you can explain

SF3: definitely, positive view, and it definitely has viewed my view of technology or my attitude towards it. I think the way it should go is that it is built into mainstream rather than specialised devices. They can only be used within a specialised market and there will always be shortcomings in them. But I definitely improved

AC: what the barriers are there using assistive technology for you?

SF3: things that are practical for e.g., even with the Clearview it a split screen, it very difficult to see, even though the page is magnified, it will split the screen so I can see half the screen. If I want to see the other half, I can't, that's not practical. It's difficult to

work with, not practical. If I have a document open I can only see half of it. People can't work with what they have to see but the next version will probably have this, they would realise part of that. They need a test and more.

AC: how about smart technology, have you engaged with them?

SF3: yes, there are really good, even the reader function with the iPad and iPhone and increase font has been good, some sites don't do that, but most do, and if they don't you can manually increased font. What I really think its brilliant is the Kindle the Pearl ink. It's great to read with, and you haven't got the glaring background. It's something mainstream. Somebody without a visual impairment but generally have the same concerns as a user who has a visual impairment. Loads of people's eyes get sore from staring out at backlit screen. If you have these things built into mainstream devices you're going to be able to use them more. As I said, there's more. The assistive technology market is so specialised, there are probably around 50 eclipses in Ireland total.

AC: in your use of assistive technology is it a necessity for you?

SF3: yes definitely because I have to access my data, I need things on screen and access them via the Zoomtext.

AC: without it, assistive technology could you complete your educational work?

SF3: no, I don't think so it would be tough.

AC: would you receive your assistive technology as a hindrance?

SF3: yes! Because I don't like becoming dependent on it. It's kind of blossom in the last few years. I've come from a background of paper and that's the most concrete, I don't really like it (technology). But as they become more mainstream within the educational system are getting better, in my years technology was going through a transitional phase.

AC: at the start you spoke about choosing a course that stays away from technology, can you clarify that the bit further?

SF3: in school I loved maths and chemistry. I've could of done anything. For example, if I did pharmacy which I really like what would I do, then? When I was measuring stuff how would that work and also in maths I imagine I would have to sit in a different workspace from everybody else with a camera or whatever. I didn't want to be seen to be using different equipment; I wanted to use the same as everybody else. That might been an adolescent thing, At the same time even now, say your put forward for things or they won't put that students forward for an internship because then they might have to supply XYZ. With languages which I really like anyway, it's just books I can read the same as everybody else, I'll be judged as the same as everybody else.

AC: have you ever been discouraged from using technology as a way of accessing information just to clarify, have you ever been told, don't worry about using the technology . I get a human to read that for you.

SF3: no, let me think, no, in secondary level the teacher would say to me "would you not get a reader. From maths to ensure you got everything down?" I decided against it because I wanted to be independent. But I never been offered a reader or anything, I don't think I'd benefit from it, I have extra time and use of a computer, so I don't think I needed it .

AC: does the technology give you independence to let you do what you need to do?

SF3: it does and doesn't, I try to vary with using Zoomtext, because it's very time-consuming if it keeps freezing. I'm dependent on people knowing that it's going to take me more time. But again, I'm hopeful it will in a few years. Even the last package is much better than the last. Overall, it does.

AC: moving on to the support side of things, and how you've come to engage with them in the first place, how you supported in the use of assistive technology, can you explain your support network?

SF3: financially wise I bought stuff myself, in secondary school I didn't use any assistive technology, it's only within third level due to the sheer volume of stuff and the nature of the course, I started using the Eclipse, then I got one at home. The albinism fellowships within the UK were talking about the Kindle in 2009. And then the support yourself gave me, even though I has Zoomtext on the PC at home and supernova I just found it was freezing all the time and very unreliable and take so long to set up but then the setup here was great. All the software was installed me made much easier.

AC: so to build a mix of online help, family help and the supports within Trinity. Can you clarify this supports within trinity.

SF3: my disability officer put me in touch with you, that was in first-year. He gave me help with the zoom X, which I can see the benefits of it, but for my course, for information base course it would be brilliant, but from my course the information had to be hundred percent accurate. Leaving the willingness from you to enable me play around it and come to decision myself. You're not forcing the technology.

AC: how would you evaluate a support level within education?

SF3: assistive technology supports?

AC: yes

SF3: in secondary level, I didn't really need it. I was very against having it . I like to work independently of it. In third level it was great to know what I could do what was out there and what technology can do, even introduction to an iPad and stuff.

AC: do you think support network similar to the disability service needs further work?

SF3: assistive technology supports?

AC: pure assistive technology

SF3: mine are very positive, but I think not just because I got so much , but have also turned down stuff like to zoom X, it just didn't work for me . Think it's an important to note a service must be open-mindedness; the assistive technology officer cannot be doggett, forcing equipment on somebody. Even if you say if two people have the same disability there are so many different types of learning. Obviously the student, I love if a scanner saved me loads of time, student is looking for things that make things easier, they have to accept that sometimes can't be a hindrance more than a help. I did get that impression that my opinion counted

AC: so your opinion is very much a part of the process in accepting use?

SF3: It up to the student, student is here in college, they looking for the most efficient way to complete the work, so why would they turn down a piece of equipment that would save them time.

AC: would you like to know more about potential assistive technology devices by support staff in general?

SF3: yes definitely. I think the only way to find out about it, for example, the Clearview the screen function sounded great, but didn't work, image wasn't compressed split, if you could watch videos on them or try them would be great.

AC: you spoke earlier about the barriers to assistive technology use been a lack of universal design, bit bulky, difficult to work in environments? Are there any other barriers that stop your use or your use to get them?

SF3: in getting them, well if you don't hear about them. When I'm really lucky my family will do everything to get me to try it out, the only barrier would be would be my awareness, not knowing what's available.

AC: have you ever been anxious in asking for assistive technology supports you having engaged in?

SF3: no, not really, the Clearview I bought when I was in Germany, I got a demo that so I knew what I want. I'll approach is more wary, which are think it's better, you were not get your hopes up and then do let down.

AC: did not your anxious in asking for support within Trinity, it a supportive environment?

SF3: yes, it is supportive.

AC: do you think you are adequately assessed for your technology needs? You met with the effect technology officer and sat down and ran through activities needs, was that adequately assessed?

SF3: yes, definitely.

AC: can you clarify is a bit further.

SF3: I thought it was good, anything that was available I was made aware of, so then it was up to me. For example, the ergonomic screen arm, the small things like that really help more than the expensive stuff. The other stuff I was made aware of and that's the way to do it. I don't think an assistive technology officer who I know is fully qualified should tailor the support for student; the student should be shown everything that could be available, what could be great for one student is not great for all students. As soon this will be great for example, for a student who's doing business? It's taking an open-minded approach, showing everything, giving their view, instead of saying that the device for you.

AC: just to clarify that are you saying medical approach because you've got X, Y and Z you should get this and this is a poor approach. We should be looking at more of a universal / social approach where it's more inclusive.

SF3: yes definitely people think because I'm visually impaired that I learn better aurally , but I don't other real visual learner , so I just think if you there are the possible purchases and the where you could learn rather than telling me the way to learn .

AC: do you think the assessment we be put in place helped you achieve your goal?

SF3: yes, yeh I think the approachability factor is a big issue to be able to say I'm having issues with this, there is always a learning curve with new technology, when you're expecting technology to do something for you there's a lot of dependency there. Not to lose faith it is teething problems at the start, I do think the approachability is important.

AC: the assessment highlights the need for training and time?

SF3: yes, it highlights is not a one-day fix, or it's going to fix everything. Like one day you're going to get the equipment and can solve everything. You have to get equipment and training yourself. That can only be communicated by been told you "can come back to me" etc

AC: do you use your assistive technology outside of your education?

SF3: yes Zoomtext would be, it can be slow, especially in my laptop, it I suppose if I was reading, I'd use it

AC: how about your iPhone mobile technology?

SF3: yes definitely. I use that as well, for reading stuff online, newspaper articles magazine articles, but I do think that it has a way to go. These devices need to be built for everybody in that market, it has to be efficient the AT market. It's too narrow. Do you see what I'm on about?

AC: of course I see your point.

SF3: the most useful stuff I have are mainstream, even things like the arm of the back of the computer screen. They are all geared for everybody. You going to have the same problems as I said, amplified by a hundred.

AC: can you see yourself using your assistive technology after you leave your educational environment

SF3: yes definitely, it would be a necessity because I have difficulties in reading I'd have it on the computer.

AC: what is your view or opinion of possible employers in the support or use of such technologies?

SF3: I think it's in some way it might be easier than third level. As within third level you're set to a structure, the way you must format stuff & present stuff. In employment there just worried about the end product. Maybe this is just exclusive to the humanities side of things, where the font has to be font 12 or you can do read stuff on the Kindle because you have to put your page numbers in etc the employers won't care how you read it as long as you get it done. At the same time you're explaining to them you need X, and y. Even though you're explaining it to them, they're not sure. I don't know, I think it might be an issue. That's not going to change with policies or regulations. It's more of a character thing.

AC: be down to you?

SF3: yes, it would be down to me how I push it, I'm not sure disability awareness workshops will change somebody's attitude is somebody is wary about disability, it individual thing, in my experience.

AC: are you aware of Irish provisions in law, which states access to reasonable accommodations?

SF3: I know within College access policy for sure!!

AC: How about Irish law

SF3: no, not all, I know better equality and all that that's all.

AC: how about employers do you hope they would have an understanding?

SF3: I do hope definitely, but I think you're going to have to that bit extra in terms of merit and stuff to balance out. I'd be very cynical, I don't know. It's very hard when you're not familiar with stuff and you hear about Zoomtext or CCTV monitor, you don't know. I do think people with vision impairments are underrepresented, so I do think I think there is a gap in experience and knowledge. Its experience is important, knowledge you can be educated on the theory of it, but I do think experience is more valuable.

AC: do you think there are any other reasonable accommodations for employers to use?

SF3: things in a different format, or if they weren't able to provide information on the right format or I'd be given more time to complete tasks, so time.

AC: finally my last question is, would you encourage future students to use assistive technology devices and be assessed?

SF3: yes, I would encourage them to be open-minded, not all students need it, I would definitely encourage them to explore what assistive technology and what an assessment can do for them. I see students at secondary level with a load of equipment that they don't need and does not fit. If they don't need anything that's going to benefit finished not be given to them on less there is a need.

AC: okay thanks for your time, relieve appreciated it

SF3: no problem. I'm glad I could have been of help.

Interview 6: SM4

AC: okay, I'm here today with SM4. This is my sixth interview looking at assistive technology in an educational environment and within a working environment. A SM4 who is a final year student undergrad student. SM4 thanks are taken the time for coming in here today. To kick off the interview can you tell me a bit about yourself?

SM4: I came to Trinity in 2009 via the Trinity Access program. It's a program that bridges the gap between secondary school and college. That was a massive help, coming into college with a disabilities a massive step, a year. Help me set up support for the following year. I sat the exams in the tap program and now I studied law now. I've done very well in law with the help of a lot of supports behind me, now i'm ready for the final exams.

AC: is your final year?

SM4: yep

AC: could you can be a bit about your impairment, disability and how it affects you?

SM4: I was diagnosed vision impaired when I was three; it's called because by bi-lateral macular scarring on the optic nerves in the retina. It is an infection that is carried over from mother to a child, it does damage and then it goes, wherever it does the damage it lies there dormant and then waits to attack. It's done no damage

anywhere else and that the doctors say it will stay here, over the years it has acted up about five times and every time it acted up its decrease my vision. I've also got short sightness on top of that. They said my eyesight will be gone when I was three, then five, then 21 and still here so far!!

AC: are there any factors that bring it on?

SM4: I think when ever I'm sick I'm vulnerable, they don't know much about the illness or able to say what brings it along. And when it does, they just bring me steroids to fight off and rebuild myself. That happened to me in second year in college, it attacked and I miss loads of college. College were very good because they changed my exams from in stuff.

AC: have you met never met anybody asked the same condition?

SM4: one girl in Temple Street, second year when mine acted up she was there, but I don't think they could control hers. I think she lost her vision, that it, it's very rare, when it's done damage to the optic nerve it's such a delicate area they can't do anything.

AC: how about the rest of your family?

SM4: my brother had it and it damaged his ears, he is okay and he plays football stuff.

AC: would you think it has impacted you regarding your education?

SM4: I think it's actually made me more determined if it is possible, kind of do well. I don't really worry about it, although I know it's there on very conscience of, I need a lot of stuff to help me, but it actually made me more determined, pushed me on.

AC: can you talk to me about your assistive technology you've used or introduced during your time here in Trinity?

SM4: going back to the 90s assistive technology was very bad in primary school. I had a visiting teachers are come into me and would say to just read this page, it wasn't helpful at all, I had magnifying glasses , but I just was unable, this went on right up to secondary school to about 5th year. Then I got a new visiting teacher who put in place a laptop got all my books electronically formatted ,that was a massive help. Then coming to Trinity I met with the disability service, they put the same stuff in place, they also introduce me to new equipment, I can remember the name think it's called the eclipse, the company in question have worked with Trinity, and with the government agency I get support from, I got a handheld device which I also used as well, then I got and iPad.

AC: has technology improved as you have moved through college?

SM4: yes, have also used zoomtext, my eyes would be knackered from reading, especially law books, the Zoomtext the way can just read things back to as being one of the biggest assistive technologies, I've used.

AC: so starting up when I low-tech poor magnifying glass moving on to more high-tech. ipad stuff, interesting. To get into the crooks of the interview can you tell me what the term disabled means to you?

SM4: this might sound a bit cheesy, but when I hear the word disabled. I only think of enabled; you're able to do anything if you put your mind to it, regardless of disability. I know it can be a barrier to a few things, like sports. I love football. I can't play football any more. It can get you down sometimes then you just realise that there are always people worse off than you.

AC: is the meaning of the word disability personal to you, do you see yourself as being disabled?

SM4: I think the network I have around me is so supportive that my disability does not stand out around my friends. I always try to live like normal; obviously I'm aware of it.

AC: to clarify does impact you?

SM4: when it's active it obviously impacts me really bad, I realise are bad normally, but when it's active I'm severely impacted, I'm not able to go to work or college. Overall effect is not impacted me on my ability to do well.

AC: do you feel there are any differences between the terms and medical view of disability or a social environment view? Are there barriers there?

SM4: absolutely. I won an award in the young scientists for blind people for that main reason, you see so many people, just last week I was on the LUAS and there was a blind man getting off at Connolly station and there is nobody there to help, to get up steps, and he was really struggling. So I went up to him, I can't see either, the two are trying were go down the steps, the blind leading the blind!! The environment can be very harsh being honest, I have a cane and I use it now and again, and some days when my eyes are really bad I have to use it because there's nothing I can do. The environment with new technology needs to be invented, not just for blind people, there are people within a wheelchair, and this could be really helpful.

AC: just to clarify, even though you have a vision impairment. You don't see yourself as being disabled?

SM4: definitely. I just don't get it affect me, I just keep going.

AC: what do you think the term assistive technology means?

SM4: I think it's really important to have in place; basically to assist people through new technology is coming out. Without it I would not be able to do half the stuff I'm doing college. Like reading the law books without it, it would be very hard. I don't know how people manage.

AC: do you see them as mainstream technologies?

SM4: I see them as being different, there's no reason why they shouldn't become mainstream technologies. If I use the technology around my family they always say that could be really useful for them as well, there's no reason why it can't branch out to mainstream technologies, like advancement in iPads, I think they should be working with blind technology companies to develop new stuff.

AC: how do you approach technology with fear, suspicion, stress or do you do you see them as a friend or aid?

SM4: at the very start here in Trinity is very wary of it, going near things like Zoomtext and stuff like the eclipse. As the years went on, I think I got so used to it and then you got a supports tell you how to use straight away, that's a massive help.
AC: so can you just clarify your view?

SM4: I like to explore, learn about new ones, it more positive now.

AC spoke to stuff about in the young scientist can you tell me a bit more about that?

SM4: its sensor satnav system for blind people, its called the Compaq- I, I worked with an accountancy firm Grant Thornton, who worked with me to create a proper business plan. Basically, there are some things out there like it, a cane that vibrates, but seeing the amount of blind people that struggle even myself. It definitely needs to be something like it. It can be turned into a app, but I like to see people wear it, another company Xzylix built the battery for it.

AC: how does it navigate?

SM4: it's only a prototype I've been very busy with college, as you workaround it uses sensors to tell you about obstacles, tells is a distance of how far you're away from it, I know there not out there , the prototype I built for the young scientists via a grant from the health research board.

AC: so you kind of see how technology can help people or should try to enable people, that was your drive?

SM4: yes definitely sure it's assistive technology.

AC: has your view of assistive technology changed your view of technologies as a whole? How you interact with a computer

SM4: I know the assistive technology is there, I don't have to struggle to see what's on the screen. I can change my view that I can get to the stuff and access, allowed me access content a lot better.

AC: so you're able to access more because it your assistive technology?

SM4: yes definitely.

AC: this question is straightforward you kind of answered it already. Is your use of assistive technology a necessity for you?

SM4: definitely, like I said without it I would not be able to get through law books. It's just a massive help, you can't overestimate how big it is.

AC: do you use your technology is outside educational stuff?

SM4: I vse it for a leisurely just to check for football results, is just become so part of my life, I used to using a forever think. Sometimes when my eyes get strained I still use a handheld device I still have from Ash technology, Reading the paper and stuff.

AC: part of your daily activities?

SM4: yes

AC: have everything your assistive technology has a hindrance? Something that would hold you back

SM4: let me think. No, I don't think so. When I was young at school, I had a camera it hooked onto my laptop so I could see the blackboard.

AC: The Opti-verso?

SM4: yes, that's the name of it, everybody in my class will be looking at it, what is that do, messing with it and taking pictures on it, you know, like in secondary school. I'd be worried that I would become distant from the classmates.

AC: So not you classwork so you would be looked at differently?

SM4: all my friends had been together since primary school and some are in this college. They know about my eyes and have become used to it.

AC: can you describe any barriers you have come up against using your assistive technology?

SM4: I'm being honest, not a lack of support because of had that from the very start.

AC: how about accessing the support getting hold of your devices that you've used, did you have to do much digging?

SM4: A ceratain government agency are working within a number of towns, and the support there was not great, I approached and told her. By me approaching her it pointed out to her, because she thought I had all my support via school I was okay, but I didn't have screen at home.

AC: how are you supported and get hold of the use of assistive technology?

SM4: I would probably come into you ever looked at, whenever I have a problem with my computer on my software I can come into you to have look at it, has been a massive help to me.

AC: Hs all the stuff that you've used been provided by the service provider, either by the disability service here or external services?

SM4: in school it was the Department of education. I remember in first year the disability service asked me if I kept my laptop that a used in school for first year. There should be a system that you're allowed to keep your laptop and the system on it. They should be able to carry on the technology over to a new way, like moving on to work, that will help not sure that would work, but I think it a good idea.
AC: have you ever been discouraged from accessing your technology, I mean by that is doubly worrying about using your Zoomtext or that paper or book. I get a human support in place to read it for you?

SM4: I think I can be a bit vocal in what I need If I feel I need somebody to help me, For example, sometimes use a reader in an exam, I just always had one so, I still use the laptop with Zoomtext and have the exam paper on the laptop as well. Using humans with technology has been helped, I don't think it's hindered it, a mix.

AC: would you like to be leapt up to date with new technology by support staff? As you transition of education into a new environment possibility of continuing on your studies, do you think having access to information and new devices is useful?

SM4: as you can see how quick technology develops all the time. I think it is good somebody to have a job, maybe to send a newsletter or information, telling me what is out now how you can get hold of it. I get a magazine every month from speak out for people who are in wheelchairs, which shows you new stuff. A member of the wheelchair Association and they send out a newsletter every month. I think that would be a great idea for assistive technology.

AC: have you ever been anxious asking for assistive technology supports?

SM4: I've had some work experience working in 2 workplaces from college into a job for two months in the summer I was very worried that how I was going to manage reading this documentation. How was I going to go from college were use my stuff, I was a bit anxious about if I was going to tell the employers about my stuff. But there are really helpful for me. They put all the support in place, got me on that books I needed electronically. Initially was just a worry from moving college into the workplace

AC: was it a worry about disclosing or were you worried about not getting the support?

SM4: as I have on my CV about the Young scientist stuff interviewers always take good interest in it. Ask me loads of questions about that .So I don't think it's my disclosure would be the issue, I'm more worried about if I was going to be able to impress them and do the work without the supports an and services to back me up

AC: can you speak about how you were assessed to ensure the technology you got met you need, the educational side first then maybe you can talk with the my summer workplacemeant experiences after that?

SM4: in school I wasn't properly assessed. I think it was down to the fact it was such a long time ago, but when I came to college I was definitely accurately accessed. I was sat down and shown different machines and different PCs that could benefit me. Over time I took a liking to certain stuff that was shown to me. And yes, the assessment was definitely up to date. Sure, look at me now, at the very end, which is positive.

AC: on the work experience, which I am interested in how we you assessed, where you sat down and asked what you need, what it should just tell them I just need to get X, Y and Z?

SM4: Both summer workplaces sat me down just after the interview, when you had the job. They asked me to come in shown show me around the offices, both companies did this, somebody will help you out. Tell me where the lifts are, how to go around, for assistive technology. The asked me what I exactly needed, did I need stuff in large font in my books etc. As it was an internship we all had small tasks., There was 20 others, they made sure all the sheets were a3 size, you know, for the meeting's in the morning, I didn't have to ask for the, they set it all up for me.

AC: so that was a very positive experience for you, with regards to the assistive technology , did they know what it did, or was it just you knew, did he have any support within their too integrated into their job.

SM4: within my summer workplace they have learning centre. They told me I can use this as much as I want and all the support would be in there. Exactly what I needed, I can remember if they bought stuff, I think they bought Zoomtext software and commented on how this would help us with other employees. They bought a lot of electronic law books, because he said it would help a lot of other people that are there who have strained eyes. I'm not saying I was an eye-opener for them but I think I helped them.

AC: was there any IT support within their use of the software I have a barrier to getting the software.

SM4: because it's such a huge law firm the IT specialist were very helpful for getting the programs on the computers, and getting the books electronically.

AC: I know we are speaking about your educational things but it's very interesting to hear about your work experiences.

SM4: I think I've been very lucky, I'm sure there are companies you are going to go into, and they're not going to be as accommodating or helpful. I do fear that and I'm worried what they do if they don't set up the stuff.

AC: just continue on that point because it interesting how do you feel you would overcome such barrier?

SM4: I do my best with what I've done so far to tell them on a need in the hope that they would try and help out. And if not I'd probably look at the law!!

AC: to finish up on the assessment so things, do you think the assessment the educational side of things has been helpful?

SM4: hundred percent for other reasons. I said, it's been a massive help me enormously get to my exams and finished a course.
AC: can you see yourself using your assistive technology outside of your educational environment when you go into the workplace? Or would you depend on the environment you are going to work on?

SM4: I'd hope to keep going with study; maybe staying within the College environment, but if I do end up going into a law firm or company. I think I would. I'd still uses the stuff I have now and hopefully there is even more then.

AC: moving on to the last so things are you aware of Irish law provisions regarding reasonable Accommodations.

SM4: I think Irish law has to follow United Nations and European Union disability law. Were signed a policy to European policy, European charters for human rights, so would have to give access to what people need.

AC: what are the term reasonable accommodations mean to you?

SM4: I don't know the number of people with a disability coming into the workplace, they are not dealing with it on a day-to-day basis, I study human rights big-time a lot and people can forget minorities' rights a lot, especially in these companies when you're so busy and stuff. I don't think they know if big companies would be as open as it should be, maybe a big awareness campaign will be needed.

AC: any other strategies would be useful, and helped to transition?

SM4: maybe that will be good; big disability awareness campaigns led by the government get a few top employers together and roll out a new strategy. It wouldn't really be a big job; you would be just raising awareness of what they're entitled too going into the workplace.

AC: onto my last question would you encourage future students use such devices needed?

SM4: definitely. I'd encourage students to be more vocal as well, I know it's hard, and some people and is vocal and it can be very worried coming into college. I definitely encouraged saying what they need and hope for the best engage in the supportsthat are there for them.

AC: okay, thank you for taking the time, really appreciated

SM4: No problem at all. Thanks

Interview 7: GF3:

AC: this is my seventh interview in my Masters in universal design and assistive technology and here with my seventh participant GF3, we are going to talk about her experiences in the employment sector primarily in using assistive technology that she has engaged in over the years and used frequently in her educational cycle here in Trinity. Thanks for taking the time today to come in you and me, to kick off the interview, broadly can you tell me a bit about yourself, your background etc., the course you did here in Trinity and stuff?

GF3: i'm, 24, I graduated last May, I studied French and Spanish doing a arts degree, since my graduation I have started work. a week after my graduation .I've used assistive technology all the way through in various forms, some of which I will used stably through secondary school all the time and some of which I've only found out through my time in trinity. I still use similar technology and same pieces of technology that I given and found out about here.

AC: your background for doing your course, was the reason for choosing a course?

GF3: my disability didn't really impact my choice of course. Obviously I knew the transition into College was going to be a big change. I'd encourage students to be more vocal as well, I know it's hard, and some people and is vocal and it can be very worried coming into college. I definitely encouraged saying what they need and hope for the best engage in the supportsthat are there for them.I chose a course because I started learning French when I was six. This is what happens when the blind six r insists she wants to do ballet!! And you have to distract her from the idea! I love the course; I did Spanish in secondary school. I never want to do anything else.

AC: your work in your employment area, how did that come about?

GF3: to be honest, I wouldn't have come across it at all, unless a friend of mine had not seen it on a website. I got the job through employability, their base in the UK, but occasionally that have stuff in Ireland. A friend of mine saw and thought of me, I spent a couple of days my application thinking that I would never hear of them again. One day has come into College and I got a phone call asking them to do and telephone interview, I nearly had a heart attack. I forgot about the application completely. I had three telephone interviews and three face-to-face interviews. From there, I was successful; I must tick lot of boxes by filling in the disability category!

AC: what your role within your employment area?

GF3: my role as customer service representative ad-words which are the advertisement when, you use my companies product my job is to look after the companies that are paying for ad's. So sometimes it can be troubleshooting and sometimes it can be improving their accounts so they get better performance depending on the day. We work through phones, chat and email, at the moment I am only working on email,

because of the access issues they use on the phones. They are trying to work on this by email has only been a recent development for me. I was unable to do in the first two months because things weren't really working; people forgot to tell people that the blind person was starting an at all just fell apart for a little while. They are getting there.

AC: how you find a job?

GF3: it a lot more demanding that I thought, people kind of think hear the word customer service any think call centre, they say "oh you answer calls all day ?" but each call is completely different, somebody can be ringing you up going absolutely mental because they are trying to advertise something crazy because My worksplace policy prevents them. Somebody could also be ringing somebody up asking me to fix their account, which can take up to an hour because you have to go through the whole setup, it's complex, a complex product and ever thought was. There is a lot in it.

AC: have any people in your team?

PM: about 50, we hired seven new people starting on Monday. I think there's another six coming in after them.

AC: Is a lot of opportunities within your job to move or change?

GF3: there are really into career development, they really encourage you to talk to your manager and develop a plan for where you want to go much want to do. I would quite like to once everything is set up to move into the French team. My manager is kind of aware of this is in the back of my mind and he's very supportive. At the moment we just need to get over the hump of the access issues that were still have.

AC: so you're only worked with the English team?

GF3: yes, the UK and Ireland team

AC: but as an opportunity to work within a real multinational environment?

PM: yes, we have offices within a lot of countries. A couple of my friends who trained with me are now in Poland, in Bratislava on the Spanish team. That a lot of people even since I started have moved around. It's very mobile and changeable.

AC: is an exciting place work?

GF3: all the rumours are true, the food is true, the beer on Fridays is true, that is all true!! And it's really exciting. You never feel like a number, you do feel very individual, as much as those days when you get frustrated due to the access issues, I would never change it, I love it. Everybody works as a team, there's no competition within the team. If you have a problem you can just shout it.

AC: Can we just talk about talk your disability or impairment?

PM: I am blind since birth, due to rethonopny, I was born at 26 weeks and my retinas were detached, they tried to repair them. When I was about six months, I went to London, I went to Chicago and North Carolina to Duke University, they tried at the time to fix them but at the time I was a bit of a guinea pig in the guinea pig failed, the experiment in the guinea pig didn't go so well. I always had light perception until for five months that went bye bye due to the detached at the retina. I've never known anything else, which are think it's a good thing.

AC: During your educational experiences how did your disability impact you? Obviously been blind comes in quite a bit but maybe you can explain.

GF3: it comes into play primarily with access to information, I'm very much at Braille user, I learnt Braille at the same time anybody other kid was learning to read. Even though I went to a mainstream school there is no question I had to learn Braille anyway, I think it's really important. I think it's a terrible thing that has been discouraged nowadays. But that a different issue. I didn't start using a computer until six class in primary school and my teacher taught me how to type and the basics. In secondary school I used a computer with speech with jaws, speech software. And then when I came at the University I got my little friend the Braille display which I still use today and I absolutely love it. It combines the two perfectly, an old-fashioned medium by a lot of people, but as far as I'm concerned if they spent the money to make something to give an electronic output it can't be that old-fashioned or obsolete. And now that I'm in work I use it a very bizarre set in work, I use three screen readers and three browsers. That was not exactly how I envisaged things going - but I need to do this to get things done.

AC: the three screen readers?

GF3: Jaws, chromevox and NVDA. I just downloaded NVDA three days ago in utter desperation because nothing else was working! Jaws and Firefox were fighting with each other so use a mixture of chrome, Firefox and Internet Explorer. I also use a brailliant display. It's called the next gen the one I had in College just gave output. This one has a little import Braille functionality. Unfortunately I cannot use it as much as I want because they are issues with tweaks that need to be fixed.

AC: A work in progress?

GF3: to be honest I don't think it ever really dealt with at Braille display before. And I think they need somebody with a bit more experience to have a glance at it. I don't know the fix, they don't know how to fix, and nobody knows how to fix it. I just want to use it. They spent a lot of money on, so I would primarily use a laptop to with a set headphones and Braille display whenever I can get to work.

AC: to maybe go back a bit and start the crooks of the interview, can you tell me what the word disabled means to you?

GF3: I think it really difficult question, when I was supplied with the questions I looked at this one for a really long time. I think it means for me a lot of different things. It can mean everything from say someone like me who has a full-sight loss to

somebody has got mild dyslexia. It covers a lot of people, but I also think it can be either helped or hindered by your environment. It's something that you've got to take responsibility for as well, you can't blame everything on the environment. As much as we have come on leaps and bounds there's more that could be done. There is a lack of awareness that needs to be fixed, particularly since I have started working I've started noticing there's a lot of people that really don't know. I feel on the first disabled person they have ever met, and it's quite a big jump for them.

AC: so barriers in the environment?

GF3: yes but you also have to take responsibility for yourself to do the best you can using the supports that are out there, you have to push yourself, you have to stand up for yourself and accept it as well. You can have enough negativity around you without you doing it yourself.

AC: the negativity is an interesting point. Do you see yourself as being disabled?

GF3: as much as as I see negativity there also a lot of positively to be fair, a lot has changed since I started school 20 years school. The idea of a blind student going to mainstream school was virtually unheard-of and they thought my parents were making a huge mistake. And now it's just accepted. It's getting more normal. For me, no, I'm actually quite proud of it. It's part of my identity. Who gets to experience zero gravity when they are 14. You were not have got to do a lot of the cool stuff I was able to do. I would never change it. And I don't think anybody should ever be ashamed of that or feel ashamed that either, that's responsibility of other people as well.

AC: the term can mean so many different things; it can impact you both positively and negatively. But for you, just to clarify, it's not just negative you don't see them as a negative.

GF3: you have your frustrations, you have days when you've think life could be a hell a lot easier, when you drop your earring on the ground and you think this could be a lot and you're if I could see it, but at the same time I'm not that interested in changing it.

AC: thanks a lot that's a really good description, to move on what you think the term assistive technology means?

GF3: I think it means anything, the kind of explain to itself. It assists you in what you're trying to do, when you say assistive by definition it says is outside of the mainstream, but more and more it's becoming a slight adaptation of the mainstream rather than the big and bulky assistive technology where as much as there are things that need to be like that. Like the stand-alone things like the Braille display which I wouldn't change at all and is very obviously assistive, but it could be something as simple as somebody on large in their font to size 24 that enables them to read the screen and they don't need to do anything else that's fantastic.

AC: to clarify that point. Do you see them as being separate the gap is becoming smaller?

GF3: yes mainstream technology does have an assistive element built into it. For example, Microsoft has developed micro eye's say the stuff on the iPhone like voice-over Apple stuff. I think that's the way it should go, but I don't think go that way fully because some things I so specialised that they need to be seen as separate assistive technologies. But as more big companies seem to be embracing it properly the better we will all be. It's got to be more mainstream. Make things bit more accessible a little bit more inexpensive.

AC: how do you approach technology, do you see as something as fearful, stress or a friend or as an aid.

GF3: definitely an aid, I think when you start using new programs, I remember when I started using e-mail here I hated it, I could not believe it. I thought it was the most stupid system in the world. And now I use e-mail for anything, regardless of job I just love it. I have no problem telling my job if it is inaccessible, but email is the one thing that is got really right.

AC: so you see them as something as good, has had always been the way, have you always been happy using technology?

GF3: yeah, I think I was, the more I found out about it the more fascinating it becomes. Its amazing people have sat down and thought about how it can make life things easier and how it in incorporated to a computer. Who sat down and said this is a good idea. It's definitely an aid.

AC: to follow from that point has your use of assistive technology changed your view of technology, I think you've mentioned it to before with how you've come to like the Gmail tool, but has your view changed on a whole?

GF3: yeah, I think so. It raised my expectations of what it should be able to do. Sometimes it doesn't always meet them. Before I would have gone no, I just can't do that, for example accessing the website or information, but I kind of believed if somebody has developed is really complex programs for people be able to use the stuff somebody's done all the hard work for a lot of people. If they were just to sit down and know this is going to send very simplistic and it takes time and I get that but they were just to sit down and go through the guidelines surrounding accessibility do a bit of tweaking it's going to increase their user base and surely that can be a bad thing. I believe it can be an enormous help. But it kind of works two ways.

AC: an untapped market?

GF3: definitely, but people just can't see that because there's not enough awareness around it, but I think that’s improving, it can only get better as more people get to use the stuff.

AC: is your use of assistive technology a necessity?

GF3: yes, I wouldn't be able to access books or even work , thanks for the tip on I books by the way I absolutely love it, I wouldn't be able to read comfortably, everything really. I use it every day.

AC: Have you ever seen your assistive technology as a hindrance, some that you go all I don't use this?

GF3: only when it doesn't work, for example when the Braille display it should be all singing all dancing, but it not kind of falls apart unexpectedly. I'm not really sure where the fault is. No, but generally I would see something is a big help that I really enjoy using.

AC: your assistive technology and how you see it as a positive, something that doesn't hold you back, do you think when things don't work does that give you any negative spin of what technology can do or is that just a short-term learning curve?

GF3: I think it's partly a learning curve and partly an opportunity to enhance it. It doesn't give me a negative spin you've got to the point where you started to like using, you can let a couple of negative experiences for people who haven't thought of accessibility put you off. I'm very lucky because people are starting to listen, I can't do my work without it. It's more the people side of things; I get frustrated with not the technology so things.

AC: have you ever been discouraged from using your assistive technology to access information, clarify that if you are asked to look at our report who advised don't worry about it that they would get somebody else to look at that.

GF3: there has been a little bit of it. A lot of the time there are parts of my work that aren't accessible and the solution largely is that I would get one my teammates to do it. I said to them, . "That's fine in the short term", but my personality, which is largely independent and I don't like people doing stuff for me. Plus everybody else is doing their own work. I don't think that is fair to disrupt them because the setup is not correct. Apart from that they have been very much encouraged to use my technology.

AC: has a barrier been support the links?

CM I don't think it's even been support, think it's literally the platform cannot handle the technology or vice versa. The design of the platform is just not built for screen readers to access. They just do not like each other, complete incompatibility until it is fixed, i said to my manager "I don't know where to go with it" static and stuck.

AC: what's your manager's viewpoint?

GF3: he is sympathetic and he's really been trying to get to grips with, but I think is on the biggest learning curve of his life. There is a little bit of fear, they weren't quite aware how big the challenge might be. The impression I got at the start was everything would be fine that my screen reader would be compatible, there kind of trying their hands up and asking what will we do. They have tried stuff, they got an engineer in from sight and sound in the UK, and he sat down with me, they pay for him to come over , tried to do with back-end with jaws compatibility . They have tried the best and I can ever take that away from them, but sometimes it gets moves so slowly, even after the expert has left.

AC: The difficulty still remain?

GF3: largely there are still there, I decided to send an email to my manager with everything written down in it again, saying I don't know where to go with this and who do I speak to. And said to them loads of times that I will test stuff for them and explain exactly how I work. I did have a recent update when I received an email from the engineering department who wanted to talk to me about your disability issues and tools. So I'm hoping there is movement, they really are trying.

AC: how you supported in your use of assistive technology, can you explain your support network?

GF3: financially was very well supported , My workplace paid without hesitation for JAWS , Kurzweil, which I have interviews I didn't know I have how use, they also pay for the Braille display and have been supported from sight and sound. It of work for a while until Firefox and jaws studied be incompatible I don't know what happened there. There's a really great guy in engineering in that tech support called Fred Smith, who has started to work with this kind of stuff three years ago and thank God he is there to be honest, because he's the only one apart from another person who gets it. For example, I went over the other day for support and the person kept asking me why am not using chrome which I replied that it's not accessible three times. I have to admit I was even started to get you know my nerves you start to go, "you're not listening!!" That's really just an awareness thing and hopefully that will just filtered through. We're getting there; I also have external support, which they have no problem with me bringing in. the government agency come in & support me, and they had no time of me taking time out to support meet with them. I just pop it into my workflow and they're happy with me meeting of them.

AC: the government agency in question have been helpful with the jaws side of things?

GF3: yes. it's another support I can use

AC: would you would like to know more about potential devices that come on the market, if something new came up how would you like to be kept up-to-date.

CM. : I kind of try to keep myself up-to-date, if your so reliant on the technology you need to keep yourself in the loop, I don't think the staff within my department would be usually aware of new technology. It's not really their job or their remit In terms of engineering guys if I said to them thay would look into help, plus you access building discuss list, special needs list within My placeof work and I could post stuff on there or if anybody had used XYZ that definitely would be users probably from California or Poland some random, somewhere that's not Ireland, because I'm the only person who would come back and give loads of information. So there is support there is just peer support available.

AC: so you self-support in a way?

GF3: yes I self-support myself kind of. I'm not always done it that way because I had assistive technology support within Trinity. Now it because I'm on my own it's become more useful

AC: driven by yourself them and hoping that you would take or inform her colleagues from there?

GF3: exactly

AC: were you ever assessed for your technology needs within your job, to clarify that point when you started in yourjob the list of technology you got was this based on any type of assessment or would you just tell them?

GF3: I just told them what I use in College and what I thought I might need, I am using most of the stuff, except for the Kurzweil, which has not been necessary, but they always say if you get something you know is good somebody who will need it eventually. It was very much that, when I started my manager sat down to me and I explained what was needed. I mentioned to them at my interview, I brought my laptop along to all the interviews and showed the technology and how it performed. I was never taken up on that offer, and my manager did reference that that was a big mistake, because he went into a blind and freaked him out a bit. Having said that you have to appreciate that everybody is on learning curve, including myself, you have to be a bit patient and grit your teeth and hope I'll be fine.

AC: how does did the assessment compare with the support that you received within third level?

GF3: there was a big difference within Trinity. It was formalised and because there was somebody specific job to sit down and go through the stuff, asked me what I used, what will you use and specific training as you need it. There are pitfalls to the work situation, but I also think it's good because very much teaches you to self-direct. If things aren't working, you have to keep on shouting because they're not going to have a clue. It's what I found apart from a few people who have decided to learn about this stuff.

AC: do you think a transition phase would help - support network to cross boundaries from education to work environment, who would also work with employers, do you think that would be useful, or down to yourself?

GF3: It would be useful to say to the employer that I have someone who I had been working with who knows his stuff in the support of technology. They would have no problem talking to you and would be reassuring to the employer that is it is there, nine that I would have a relationship with that person, no matter what type of business it is, it would be a good idea because employers are going into the unknown they need reassurance.

AC: do you think you employers were unprepared for what are going to accommodate for?

GF3: I think so; they learn very quickly and are still learning. I think it was great in a way because they said that they take me on and see what happens for a little, but more preparation will not have gone astray because of the learning curve. And I would not have been waiting for them for them to figure it out.

AC: Are you are posing the questions and said that having the solutions

GF3: There kind of saying they have no idea

AC: the term rabbit caught in headlights comes to mind.

GF3: exactly how willing to learn rabbit, but confused

AC: do you think your assessment has helped you achieve your working goal, he said at no assessment but?

GF3: there was no assessment of such so I have not reached my working goal as I'm not on phone support yet.

AC: do you think you worked within your educational environment?

GF3: yes definitely, it helped me achieve my goal of graduating.

AC: have you ever been anxious in requesting assistive technology support, either environment?

GF3: I'm only anxious within my working environment, because I'm not sure what a response,I'm going to get because they do not know what I'm talking about, which is fine because I have be really informed to help them but sometimes I feel if I have to really explain this to one more person I might explode. Within my educational side it was on a plate, i.e. what kind of supports do you want? Within a working world I think it's good that you have to advocate to a certain extent, they have to be listening and are willing company like I have, but if you end up stuck somewhere where the attitude is that the problem is mine. I can't imagine how her that would be, especially on your own, it will create a huge barrier.

AC**:** do you think the lack of support networks within a company stops employees expressing a need surrounding their assistive technology?

GF3: yes, I think it can be a very personality driven thing as well, if you're willing to give it a go, which is how it's turned out for me, I think would be great if you had someone to supported transition and having a closer link between the employers and universities, but only could be good.

AC: do you use your assistive technologies outside of work?

GF3: everything all the time, check my mail, check the time, bus timetables, listen to the radio, reading is a big thing.

AC: Hourly then?

GF3: yes, all the time

AC: your work colleague's do they understand what your assistive technology lets you achieve?

GF3: they do now, most of them laugh, the most recent screen reader I've downloaded NVDA has a lisp. I've never heard of a screen reader with a lisp, the find that very entertaining. As I said as I got a job at your employability, faded and awareness day. I was really against that at the beginning because I'm not used to the let's make a big fuss thing I don't really do that, but actually quite glad because it made other people a lot more comfortable, one of the presentations was on assistive technology, a list of what blind people usually use. People are asking a lot more questions as a result about what it does, can you hear it. Can we touch the Braille display etc?

AC: do you think that approach will be good generally?

GF3: I think it could be difficult one because some people aren't forthcoming; some people want to hide it. I wear my disability on my arm, you can't really get away with it if you're walking around with a white stick. It's pretty dam obvious! As I said I was completely against it in the beginning, but it turned out to be really good. it was more around etiquette, how to walk with the person, sometimes is nice for somebody to explain it for you, you do it all the time so is good to take a break , go learn about it and come back to me.

AC: they've seen your technology?

GF3: yes, it took ages for them to The concept that jaws does not follow the mouse, it confuses them a lot, the fact that jaws is reads linear really confuses them. I'm still trying to explain to people, but I don't mind if somebody is tells me something is on the top left-hand corner, but that's not going to help me because jaws doesn't work that way. That's fine. You have to let other people learn at their own pace and some people are going to figure a quick others aren't.

AC: what was the reaction to the output?

GF3: they were fascinated, they never seen before. They thought it was great, there are fascinated that I can have the earpiece in one ear and have a conversation with somebody on the other ear, but for me is just a way of life and the most natural thing in the world. I find an entertaining for them to watch because I went through that phase a long time ago.

AC: do you self-support yourself in use of technology?

GF3: I'm on a lot of email lists email lists are good, you can just throw question out there and somebody usually find to know an answer, workplace has a few external ones as well. If it an external one is safe my workplace would allow it block if it was critical of my jobs. I will always be careful how I use lists. I would use jobs inbuilt stuff using their lists, and if I wanted to use the external stuff I do sat at home.

AC: what is their policy with regards issues externally?

GF3: as soon as the government agency came in they had to sign a nondisclosure form, that's fairly standard as I'm looking at people's business addresses, credit card details stuff that's fairly sensitive. There quite open to it as much as any big company who has a lot of users a lot of that can be.

AC: are you aware of Irish law provisions in the right to access reasonable accommodations?

GF3: no, interesting, though, but know nothing at all.

AC: have you ever heard the term reasonable accommodations?

GF3: I've heard that term in College, in applying via the CAO and that stuff.

AC: what is the term mean to you?

GF3: I think it means something that means different to what the mainstream population would use, in allowing you to you do what you need to do in your job or access your material in College. I think an accommodation is an interesting term as is seen that we are accommodating you, were moving to help you. If things are there or not provided technically you could start shouting and screaming, but you don't because it doesn't get you anywhere.

AC: just to follow up on that. Do you think your employer knows what reason accommodations is what the law provisions in is on that area?

GF3: no, it was never mentioned, I think they have an understanding, I think they inform themselves because I get the impression that they do, but there is nothing about law mentioned to me.

AC: onto my final question. Overall, do you think the use of assistive technology for disabled students or employees is a positive support?

GF3: yes definitely. If it wasn't for it, there wouldn't know where near the amount of people who could be employed.

AC: do you think assistive technology allows enhanced access?

GF3: definitely gives more options if you can walk up to somebody and say this is what this is an I'm confident in using it, I might need some support to be aware of, but at least I'm making to step, and reassures them about my ability.

AC: thanks for your time I really appreciated it, your comments have been fascinating.

GF3: no problem at all

Interview 8: GF4

Andrew – This is my final interview no 8 of the series, i'm here with GF4:. We're going to about her use of JAWS, the assistive technology software, how she's engaged with it and if she's had difficulties with it, her support network and how she's used this since she's graduated from TCD and gone into employment or further education.
To start the interview could you just tell us a bit about yourself, the course you did at TCD, why you chose that course and your work since?

GF4: – I chose Law because I was always very interested in it. I was jealous of a friend of mine who had actually done it when I was growing up. Then when I started to lose my sight I remember one day my consultant said to me look there's another part to you apart from your eyes, because everything was always concentrating on the eyes, he said you're intelligent, use it in some way instead of just focusing on the treatment and the medical side. So, I met with a TCD staff member who works in admin for mature students. She helped me fill out the application form but I wasn't actually going to hand it in because Law is so elite. But I did and was called for an interview and got a place and was totally in some ways fooled because I though with Trinity being established as a top university in the World I thought that when I walk in here everything would be ready. But it wasn't.

Andrew – Can you talk a bit about your disability, how it started and how it affects you today?

GF4: – Well I was working in London at the time when my eyes started to go. I got really bad headaches. I went to see a specialist, they said it was glycaemia. Then I went to a consultant in Moorefield and I moved back to Ireland with my two girls and I was referred to Colm O'Brien, he's one of the top glycaemia specialists in Dublin. Before my eyes started going I had normal vision. I had so many operations, the eyes deteriorated and then just from the onset of glycaemia a secondary disease set in, the corneal disease, so that made the glycaemia get worse. I lost my sight in the right eye completely

Andrew – Whats the time period here that we're talking about?

GF4: – About twelve, thirteen years from the start to now.

Andrew – How is your vision now – what can you see on the screen or what can you read?

GF4: – It's very strange what I can see on the screen. I can see whats on the television and I thinks it's because of the contrast, It's the colours. With my screen that I work with I have a black background, white text. It's all to do with colours and contrast but everyday life , I can see nothing but shadows. I wouldn't be able to see a glass door or steps. Unless someone spoke I don't think I would recognise them so it's nice when someone speaks likes says hello or something. It's very very difficult sometimes when

you're using the stick and they literally don't see you or the stick. They just bang into you.

Andrew – So from the time when you had vision to the time now where you'd be classified as blind, your opinion of how you see the world disabled. What does that term disabled mean to you and has it changed from before you lost your sight to now?

GF4: – I think the word disabled would mean discriminated against , to me in a lot of ways. I know people think disabled they see the physical side of it. That is the biggest part of it but then there's the other side to it. Even before I lost my sight I never even thought about it, what the word disabled means. You see people in wheelchairs but you don't see people with eye problems.

Andrew – Would you see it as a negative term then? When someone says to you you're disabled, what would you say to that? Would you say I'm not or question that. ?

GF4: – Well I'd always question it. You feel like you're always having to defend yourself because I always had people speak on my behalf eventhough i would be in their company, like my sister. I remember one time she was actually speaking over me to my consultant eventhough I was sitting in the same room, sitting next to her. That's the way people do it sometimes.
Andrew – Is someone said to you what you would classify your visual impairment as would you give it a label ?

GF4: – I hate the word handicapped , I hate the word disabled. I think there are so many other words that you could use to describe it but I never really label myself.

Andrew – So how would you describe you're impairment, would you describe it at all or as a difficulty .

GF4: – I would, I know I have a sight problem and its dreadful , you can't even describe it half the time. But I like to say there's a problem with my eyes, I never say blind or that
Andrew – You finished your undergrad in TCD in Law. You've gone on to further studies and you've also applied for WAM employment. Could you speak to me about that. Why you went on to further studies and the WAM programme ?

GF4: – Well I went on to further studies because I thought that if I applied for a job, and you have to say that you've a disability. People say you're not discriminated against but I always felt that you are. It's like they might want to make up some numbers but at the end of the day if they were just to look at your CV and you hadn't said you had a disability of some kind, maybe you would be asked in for an interview.

Andrew – And the WAM side of things will that be a helping hand into employment or have you always shied away from making that step because of you're eyesight problem
GF4: – Sometimes I think I hide behind the studies, because then it's just me and the studying. I don't need to explain it to anybody, I don't need to explain my sight. Even though you do have to explain it in some ways because you need support.

Andrew – Do you think the WAM programme will enable you, is that why you've applied for it.

GF4: – Well I applied for it because I heard that they were very good. But I don't think they're as good as they make themselves out to be. They don't actually offer you any real support. I remember a couple of times when I was in here and people were talking about WAM they did this and they done that. I phone up and I found out that they do nothing really. I know they're employed for a certain reason but I just can't see anything that they have to offer
Andrew – So you haven't got much out of the experience all the way through

GF4: – No

Andrew – So you're continuing you're studies as a side track to taken the jump into employment?

GF4: – Yes, I'm afraid to, because it's how the employer's gonna take that. You're going to need special equipment, the noise of JAWS in the office.

Andrew – Just to finish off on your choice of Law as a topic, do you see your sight issue as being a problem to finishing Law? Was it something that you took into account when you decided to do Law.

GF4: – Yes, I think I just ran into Law. I never really thought. I know there's going to be a whole load of obstacles in the way like even to get a training contract, when you finish your fp1's and you go on to get a training contract I've heard of so few people being taken on for training contracts who are partially sighted or blind, and then you're thinking is it all worth it but you just have to keep going and see it will.

Andrew – Can you tell me about the assistive technology that you would use? In your case it would be JAWS or Zoomtext and stuff that you've been introduced to in your time in education
GF4: – The only thing that I use really is JAWS, I don't use any other kind of assistive technology software except the Dictaphone a small bit.

Andrew – So when you're looking to read stuff or go to websites to get information

GF4: – Yes, I find it very difficult. Because sometimes JAWS doesn't work with sites when you're working on the internet for some reason. And I've also found that even when I was sending emails through google, instead of the way it's set up on my computer, I actually have to turn JAWS off so I'm literally doing emails blind
Andrew – Okay so the design of what you're trying to interact with is poor. So just to finish off the point on the assistive technology, the only software you use is JAWS screenreading software

GF4: – Yes

Andrew – How do you approach technology as a whole? Do you see it as something that's stress free, suspicious, and helpful?

GF4: – I find it very stressful, I don't like it. I'm totally afraid of it sometimes because i do think well if I do this I might delete everything.

Andrew – But JAWS itself when you go to use it do you think oh I have to use it or do you see it as something thats helpful

GF4: – Sometimes I think it's mostly I have to use it, I don't want to use it. I have to use it because then I can't see what's on the screen even with the way you've done it for me

Andrew – Has your use of JAWS software changed your view of technology as a whole. Has it helped you engage with technology

GF4: – No, there were a couple of times when I was trying to access the internet to look up something to do with what i'm studying and you'd have to go around the world.

Andrew – Poor design?

GF4: – Yes

Andrew – What does the term assistive technology mean to you? If someone said to you can you use assistive technology, what does that term mean to you?

GF4: – The only thing that it means to me is JAWS. That's it because that's all I've ever really had.

Andrew – But that term itself would you see it as useful. Do you see a difference between assistive technology and mainstream technology or do you see them all as one or separately?

GF4: – Oh separately because is assistive technology for the partially sighted or blind is completely different

Andrew – Should they be different?

GF4: – In some ways they should be different because they can't all be the same but I think there has to be a huge improvement in the technology that's out there. I think more can be done and should be done, but it's just not being done. When I first came in here and came into Disability Services I didn't even know what I needed. I know I was assessed but I still to this day don't know what's available out there thats going to help me.

Andrew – Do you ever use any mobile devices?

GF4: – What do you mean?

Andrew – iphones, have you ever been introduced to that side of things

GF4: – No, never used them

Andrew – what would your view of them be, do you think it's something you would like to use

GF4: – I'd love to use it , I'd love to be able to

Andrew- Is your use of JAWS software a hindrance to you?

GF4: – I wouldn't call it a hindrance, it is a pain in the arse sometimes . When you're studying and I know you can get different voices but you're listening to the same thing. There's pros and cons, yes . It is helpful because without it you wouldn't be able to study. I wouldn't be able to do the exams that I wanted to do. But on the other hand it's monotonous and you don't get the same kind of enjoyment out of listening to a case through JAWS.

Andrew - Would you say your JAWS software is a necessity for you

GF4: – Yes

Andrew – Eventhough you don't really enjoy it it's something you have to use.

GF4: – Yes, sometimes I hate it but I have to use it

Andrew – Have you ever come up with any other alternatives to using JAWS

GF4: – I was shown how to use the Zoomtec but i'm just afraid of the technology, i'm not techie at all. I never have been and I don't think I ever will be. But I think when I was introduced to JAWS, I thought yeah that's it I don't need to do too much work.

Andrew – So you saw it as something that would allow you access to a basic minimum

GF4: – Exactly, because it was hard enough to do the work as it was without having to work on something else aswell .

Andrew – Can you describe any barriers you've come up against using your technology,JAWS software?

GF4: – When I was trying to look up something on the internet, the way my computer is set up I have to turn JAWS off. So when you think about it, I'm stuck when I have to do that. I can't do it. I would have to get a friend of mine to download something, email it to me and then I can get JAWS to read it out, but I can't do it myself.

Andrew – Accessing technology, cost and that side of things has any government agency been helpful for you.

GF4: – No, not really. When I think about it, I've never had any other software, gadgets

Andrew – But you have dealt with other agencies

GF4: – Oh yeah, I have dealt with a certain government agency , But I did have a guy who showed me how to change a document from rich text to Word so he was very helpful in that way but that's it.

Andrew – So you're on your own essentially from that side of things

GF4: – Yes

Andrew –Have you ever been discouraged from using JAWS as a way of accessing information. i.e. don't worry using JAWS I'll get someone to read it.

GF4: – No I've always just used the JAWS, I wouldn't ask someone to read stuff for me
Andrew – How are you supported in the use of JAWS financially, and the support network that you have in place at the moment?

GF4: – So you're on your own essentially from that side of things
GF4: – Yes

Andrew- And how do you contact him, do you have a working relationship with him?

GF4: – Yes I'd email him or phone him

Andrew – What kind of issues do you come up with?

GF4: – the last time JAWS kept on turning off

Andrew – it was something to do with the software then , it wasn't your hardware

GF4: – No

Andrew – How do you buy or get hold of technology. Is that through government agencies, trinity or have you bought stuff yourself

GF4: – I haven't really needed to buy anything because I just use the one that I got here

Andrew- would you like to know more about Assistive devices and be kept up to date on new technology?

GF4: – I would

Andrew – How do you think that could be achieved?

GF4: – I don't know, if I found a system like Trinity. I don't think i'd like to go back to the government agency. I hated every minute of it

Andrew – Where you ever assessed for your needs and supports

GF4: – Yes I was, but then that was it there was nothing ever done

Andrew – Was that with a specific government agency?

GF4: – Yes, that was years and years ago

Andrew – Was that before you started here in Trinity?

GF4: – I think it was, yes

Andrew – Were you assessed here in Trinity College?

GF4: – Yeah by the first fella Colm and then yourself

Andrew –And did we go through stuff?

GF4: – Oh yeah, you've gone through loads of stuff with me. But yes I was assessed

Andrew – From the assessment in Trinity, we then introduced Zoomtext and JAWS and we identified JAWS as something we should use and work with. Do you think that was successful?

GF4: – Yes, the assessment here was brilliant but I think it was me who puts up this anti to technology. The minute I was given JAWS I thought boom in my mind that's all I knew. I don't think I was ready to accept anything else. It took me long enough to accept that I needed to do my work through JAWS .

Andrew –So you stuck to one thing instead of trying to take on something new. Do you think you're in a position to take on new stuff now?

GF4: – I'd like to be because I'm limited with what I'm using and it's my own fault in some ways because maybe if I have been younger I would've open to technology and the way it's being upgraded every year . I think because I'm older i'm stuck in my ways

Andrew – Do you think the assessment process needs to be revisited? You were assessed via the government agency and in Trinity with small outcomes coming from those, Do you think it has to be a constant process?

GF4 – I do, and I'll tell you why. Because when someone comes in first to be assessed they probably don't tell you half the truth about what they can and can't see. Sometimes its embarrassing and you think well if I say I can't see that. You always want to be equal with everyone else and sometimes you wouldn't say. When I was first being assessed I don't think I let on how bad my eyes were because I was thinking it was embarrassing. And you have to build up some sort of relationship with the clients and you then get to know them better

Andrew –So the outcomes are important to you. Doing an assessment is one thing but getting goals from it is really the objective. Can you talk about that a bit more

GF4: – Exactly. I remember when I first came here I was promised this and promised that. And I felt I was doing the chasing for the first year with the library, upstairs and it just kind of put me off. Things like what way I would sit my exams, what way I would access information, get books. I actually had to go to the law school and say I need books, they didn't think how she is going to do it without books.

Andrew – Have you ever been anxious requesting technology support s. I know you only use one bit of technology but is that based in the fact that you're anxious about asking

GF4: – Yes and no – I think it's a bit of both. First of all you don't know what to ask for because you don't know whats out there. I wasn't anxious but when I was first given a Dictaphone I thought it was brilliant I thought it was really hi tech and when I showed it to my two daughters they went ah yeah., it's a Dictaphone

Andrew – So it's a lack of awareness for yourself, not through any fault of your own or maybe there is but there needs to be a cross over

GF4: – On both sides because you have a younger person sitting across a desk assessing an older person. It's okay for the younger person because they're mostly techie, they know whats out there but they have to inform the client.

Amdrew – Do you use your JAWS outside of your work?

GF4: – No

Andrew – So it's literally a means to an end?
GF4: – Yes

Andrew – Do you support yourself in your use? Is there anybody where you are now that can support your use of JAWS?

GF4: – Oh yeah my brother-in-law .

Andrew – But in your studies now is there anyone?

GF4: – No, they've sent me out past exam papers and reports

Andrew- Since you've left here has anyone sat down with you and gone through technology in you're new college – was it ever spoken about?

GF4: – No

Andrew – Why do you think that is – because there's nothing there?

GF4: – I don't know to be honest. I didn't ask for it and they didn't suggest anything

Andrew – Did you register with the disability services?

GF4: – No

Andrew – So you just self-support yourself

GF4: – That's it. Which is mad in a way because I put more work on myself. But I just didn't want to go through that fight again. Whatever I had I worked with

Andrew - How does your brother in law support you with your technology? Is he just good with technology, do you rely on him heavily?

GF4: – He's really good with technology, he's a computer analyst or something so if anything goes wrong with it I call him down. When he's not talking to me I'm lost.

Andrew – Do your work colleagues understand what your device does and support you?

GF4: – Some of them do and some of them don't – they hear the noise and say how can you listen or work with that. But no half of the don't understand what it is

Andrew – Is that a problem – would awareness help

GF4: – Well, It would be nice for them to know how you do your work but I can't see how they can help you
Andrew – By them know how it works would that create awareness about how you collect information eg the barriers you spoke about earlier. Having that awareness in general breaths good practise

GF4: – but then how do you inform them you can't really say to them go in and look and JAWS or Zoomtext

Andrew – Do you think it would be good for them to see that?

GF4: – It would, it would be really good. Maybe in university, work areal it should be talked about at least. Ther e should be more information. Knowing what it is just makes it more known how we do the work. Nobody really knows how we do the work the minute they hear JAWS they ask but no one really knows. If you went into a company and asked how a partially sighted person works, they wouldn't know

Andrew – Is that down to ignorance or just an awareness issue

GF4: – I think it's both. Why would they have to think about someone with a sight problem and the way they work because they're not themselves. The same as I was, I never thought about it before I lost my sight.

Andrew – So they don't do it on purpose it's just a lack of awareness

Andrew – Are you aware of Irish Law provisions into reasonable accommodations

GF4: – yes, like what your are actually entitled t, Like the company that you work for would be entitled to some people grant to make sure you have all the equipment.

Andrew: Have had to use the law provisions as a tool to get accommodations?

GF4 - you get accommodated, but I don't think there are reasonable. They'll give you the software but getting training is more difficult, I do not know, it only goes so far.

Andrew: do you know if your employer has an understanding of such regulations?

GF4: I wouldn't say they all know, I think the lack of understanding just puts me off.
Andrew: onto my last question. Overall, do you think the use of assistive technology is a positive support for students to take into employment?

GF4: I do it is positive, how could be negative when you think about it, it's helping you get a job and get into employment. Getting past the first step of getting into employment that's the big bigger step.
Andrew: do you think the two are minor assessment phase of planning in my research, to enable students some official documentation or assessment into employers to show them what they've used and where to get it, what are your thoughts on that?

GF4: I think that's so important, if, if you how it down on paper what they needed, what their accommodations needs are because sometimes it's very hard to explain to somebody who has not came across it before, something has to be there.. It shouldn't be always up to the vision impaired user to explain all the time what they need. If you have something can black-and-white to explain what they are entitled to as an employer, it would be a big help.

Andrew: my last point making the difference between a medical or social model of disability?

GF4: I have no idea

AC: would you see your disability as a problem for the environment at you are working in or do you see the disability as a problem for yourself to deal with, what's putting up barriers there?

GF4: I think it's a mix, but that is both, nothing ever is one-sided, there's barriers on both sides, there has to be something in between, it's as if people are afraid of people with disabilities. They just don't know what to do or what to say, what questions they can even ask that I'm politically correct.

AC: thanks for your comments and your time

GF4: you're very welcome

Interview 9 – Dell

Dell interview

Andrew: I'm here today with Octavian Racean from Dell's true ability section, thanks for taking your time for meeting with me today.

OR: my pleasure, no problem at all

AC: I have a number of questions to raise regarding students or employees and their disabilities, and how you (Dell) supported them or accommodate them to your best of ability, to kick off the interview are you aware of job applications from disabled people who have certain needs or is that something that raised by the employee after the process?

OR: no, we are aware, most of the people with disabilities that we recruit come in via certain channels, they are recommended and mentored by certain organisations like wam, we are already aware that they are certain shortcomings like short sightness, physical disabilities, like walking. We know a lot of things about them prior to the recruitment stage. We avoid the roadblock of putting embarrassing questions, questions that may give the wrong impression of the person who might not be selected because of their disability.

AC: you are aware the disability before the interview?

OR: yes

AC: the whole process of disclosure is taken out of the equation because you are engage woodworm and those types of agencies, they support in advance?

OR: the recruitment process is not necessarily a face-to-face process, many times and I'm taking my case as an example I signed the contract and went on my first day when my manager summary for the first time, during the entire interview process I was not physically on-site. The interview process took place by telephone; we exchanged emails, of course. Nothing would suggest that I was in a wheelchair for example. Dell is not interested in knowing that the user may have a disability.

AC: do you see any advantages in employing disabled users over enable users?

OR: from this point of view they are seen as the same, the disability part of the equation is transparent, there is no focus on the disability, for example, their ability to move or their ability to see or their ability to hear. The telephone interview would pop up the audible disability otherwise there disability is seamless.

AC: have you ever been made aware of the difficulties that it disabled employees might face when working within the organisation?

OR: from the technology point of view, as Dell is a technology company and we provide a range of products including technologies that can help users with disabilities, if an employee with a disability needs and adaptive piece of hardware or software this is not a problem for us, it's just a separate order to the factory.

AC: is the design of your system interface has any issues regarding the accessibility of that type of software, has it been tested etc. that you aware of?

OR: an employee, which either comes with a disability, we've also had a situation where a disability has been acquired during their employment, honestly based on medical reports the equipment or the adjustments to the physical chairs our desks so the user can use the appropriate equipment is used, this is taking care of by the facilities Department. The IT department is generally taking care of laptops, maintenance of internal servers. The facilities take care of the physical layout. We also have on the ground liaison officers, which communicates with such departments. For example, this user needs and new desk height or a bigger screen are bigger mouse ergonomic equipment. The mechanism is in place to provide the right environment.

AC: just go back on the interface, I'm not sure of your systems I'm sure you have many to import data into, the accessibility for an example to clarify, I'm blind user using screen reading software I enter into Dell to work and I'm told I am on customer service and I have to input what the customer is saying into the system, the accessibility levels of this to enable my screen reader to communicate correctly, are you aware of any issues around this?

OR: in my answer. I covered the hardware part, in terms of software or a specific or adaptive software it's less a focus of Dell. We would require some's software is needed, these are bought or acquired from third parties

AC: just to clarify that point and not to go on about too much , but the company has no problem getting in the software and you're open to accommodations in this regard, the actual use of the adaptive software with the mainstream technologies or mainstream technologies, do they talk to each other correctly? Have you been made aware of such issues?

OR: no, they go through training, if they have any problems they would escalate to their manager of the third-party software.

AC: what is the term assistive technology mean to you? What does that trigger for you?

OR: when I met you in December this was the target of the workshop we were very pleased to listen to your speech. The term in my view, means specific technologies to adapt and enhance needs with special needs. I've seen more in the robotics side of things, adaptive technologies play a very important part in adapting a robot to bring commands without that need for physical movement of our users hand etc.
AC: do you think assistive technology is separate to mainstream technology, I do you see them coming together or overlapping?

OR: I don't see them separately. This is more of an integrated view, it's coming more into play more and this is because of course the number of people with disabilities are on the rise, this is not the only one thing more and more the needs of common users are up to the level that they have to use less of the movement of the body. Universal design is much more appropriate, I can give you an example being incorporated to Tobi software into the Dell tablets to be manned by the movement of the eyes. Once

again, the type the high level of usability is not necessarily to be applied to a person who is completely disabled, but also a person who is in traffic and wants to find directions to a certain place and they control the target using the eyes.

AC: what your perception of end user assistive technology be expensive or complex, hard to integrate?

OR: I don't see the technologies issue here, the complexity might be on the software part, but not in the hardware point of view we have the right technology is in place to answer such changes. By all means technologies is moving towards software. More and more hardware is left aside, so the software must also be adaptive. Perhaps as a side note for specific needs may well be necessary to adjust the software, the adjustments would be for the benefit of a small range of users, so companies nowadays there is a temptation of working out that P&L - the profit and loss, but more and more companies nowadays don't see adaptive technologies as a loss in their books, but more PC is as a gain because of the increased engagement with end users. It's definitely changing the way the problem is tackled.

AC: so they seed as a benefit not just one employee, but to benefit the entire work force, it's not a negative they see it as a plus, but that be fair comment
OC yes
AC: have you ever been aware of Dell employees you have used assistive technology?

OR: yes, in the past I've told you about an employee who had impaired vision and during her employment she had another accident and she was confined to a wheelchair, not permanently, but she required a certain type of monitor, a complex monitor that was necessary not only to have big letters on the screen, but a high resolution, her entire desk was changed so she could get there with her wheelchair. It was a learning curve for both parties, she had a lot of strain and a lot of bad luck. To not only have one disability but to require a second one was unfortunate.

AC: did the accommodations you put in place help her continue in her employment?

OR: yes. As far as I'm concerned she gave up her employment as she had second son.

AC: in relation to those accommodations how were they put in place? Was it assessed by somebody internally or externally to do any type of assessment what you leave it down to the employee to make the request?

OR: not necessarily so, there are no cast in stone procedures, usually the facility Department has the knowledge and they know where to look for occupational adaptive things. Of course we have a few employees internally who can be consulted on the matter of technology, we also have an occupational therapist who can answer such questions and provide guidance on what to do in certain situations, and they are not on site.

AC: so the procedure would be if I came in the disability and I had accepted the job and if I needed an accommodation it would be up to the employee to make the request against coming from the employer who might ask these questions via a PMDS or an annual review, is a left to the employees solely?

OR: no, any new employee goes through an induction programme, it's very common, it's the right moment to pick up any issues. In this induction programme it consists of a presentations of different sections, activities within the company, the Facilities department come in and do a presentation on the physical environment and ergonomic equipment, the way works not only from the law point of view but from the health and safety point of view employees are not allowed to move equipment, there is a process in place to log a ticket for the move to take place. There are certain processes in place and we are aiming to prove ourselves. On the other hand, most of the cases that I am aware of. They had assessments done already done by an occupational therapist, they had GP recommendations.

AC: it was more transparent for you to put recommendations in place as you had something to go on?

OR: yes, he already had a recommendation in place.

AC: have you ever received any feedback on the use of their assistive technologies, is something that they feedback on, is that a process they can revisit? For example, if I start a job and I'd been through the induction process and that really helped me, but after the second year my eyesight has got worse or I have acquired a second that disability, is there a way to revisit that process?

OR: the company offers health checks, and by all means they are voluntary, it's a benefit for the employees, if this is picked up there , you are obliged to tell your manager, for e.g. my right ear has difficulties and I've popped up to my manager to say I needed had better headset, from this point of view, the process is very easy, manager put in place an order, and this goes through for approval for funding and so on, and you receive another headset.

AC: just to clarify, I know you've covered this point. Already, but just to ensure it's covered to any of your IT support staff have a working knowledge of assistive technology or do you rely on external support?
OR: I partially covered this already. We have people who were dealing with assistive technology on a global level, not just based here in Ireland, it's the nature of my engagement in the true ability Department I get in touch with such expertise to ensure my support are aware of such help. They are running through a kind of template to assess for a special school on the customer side but their experience is also use on the inside.

AC: so you have a knowledge base on the outside that you can relate to, do you use any external support for examples, government agencies you spoke about WAM and ahead.

OR: we are in contact with WAM as I mentioned, they definitely came to bring us a lot of knowledge in terms of running assessments on site, on factory site we had to run an assessment like we've done here, for example, we had to reshuffle the parking spaces for an employee you has a disability, once we detected a short coming, we went through a process of correcting different staff areas. For example, the access buttons for the staff making things more universal.

AC: do you think awareness and staff training in the use of assistive devices would encourage the use of such devices among staff and is not seen as much of that placebo?
OR: definitely. It encourages people to come forward, one of the things that true ability wants to achieve is to leave people with a confidence feeling that they can disclose their problems without the fear of a bad feeling, it's the culture of the company where things like disability or temporary issues using technology or on-site facilities make people more comfortable, in certain situations they could work from home, if somebody chooses, For example to work from home that's not a problem, they are different programs for this circumstances.

AC: your staff appear as a whole their awareness of this those types of accommodations if they have a need for it would you say is a good would does it take time to build awareness among staff and trust?

OR: I think from this point of view true ability marked big progress, probably two years ago on-site there was much more a reluctance in disclosing such issues, because of implementing true ability and promoting the idea of conclusion people feel more comfortable, if you have a permanent or temporary disability. It's not a problem.

AC: you're making things more open, it part of what we do here, it available for you, it's not like what are you going into that room for!

AC: what measures to you think an organisation can reasonably undertake to accommodate a user, is there a limit to what you can provide our wants you know the employee is happy the organisation will go to whatever bounds are at needed to accommodate such an employee, or is it a joint approach?

OR: the fact that somebody has a disability and that the disability may be hidden it's obviously a legal bound to the company not to go and investigate the employee with questions that are personal, even if you have not disclosed to your manager, your disability is not necessarily public or should be in the public domain. So in case somebody has a hidden disability, it can make things easier if he/she come to us and ask for support for a certain problem. I have seen time and time again managers encouraging via one-to-one sessions or ad hoc workings to have open discussions on things that are more personal to the employee. The person receives the support that they need.

AC: very good, so there's no set limits on the supports somebody saying this is as far as we this is as we can go, the company is open to taking things on board from the employee, that's reasonable to accommodate.

OC: I would say that there are no budget limitations on this either, whatever is necessary from the company site is done

AC: do you have any equality policy within your company to ensure products are of universal design, even the formatting of documents, internally am talking about? A policy that ensures everything is have a standard?

OC: from this point of view there is an equal opportunities employer, the entire organisation ensure their concert and services can be adapted to specific needs, so obviously it follows the same path

AC: if there a staff policy around equality or disability? Again, just for example, Say I am a new employee I come in the door as part of my induction that I go through, I made aware of the code of conduct for what you aware and that the policy on equality/ accessibility, is there any formal policy in place that I can refer to as an employee, or it**'s** just management, led?

OC: no, there is a policy in place. Usage of appropriate clothing, things like this, but for example there are no limitations for wearing specific clothes, we even have an international day where people are able to dress in their international clothes, we provide support from other religions

AC: just to clarify the point, there is a physical policy written note by management around equality or access? Some think an employee can actually read up on that
States that we are an equal opportunity employer; stuff can be an accessible format.

OC: yes, it is a policy in place

AC: justifiable from not point to follow up on national legislation and the disability act, which are both tightly aligned to working accommodations which policy reflect the same themes?

OC: Dell upholds all laws in all countries, so we have to follow that the rooms.

AC: do you think assistive technology is a lasting resource that can benefit all employees in your company?

OC: yes definitely, we would like to see more disabled people integrated into our organisation, definitely. This was my name to visit Trinity and I would be very happy to co-operate and your service to find candidates who were interested to get into employment with Dell, by all means it would be good to see students but all abilities coming into Dell.

AC: finally my assessment tool. I spoke about earlier on, do you think that the tool would be useful if somebody came to you that had a written assessment of the technologies that they have used before, but that beer tool that could benefit Dell?

OC: I think it would benefit us to raise awareness of what assistive technologies they have used before, it would save time and resources in going through assessments. It would be great at that have some history on the person, obviously it would be good to keep in touch with previous employers or support organisations that have looked after that person. This is why it is much more easily to go through an employment process with a government agency like WAM because they have been looked after by them and they know there are issues. Like your position within Trinity college it's like an incubator people with disabilities are encouraged to leave on the own, he accommodations are put in place by WAM, but they are encouraged to transition to an independent style of living, so definitely. It's good to keep in touch with such

organisations because they can provide you with information and history, and a bit of advice. In these cases is much more it easy to know what the specific needs that need to be met. Obviously it's a process that you don't leave out the most important person itself, they might not feel comfortable coming forward about the assistive technology for such a process helps.

ac: it's about making the match with the person and the technology, the idea of the exit strategy is that they see the benefit of the technology moving forward that there is a link there with the employer and the past use on the employee does not have to justify it all over again and that is a link to support. In your case, you have a lot of support in-house but in the case of this is assistive technology having expert help in this field might be a benefit.

oc: it's definitely two-way process, engaging the person in open dialogue, it may surface that in their previous employment they've used a technology that is outdated and we may find out that they can use a new technology, so the feedback would be of benefit.

ac: thanks for your time

or: no problem at all

Interview 10 – Stephen Long DIT Assistive technology officer

AC: hello, I'm here today with Stephen Long, whose the assistive technology officer here in DIT in Angier street, thanks for taking the time today to meet.

SL: no problem

AC: I'm going to ask your reflections - views on supporting students or transitioning students, which is what my research is about from an educational environment into employment, how we support such students and how we should not support, just to kick it off do you feel assistive technology should be an area specific or should we embedded across a student's lifetime, should be thinking about education only on its own or something that there are going to be looking for the student to use for life when procuring such devices?

SL: my perspective my philosophy is that it should become something that is part of the daily life, while we have our limitations based on funding and all the rest. I liked the idea that it becomes mainstreamed, we have to focus primarily on the educational side of things, but I do think that it's something they should be able to take forward. There's too much of a division between education and real-life as such, I tried to explain to students their course of educational and stuff I'll be doing with them is just part of a bigger picture, it embedded into their life. It should not be separate from the rest of their life.

AC a tool for life

SL exactly, the processes are important, get to grips things on a daily basis and enjoy things on a daily basis because at all about processes, we are always running towards the end! It's really looking at is a bit more holistic view, the educational side of things there should be no barrier between educational and a working life. You should look at the tools and skills that are transferable from an educational background, why you would AT be anything different really, is just context were you are using it, you still have the same difficulty , but that assistive devices just aiding you.

AC: do you see any barriers for users who want to take the technology they have used?

SL well in general , a lot of it comes down to the practical side of things, budgeting and licensing and how expensive assistive technology can be when it shouldn't be, I suppose where I come from, and a silver lining from us been under such tight budget constraints is that you have to be a little bit inventive, use what students use in their day-to-day life and use them in College that there are always have, there is no cost for me to give it to them, but I've might sparked the idea with them, I think that's one of the keys. As an AT officer part of the assessment is to figure out what they do on a daily basis what the use, even for leisure activities. Does that technology have facilities I will lay the main education and them for aid them in the workforce as well?

AC have you ever supported anybody are had any dealings with people who have graduated out of DIT and moved into employment, any feedback?

SL: I have to say I haven't had that many who would come back to me after they have left , but I do talk in particularly here in Angier Street, I what I've had an off a lot of interaction with some of are slightly higher needs students who before even done they have completed their final year exams and it's not because of the exams you could feel their anxiety on what am I going to do next, I would do a lot of refreshers work, ensuring that they had software, open free software that are well able to use it and use it going forward. I've had, despite the number of students I've seen over the six years not so much feedback after they've left but they have been times where I've bumped into students and you are somehow you're getting on and they don't specifically mention the AT! But they do use it, I think if we open their eyes to the possibilities of assistive technology, despite finance and all the other side of things, I think it's the mind-set as well of the practical tools, they are open to do things, I'm providing the avenue for them thinking in that perspective, I have to say I have made sure students before they have left they have had to upgrade the software all that, of thing. If the money is there give something to take with them to give them a better confidence within the workplace. I have seen a number of students on an informal basis, once I got a phone call from a HR manager in accounting firm it turned out that it take all the graduates from DIT and three them use assistive technology, she was been very cagey to start regarding confidentiality, but he ended up being DIT students anyway, it turned out that 2 to 3 students have a fairly high level SpLD, they had never disclosed to the disability service, but their manager recognised that the employee was very bright aurally everything was fine, but when asked to do something on spec it all fell apart. In that respect, there is a place for students that we mightn't have seen for employers to have some information because they are recognising that they knew employees it a perfect person for the job, interview process worked, they got the right person, but they do have difficulty in a certain area. And then knowledge is just poor.

AC: do you think a transition tool what arm a student for questing accommodations within the workplace and providing a smooth transition for them and for the employer?

SL: definitely. I definitely believe so, there are always issues surrounding disclosure, it's always going to be one of those subjective type of things, depending on the environment somebody's going into, depending on the individual, their personality and how they can sell themselves. It shouldn't stop you implying but I definitely think we do need something in between. Something to help in the transition, I do think employers need to be informed, I don't think there are bad guys who on the moment the employee discloses that they go oh I don't want to deal with you because you're too much trouble, I think that if the information is out there, even the ones that may think that way might change their attitude slightly.

AC: would you feel that the employer would only see the disability as a negative and not seen the skills.

SL yes, not seeing the skills and the great ability that person has, especially with the assistive technology in my come to the realisation that actually this is an issue at all. This person can function in exactly the same way as everybody else, and perhaps better because we've really employed a very good person here and we just need to supply them with X, Y and Z another office tool.

AC; do you think that some of those tools could be used for the entire workforce?

SL: exactly. My wife one of the senior partners company she works for has the greatest spoken English you've ever come across, but he has hard-core dyslexia and she actually does his letters for him and my white dictates all the work. I told him about read and write gold. If you can have the senior manager that will allow other people. It makes it more mainstream, everybody can use it. That itself takes a stigma way. This is another part of the office suite.

AC: you can use your Microsoft Word, PowerPoint and you can use your read and write gold if you want to.

SL: maybe that's the way to sell to employers as well, you shouldn't have to set to people in that respect because all it is. Just take a read and write gold for example, realistically, you can actually add all those tools into Microsoft office. If Microsoft wanted to do it. There are really just extra facilities that you have in word. You need to do put people that assist not just freaky thing.

AC: even the name can put people off the name read and write, people think sure I can read and write why would I need such software, they would shy away from it because they are degrading themselves.

SL: the label has connotations, social construction of disability. We need to be aware of such a feeling so we can break down the stigma than the barriers. Even the term disability. It gives a difficulty, gives a label. Everybody has difficulties but that does not labelled as disabilities.

AC: do you think the employer's responsibility to provide the accommodations and

support the employer or do you think there is a role there between an educational or a government agency to overlap and be involved in that transition, even around awareness, even getting those products into the workplace.

SL: I hate the idea of things been fragmented so much that it becomes responsibility of being X or Y. I think a partnership approach is the way to do it, that there are consultations between all of the parties involved, for the agencies involved, I definitely think the educational sector has to be involved in the current climate in Ireland. Even when I was growing up third level was seen as an elitist thing, but now it's just universal. From school to the workforce increasingly, people have got in between that them going to third level. Third level has already changed because it's so different from second level and into employment it a natural progression. Anybody working within services within third level were seen this on a daily basis. We can see the mind-set changing and we have the expertise to bring it on to a new level, qualitatively we have the expertise we work with it on a daily basis and were seen students for 4,5, 6 years at times and were seen the issues that come up. It is part of frame of reference by giving advice and were constantly learning new approaches, I deftly think we have a place.

AC: and finally my last question, how do you see assist technology groaned when the next five years, barriers to thing might exist?

SL: technology is growing to such an extent, and there's positives and negatives to both, in some respects and I'm not talking about assistive technology there are dependencies formed on technology. And that's something I'm always wary of, in this context here not everybody will have an employer that is open to things, self-advocacy is very important and I would like to think assistive technology would go in that direction were mainstream mean is number one and everyday tools that people use would be universal access. It's too way assistive technology needs to go, but I've noticed even using a smart phone or a tablet the first thing I did was to look for it assistive technology related apps, there are so many general apps that you can use on a daily basis. If you look at the functions of what were already using it already there, accessibility options on every laptop, and I think that's the way forward, instead of marginalising you should open it up to make it more mainstream. It will help students to identify having a disability and it would also help people who are afraid to identify.

AC thanks for your time, relieve appreciated

SL no problem at all.

Interview 11 – Henry Langton – DCU Assistive Technology Officer

DCU interview - Henry Langton

AC: I'm here today with Henry Langton, who is the assistive technology officer here in DCU, Henry thanks for taking the time of having a chat me today

HL: no problem

AC: to explain my research I am looking to develop a tool to allow an easier transition for students to bring the assistive technology into a work place environment, do you feel that assistive technology should be area specific or should embed itself across a student's lifetime journey, if you're looking AT should it be our role to support the student solely in an educational environment or should we be looking beyond to this environment?

HL: I think with regards to my job is based around the educational environment. From the time they come to the door and first through to the time that the graduate, I think the importance of it being a tool that can be used further than just the graduation, the significance that is very important, what you're looking at their is giving information and the tools needed for that and proper advice, but not that you can't be responsible it would be very hard to continue the support posts graduation. It's a case of giving the right information, setting up the right accommodation that works for them and to give them the ability to go out into industry that they know the tools and support that they need.

AC: to get tooled up for the supports that they need

HL: yes

AC: do you do you think that there should be a phase that you have a contact with the student after they leave if this student wanted. For example, six months or again do think that is not feasible

HL: I would like to but I don't think it's feasible, if you look at everything that's in their current role of the AT officer in a university it’s very much driven by supporting students to the academic study. To support them after the academic study I think would be good, but resources are limited.

AC: have you ever supported a student or had queries from students who have left here, can you explain

HL yes, the support I've given after graduation are basically things like if you give them software during their undergrad they would ask questions like could I still use it, if it on their laptop. It's okay for them to use. The students sign up to use the software, whilst academics, but mostly the software & new updates are needed and I would let them to keep using the software. It's questions around that, I will not troubleshoot support because again, it required a student of graduate students to come back into DCU. Other questions will be around their account settings, but is still use DCU apps etc.

AC: what do any be questions about using the assistive technology and using it in their employment area.

HL not really no, if they had a question like that, judging by the fact that operating systems changes the are usually asking questions about how to upgrade their software to get their assistive technology to work. Within industry they might not have the

support they had within third level. In might not be fair to say to give them an assessment that I would advise their employer to upgrade the equipment or the software, it's hard to be responsible for that. You're basically asking industry to change how they support a user.

AC: do you think a transition to a transition arm would give the student a better understanding to request accommodations within the workplace and provide a smooth transition into employment for both the student and the employer.

HL: absolutely. It's not that the employers, says I have an employee with a disability. It's how can I support this user, it's not a case of fear , it a case have not been able to provide accommodations for that reason, some employers are reluctant to hire students / staff with disabilities because they feel that do not have the appropriate skills , also there is a cost factor that . If they don't have the appropriate skills it probably going into the unknown on how do I support my staff if they do not have the expertise?

AC: just to clarify the lack of knowledge and the lack of support would be a barrier to them. Would you see any other barriers?

HL: yes, it was not been made very clear to the person who is getting employed what's required and if the type the skills that are required are not transparent it means that the expectations can be higher than what the person seeking the role is going for. They might be out of their depth and need further skills, support, that could be an issue

AC: any barriers accessing technology or assistive technology for the employer and the lack of support as you spoken about is there any other barrier to think of?

HL: yes, I think working in assistive technology in a university you know all of the contacts and you have all the information. It's easy for you to get to support. For an employer in might be a lot of work to get such supports unless they had somebody in the Department that already put those support in place. So maybe you would have an IT department in a work environment and part of that IT department could be support around assistive technology. If they don't have the support, I don't think an employer is going to employ somebody to take on that role, again, is a lack of information

AC: do you feel any third party play a part, government agencies. For example, the NCBI ?

HL: on contrary to my last answer there is people out there that have the expertise and employers can contact these people for information. That it is very doable. There's no reason why an employer can’t support somebody with a disability, providing the disability does not hinder to do the role. There's no reason why an employer can’t put in the reasonable accommodations for that.

AC: just finally how do you see a tea growing in within the next five years and what barriers do you feel are in place?

HL: I always felt big companies that employ over and a thousand staff should have within their IT department an expert in assistive technology because if you look at the statistics with people with disabilities is not just students it's true out the entire

industry. For instance in DCU we have over 1500 staff employed and we did a survey to staff recently to see what percentage of staff are actually willing to say that they have a disability . Think the results were around 8 to 9%. If it's 8% to 9% here in DCU why isn't there support within industry? The lack of disclosure leads to a lack of supports.

AC: do you see assistive technology becoming more mainstream, could you see a day were assistive technology does not exist?

HL know because I think assistive technology is always changing, if you look at things like a lift or a ramp to support people within wheelchair assist users of bikes and buggies. It's the same with any other assistive technology software that for SPLD students can be used by all students and get the benefit from it, it should be part of the mainstream, but I always think that there is so much changing with disabilities and assistive technology. Firstly, it always going to be tried and tested with users with a disability and if it's very successful it becomes mainstream. For for example, is mind mapping software help people that procrastinate and help it with time management yet all students can get had benefit out of it and staff for that matter.

AC: so you can get used in the matter who you are, moving it into a more mainstream area. You could see it getting more benefit?

HL for sure in my own role , which started within the disability service and moved into ISS the computer department, AT is part of the service desk , and students can drop into ISS get support would assistive technology . My own role is more specialised in assistive technology but all the staff have some idea of how to support students with a disability, that's giving the right information on how to download a particular software. It enables them get the tools that they need and there's no reason why assistive technology cannot be a main part of the software students get and the support students get.

AC: thanks very much

HL: you're welcome