

A Phenomenological Investigation of Learner Usage Patterns, Attitudes and
Perceptions of Information and Communication Technology (ICT) and
Technological Preparedness for the Covid-19 Pandemic Crisis

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July 2020

Dissertation in Partial Fulfilment of the Requirements for the

Degree of

Master of Arts in Learning and Teaching

Presented to:

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Abstract

This exploratory phenomenological investigation addresses the lack of regional data regarding learners' perceptions and attitudes towards ICT in learning environments. The substantial dependence on information and communication technologies (ICT) necessitates relevant and appropriate evaluating usage tools. Measures of usage, attitudes, and perceptions towards ICT and in particular, digital and social media are varied and this can hinder the comparability of data (Costa et al, 2016). Furthermore, many of today's learners are digital natives (Prensky, 2011) and this makes the necessity to assess behaviours and attitudes in ICT usage even more pertinent (Costa et al, 2016).

This study is focussed on adult learners that are currently in or recently completed an educational course of study. The empirical study was composed of a mixed-method questionnaire of open-ended questions that gave insights into learner's usage of technology and their views and perceptions of technology within their respective learning environment. The study data from 84 participants was analysed and summarised and emerging themes were identified. The research study found that participants had a wide range of ICT usage patterns and range of experience of using technology both for everyday use and in learning environments. Participants had both positive and negative views towards ICT technology usage and diverse opinions on the challenges and benefits it delivers. Areas of particular significance are ICT usage patterns, ICT devices, access to devices, perception, and attitudes of ICT in learning and technological preparedness for online learning due to the pandemic crisis. This research will inform and influence educators on learner technology usage patterns and provide learner opinions and behaviours relating to technology. In addition, it will offer an insight on dependency on technology and how prepared learners were technologically for the Covid-19 pandemic where learners were forced to switch to online based courses with very little forewarning.

Acknowledgements

I would like to express my sincere thanks to my supervisor Dr Louise Duggan for her guidance and support throughout this dissertation.

I would also like to thank the learners that took part in this study and my family for their support and encouragement.

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Chapter One: Rationale and Introduction

1.1 Introduction

This chapter provides a background of the research project and is reinforced with an overview of research methodology. The purpose of this research study aims to research and investigate the usage, attitudes, and perceptions of information and communication technology (ICT), in particular, digital and media technologies within learning environments. The term information and communication technology (ICT) is the different sets of technological tools and resources used to transmit, store, create, share or exchange data. These technological tools and resources consist of computers, the Internet (websites and emails), broadcasting technologies such as radio, television and webcasting, recorded broadcasting technologies (podcasting, audio, video players and storage devices) and telephony (Unesco, 2020). This research project investigates learner ICT use, articulates the attitudes, views and perceptions of learners towards ICT and explores learner preparedness for the pandemic crisis.

1.2 Rationale

The use of ICT has increased dramatically over the past twenty years and it now has a significant role in society in addition to improving quality of life. It also plays a substantial part in the productivity of enterprises, businesses, and informational technology (IT) services. According to Statistica (2000) 4.6 billion people use the Internet every day and 3.5 million people have a mobile phone, the majority of these smartphones. Short message service (SMS) text messaging, another technology domain, has also grown dramatically, especially for young people.

In conjunction with ICT advances, teaching and learning environments have changed significantly in recent years with educational courses accessible to all ages in a variety of flexible formats to suit every need. Learners are now digitally aware when starting a course as they are exposed to a digitally rich environment from a young age in a world full of communication technologies. Young learners from the Net Generation (Tapscott, 1998), also known as digital natives (Prensky, 2011) have grown up with ICT. Research shows that this can subsequently impact their learning experiences on their chosen course and infiltrate into the classroom (Selwyn, 2020).

There is abundant literature from the past two decades that examines the effect of technology on learners' academic achievement. Fonseca et al. (2014) indicated that by using technology, learners could increase their level of engagement with the programme content, and this could lead to an improvement in overall achievement. The research revealed that learners who use technology in education outperform in student engagement and achievement and indicated that technology was interrelated with student motivation and an incentive to learn, finding a significant association between learner technology use and their subsequent academic achievement. In other studies, Cheng et al. (2015) found that learners long term knowledge retention in a technology-enhanced classroom subsequently influenced learning outcomes. Measuring and assessing the overall impact of ICT is not without its difficulties, however, this research project aims to investigate learner attitudes and perceptions towards technology, alongside usage ICT patterns.

Progressively, academic research has concentrated on the potential benefits and pitfalls of current technologies, especially concerning social media technologies (SMT) (Best et al. 2014). Bonetti et al. (2010) confirmed that the internet allows users to fulfil social interaction needs and explore their identity. However, the effect of social networking, internet dependency and addiction poses various issues. These harmful effects were reported as having the potential to increase social isolation, exposure to harm, cyber-bullying, cyberharassment, and mental health issues such as depression (Best et al. 2014).

The use of ICT including digital and media technologies continues to be a topic of interest in education as the past decade has seen the rapid development and use of ICT in teaching and learning. The need to incorporate ICT into learning environments is universally accepted. New technologies have the potential to reshape all scholarly areas and provide an abundance of teaching and learning resources (Weller, 2011). However, the relationship between technology and learning is constantly changing as technological innovation and digital technologies advance and progress. This has caused exceptional changes in the provision of teaching and learning courses and as the uptake of technology in educational institutions increases, the role of the teacher/tutor has changed to that of facilitator (King, 1993). This paradigm shift has moved the emphasis from teaching to learning and has encouraged control to be moved from the teacher to the learner (Barr and Tagg 1995). The focus now centres on the learning experience and this leads to an increase in opportunities for more flexible learning environments such as online and blended learning options using a variety of digital tools. Online

learning is any type of learning that takes place using the Internet as the communication method and blended learning uses a combination of online and face-to-face communication for learning.

There is a belief that technology enhances and transforms teaching and learning in education (Beetham & Sharpe, 2013), and another belief that perceives these technologies as troublesome, difficult to cope with and a view that not all modes of digital engagement are suited to teaching and learning (Losh, 2014). Nevertheless, education providers are transforming their approach to technology use so that emerging technologies have a meaningful impact on teaching and learning. These demands have brought additional burdens and challenges creating shortcomings and deficiencies in the system that must be acknowledged. Successful course completion now requires a fundamental basic knowledge of technical skills as a prerequisite for learners and those without these essential skills may commence their course of study at a disadvantage and struggle throughout.

While it is evident that there is widespread technology use in education and the need to incorporate technology into teaching and learning is widely recognised, there is little research into the frequency of technology usage and learner attitudes towards technology use across all learning environments. This study aims to analyse the complex relationship between technology usage and learning from a learners' perspective. This mixed-method research project involved collecting, analysing, and interpreting both quantitative and qualitative data from adult learners in all types of learning environments from secondary schools, further education and training (FET), third level, and other learning environments such as online, blended, and work-based. It examines and investigates the experiences and behaviour of learners concerning the frequency of usage and knowledge of ICT, in particular digital and media technologies. In addition, the learners' perceptions and views of how well equipped they were technologically in relation to their preparedness for the recent Covid-19 pandemic was also explored. This research project utilises an existing survey instrument and adapts it for further investigation and analysis in this subject area.

The main objective of the research was to determine the technological skills of learners, along with their frequency of use of devices and explore learner attitudes regarding technology use in learning. A central question is whether the learner perceives that the use of technology has a role in the teaching and learning environment and the impact technology has on teaching and learning. Many studies

investigate the use of ICT, including digital and media technologies in teaching and learning (Wang et al. 2014, Henriksen et al. 2018, Head et al. 2002) but very few studies on this topic that relate to all modes of adult learning including Further Education and Training (FET) and work-based training courses in this specific region of Ireland.

This research project will increase our knowledge of learner use of ICT and in particular digital and media technologies, along with learner attitudes and perceptions towards these technologies. As a result, educators will be better placed to put interventions in place for future learners.

Chapter 2: Literature Review and Critique

2.1 Introduction

This section includes the important theoretical considerations associated with the research study and research on the identifying themes, including ICT usage and practices in teaching and learning. It provides an extensive literature review in the area of technology use in education in relation to its definition, rationale, benefits, and challenges. Furthermore, the research expands on recent relevant literature and theoretical frameworks related to technology use in education and explores the current method for measuring ICT usage and behaviours.

2.2 The Changing Learning Environment

Technology has greatly expanded access to education and its widespread availability can enhance education and deliver flexible learning options. New technologies are challenging ‘academic cultures’ (Elhers & Schneken-berg, 2010), and the ways we learn and teach in educational organisations.

Opportunities for communication and collaboration have also expanded due to technology. In the past classrooms were fairly isolated, with team work among learners limited to the same class or organisation, but now, due to technological changes communication and collaboration can occur all over the world. Additionally, Mishra & Koehler (2006) suggested that facilitated technologies can be integrated with content and pedagogy to engage and enhance learning, and that the task is not so much cost or access to technology in the classroom but how best to use the technology suitably in the context of the course and classroom that best fits with the teacher or tutors’ pedagogical inclination.

There is an assumption that new generations starting education are digitally literate because they have grown up in a technology rich environments but research by Bullen (2011) questioned this empirically. It is disputed whether increased access and use of technology enhances teaching and learning by improving academic performance and fostering student engagement. Previous studies by Elsevier (2016) revealed that the use of technology had a direct positive relationship with student engagement and self-directed learning but no direct connection was found between technology usage and academic performance.

Internationally, the prevalence of a digital divide among third level students belonging to the same cohort is well reported (Cavalli et al. 2011). Empirical studies show that socio-economic, cultural conditions and the family context can play a more important role as drivers or inhibitors in the acceptance and implementation of digital tools by learners (Hargittai, 2010).

2.3 Technology and Education

Digital learning is regarded as any type of learning that uses technology and occurs across all teaching and learning curriculum areas. Digital technologies could be digital tools, systems, devices and resources that generate, store or process data such as social media, online games, multimedia and mobile phones (Unesco, 2020). Within education, the term Technology Enhanced Learning (TEL) is now commonplace and this umbrella term describes any situation in which technology is used to help learners engage with teaching and learning. TEL has the ability to affect deep learning and this technology usage and knowledge can be a critical predictor of success and promote higher order and deeper learning.

The successful integration of technology into classrooms is a goal for learners and teachers alike. Teachers now have access to a variety of digital technology innovative tools that can and are used to enhance the curriculum. These tools allow teachers and learners with new ways to perform research, offer a limitless amount of information and allow teachers and learners to work collaboratively with each other so they can connect with others around the world. Integrating digital technology into the curriculum with computers, interactive whiteboards, class blogs, podcasting, and social networking can improve the quality of education (Autio, et al. 2019).

There are two main strands within education, that technology integration has allowed learners to engage with and become confident users of digital technologies and, that technology use will increase engagement in learning and improve learning outcomes (Selwyn, 2009; Thompson, 2013). Prenksy's (2011) research introduced the concept of 'digital natives', indicating that current generations of learners having had access to a society more saturated and dependent on technology should be more technology aware. His research findings imply that the concept of 'digital natives' may be misleading and that the disconnect between learners' in class and outside of class technology experiences may be the result of the lack of sufficient teacher training concerning technology integration strategies. Further research concurs with this view indicating that many learners are not confident or interested in using

digital technologies. Wang et al. (2014) suggested that the problem appeared to reside in learners lack of opportunities to practice technology beyond pursuing personal interests even though many learners may be fluent in using entertainment or communication technologies. However, more evidence is required to support this learning and understand how these technologies are used to solve in-depth cognitive problems.

There undoubtedly is a complex interchange of relationships between learner technology use, learner engagement, self-directed learning, and academic performance (Rashid and Asghar, 2016). Junco and Cotton's (2012) research results indicated a negative but insignificant relationship between overall technology use and academic performance. Their research investigated the effect of multitasking ICT applications on college performance grades and reported that while students spent a large amount of time using ICT daily, the content was often not related to their course of study and that using Facebook or smartphones at the same time as completing assignments or schoolwork may tax learners' capability for rational information processing and impede in-depth learning.

At a local level, the Irish Action Plan for Education (2018) is a 3-year plan that articulates the goals for the Department of Education and Skills (DES) and this plan, alongside the Strategy for Technology-Enhanced Learning (TEL) (2016-2019) (Solas, 2017) aims to establish TEL as an intrinsic element of the Irish education and skills sector. The overall aim is to equip learners with skills to use technology and ultimately enhance learner engagement and outcomes. This research project complements these goals for a digitally knowledgeable learner and will assist with providing underpinning knowledge in this domain.

2.4 Changing Learning Styles

Familiarity with new technologies has changed the way learners learn and their style of learning. Shaw and Fairhurst (2008) described Millennial learners as active learners and interactive approaches are suggested for this technology literate group as the learning styles and expectations are different from earlier generations. Exploration of the effect of technology on learning style reasoned that technology has augmented the requirement for structured, practical, interactive assessments in learning environments (Shaw and Fairhurst, 2008).

Millennial learning styles are described by Dede (2005) as fluency in multiple media, learning based on experiences, active learning, mentoring, and reflection. Abundant literature supports the opinion that preferences of Millennials are active learning styles as they have grown up with computers and the Internet and have more advanced technology skills (Wilson & Gerber, 2008). However, other research disputes this stating that a majority of learners use a limited range of technology for formal and informal learning (Brown & Czerniewicw, 2010) and that few learners could be described as digitally literate. Digital literate learners are learners that can effectively use a wide range of technology applications proficiently (Margaryan et al. 2011). These skills include digital, communication, Internet and online safety, collaboration, and functional skills. Furthermore, while many Millennial learners are using an increased level and more advanced technology there is no evidence to show that these technologies are used to support learning. Kennedy et al. (2008) suggest technology does not always have a positive impact in the classroom and that while some students have embraced technologies, this impact does not apply to all learners. Their research suggested that there is considerable variation in technology use when one moves beyond the most commonly used technologies and tools such as smartphones and email. These findings challenge the key assumptions underpinning Prensky's (2011) Digital Natives theory, which explored a changing world and a proposed new age of technologically smart astute learners.

Currently, learners derive from all age ranges with this project survey sample selecting participant learners from ages 18-65. Learners that undertake further education and work-based courses are often pre-millennial learners. In 2019, Donegal Education and Training Board (ETB) provided education and training courses to over 25,000 learners, the majority of these in the 26-65 age group. Therefore, it is important to take cognisance of these older learners that were not reared in a technology rich environment as their needs may vary from the so-called Millennial generation learner.

2.5 Technological Pedagogical Content Knowledge

The Technological Pedagogical Content Knowledge (TPACK) model (Figure 2.1) conceptualises an approach to teaching and technology usage within education. This theory was developed to explain the set of knowledge that teachers require to teach students a subject, teach effectively, and use technology (Mishra & Koehler, 2006). This theory provides the underpinning theoretical knowledge that supported this research project and was applied to understand technology integration in teaching and learning and subsequent questionnaire selection and formation.

The model focuses on the TPACK framework, which highlights technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) and offers a solution to the challenge of introducing technology within the classroom. The framework outlines what content is been taught and how the teacher will deliver the content. The concept is that the technology will support the content and this will ultimately enhance the learner experience. The TPACK framework is a flexible tool for research and offers no directives concerning what pedagogical approaches to use (Mishra & Koehler, 2006). This aligns with the views of Brantley-Dias and Ertmer (2013) that describe TPACK as suitable for various pedagogical orientations. This feature makes it possible to apply the TPACK framework flexibly to different areas to study topics related to ICT in various educational contexts.

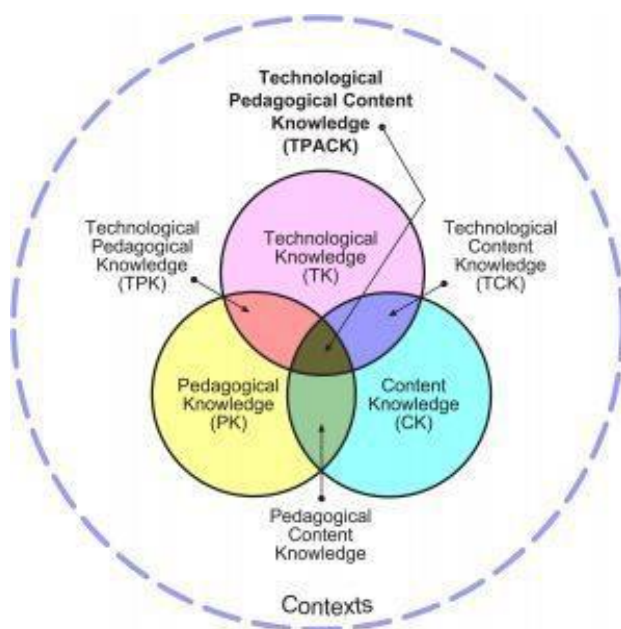


Figure 2.1 TPACK (2012)

Teaching and learning environments are now well equipped with computers, devices and Internet access in comparison to previous years but bringing technology to learning does not always generate effective teaching and learning practices. Alongside the introduction of technology pedagogical approaches must be implemented for effective learning.

The approach to TPACK has a critical role in technology integration within a course of study. This research project contributes to the advancement of this understanding by examining the relations between information communication and technology ICT and attitudes towards ICT usage based on a sample of Irish learners across learning organisations in Donegal.

2.6 The Research Onion

The research onion was developed by Saunders et al. (2007) and clarifies the stages that are recommended when developing a research strategy. Research is defined as something that people undertake to find out things in a systematic way, thereby increasing their knowledge (Saunders et al. 2007) while methodology is the way research should be embarked on ensuring that the data is collected and interpreted in a planned and structured manner. The “Research Onion” framework ensures reliable, valid and credible research covering all areas of the research methods. When viewed externally, each layer of the onion is a description of a more detailed phase of the research process. The six different layers of the onion, research philosophy, research approach, research strategy, research choices, time horizon, data collection and data analysis are all crucial constituents for successful research. The model was used in this project to aid the formulation of an effective methodology. Once the appropriate methodology was selected the research onion suggests the appropriate research strategy. For example, the research onion proposes a mixed-method, multi-method and mono-method as options for performing research. This research study is a mixed-method as it is based on the use of two or more methods of research, qualitative and quantitative methods.

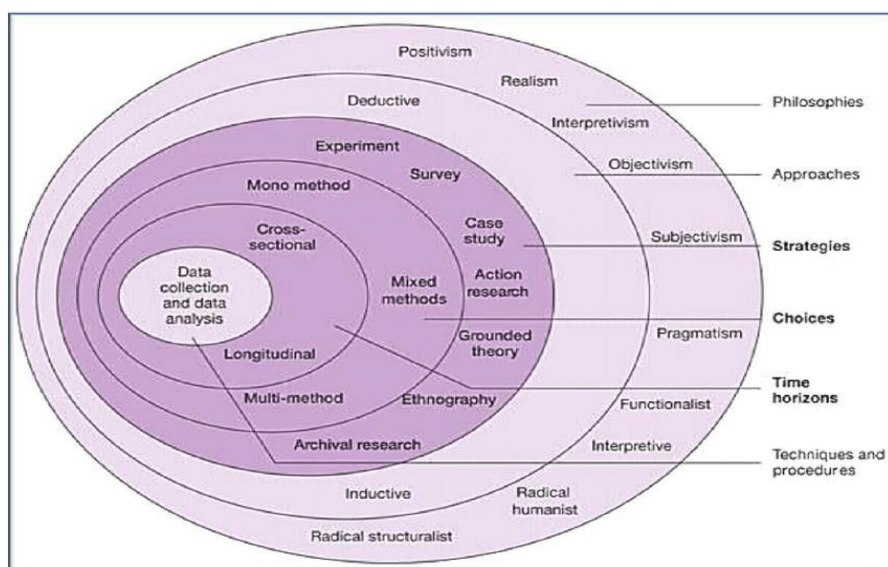


Figure 2.2 The Research Onion (Saunders et al. 2012)

The terms ‘qualitative’ and ‘quantitative’ are commonly used to describe the difference between data collection techniques and data analysis procedures (Saunders et al. 2007). According to Brymand and Bell (2007), qualitative research is a research method that mostly uses words rather than quantification in the collection and analysis of data. Quantitative research collects numerical data and a statistical view of the relationships between theory and research is gained.

Mixed-method methodologies are common place where questionnaires are the main research method and this is supplemented by document and literature analysis in order to further explore the research questions. Mixed-method can provide a comprehensive perception on issues raised in the research study. In this study quantitative research will permit us to establish associations among the variables and the qualitative research will explore and clarify these associations and explain the underlying factors.

2.7 Challenges of Measuring Learner Attitudes and Perceptions

Measurement is defined as the assignment of numerals to objects or events according to rules and the fact that numerals can be assigned under different rules leads to different kinds of measurement (Stevens, 1946). Within any research study, it is essential to take regard of how quantitative attributes are measured, as they can often appear ambiguous. In social sciences, a measure of interest, such as attitudes cannot be measured in the systematic method which relates to a number of units within a given scale. This creates an element of uncertainty and the hazard of educational and psychological measures is that almost anyone can devise his or her own set of rules to assign some numbers to some subjects (Suen, 2012). This issue is directly related to the core issue of data reliability and validity, which will be discussed further on.

There are methodological challenges connected with the measurement of learner attitudes and perceptions towards technology. The different attributes such as attitudes toward the general use of ICT, attitudes toward the use of ICT in learning environments, the educational use of ICT, and attitudes toward the ease of ICT use are often highly interrelated and difficult to distinguish (Baş et al. 2016). In the past media and technology usage was often measured by monitoring time spent using computers for specific activities such as playing a game or watching television (Subrahmanyam et al., 2000). Research by Rosen et al. (2013) indicated four main methods for assessment of technology, measure

time per day in minutes or hours or per usage, frequency of use in a time period (Thompson, 2013), technology usage using a Likert scale (strongly agree to strongly disagree), and experience sampling by question survey at a specific point in time (Moreno 2012). In response to the limitations of these four methods, Rosen et al. (2013) developed the Media and Technology Usage and Attitudes Scale (MTUAS) as a new method of measuring media and technology affiliation in research studies and determining media and technology usage and attitudes. The MTUAS scale is identified as one of the most comprehensive methods for assessing digital and media technologies (Costa et al. 2016). This method incorporates prior models for assessing self-reported frequency of media and technology use as well as attitudes towards technology use, rather than relying on inaccurate self-reports of time spent using a variety of technologies (Rosen et al., 2013a). The tool was a step forward in this research domain as it is comprehensive and includes an attitude towards digital and media technology element. The scale provided a technological tool for usage frequency such as mobile phones, computers and gaming as well as an attitude towards media and technology usage measure. The original scale has a total of 68 items, 50 media and technology and 18 attitudes.

This study utilised the MTUAS scale developed by Rosen and adapted it to develop a valid and reliable scale for determining learners' usage, perceptions, and attitudes towards specific technologies and in addition appraised learners' technological preparedness for the Covid-19 pandemic.

2.8 The Covid-19 Pandemic and Learning

The Covid-19 pandemic is a adaptive and transformative challenge, both for educators and learners, one for which there is no preconfigured rulebook that can guide appropriate responses (OECD, 2020). Presently the crisis is impacting the whole of society especially learners in education. Educational institutions have had to cancel all face-to-face classes at short notice and move courses online to help prevent the spread of the virus. This online learning mode of delivery gives the flexibility of providing learning anywhere at any time, but due to the unprecedented pandemic, there was little or no preparation time for educators or learners.

The term Emergency Remote Teaching (ERT), is used to describe the temporary shift of instructional delivery to an alternate delivery model due to crisis circumstances (Hodges 2020). This new term, now used by online education researchers equates to educators providing quick temporary access to instructional materials and supports that are made available to learners during the crisis period. Learners now have new varied complex needs that education providers are committed to fulfil for the

duration of this emergency. The pandemic crisis has exposed many challenges faced by our education providers, from broadband requirements and technology required for online education, to adequate learning environments and requisite knowledge required by the education providers, in particular teachers and tutors. Delivery modes, methods, and media, specifically as they map to rapidly changing needs and limitations in resources, such as learner support and training must all be considered and re-evaluated (Head et al, 2002). The implementation and evaluation of these resources will provide another challenge for educators. Factors such as teaching and learning strategies, delivery system establishment including learner management systems, facilitating access to learner support systems and ongoing support for staff training and professional development for teaching and learning online pedagogies and online tools must all be enabled and facilitated.

The Covid-19 public health emergency emerged before research for this study commenced. A decision was made to incorporate elements of the crisis and associated issues into the research study due to the extent of the potential impact on learners. To facilitate this, additional qualitative open-ended questions were added to the survey rated on a Likert scale. With these challenges in mind, appropriate questions were devised for inclusion in the survey to capture the learner's reaction and perceptions of the impact of this crisis, technological preparedness for the pandemic and the amount of time they spend online learning since the pandemic commenced.

2.9 Conclusion

This section has explored the available literature surrounding technology and learning and the correlation between learner technology and learner attitudes towards technology and investigates the important role of technology within the learning environment.

It is apparent that there are deficiencies and challenges within the teaching and learning domain and future advances may address these concerns. Learner use and knowledge of digital technologies are continually developing and the potential is still to be fully realised. Educators may be cautious against using new technologies for its own sake, yet must embrace and encourage it for teaching and learning.

Alongside this, the current pandemic was unprecedented and brought complex challenges for education systems but it also has the potential for society to become more digital. For this to be achieved learners from every sector require tailored supports for their needs. It is evident that digital

technologies can cater for a variety of learning styles and technological tools can support this. However, the current digital learning environment will not replace face-to-face learning and it is vital to capture learner perceptions and behaviours concerning these current changes in the learning environment.

Chapter Three: Implementation and Evaluation

3.1 Introduction

This chapter highlights the main research question, sub research questions, and objectives of the study. The methodology and methodological tools that are utilised in this research study are reviewed and a rationale for their selection is provided. It also describes the subjects (participants) of the study, the instruments used (questionnaires) and the procedure of data gathering (i.e. construction of questionnaire, validation, distribution, retrieval, collation and presentation of data). The procedures of data collection and the nature of the analysis will be discussed in this chapter along with the sample and sampling procedures used alongside the researchers' viewpoint and a detailed summary of the research processes and procedures utilised. The evaluation presents the findings collected from the questionnaire. The data gathered from the survey questionnaire is mainly qualitative as the questions deal with the ICT skills and attitudes and perceptions of the respondents. A comparative analysis is then used to extract themes from the data. In addition, quantitative data analysis is performed to check data reliability using statistical software.

3.2 Research Aims and Objectives

Defining the research question is an important process as research questions help to constrict the research goal. The research question prescribes the method of research design used, the size of the sample, the variety of instruments used, and the information analysis systems utilised. The research question will also reveal the problem that the researcher wishes to investigate further. These research questions are probing statements that represent an extension of the statement of the purpose of the study in that it stipulates exactly the research question that the researcher will attempt to examine and answer (Johnson & Christensen, 2004).

This highly structured research study followed a set of defined procedures that included research data collection, design, analysis and research reporting. Yin (2009) suggests the first step is to decide on the strategy to use, emphasising that defining the research question is probably the most important step to be taken in a research study.

The research questions considered in this study were:

1. What technology do learners use and how do they rate their technology skills? What are learner's usage patterns of ICT (digital and media technology) The purpose of this mixed-method study will be to explore the different technologies that learners use, the rate of usage, and how they rate their skills.
2. What are the learner attitudes towards ICT? This will help explore learners' opinions, perceptions, and experiences of using technological tools.
3. What role does technology play in the learning experience from a learner perspective? How effective does the learner feel the use of ICT is as a tool for learning?
4. Were learners prepared technologically for the change to online learning caused by the Covid-19 pandemic? How many hours of online learning do they engage with since the pandemic commenced? This will question the level of learner technological preparedness for the pandemic crisis and access how much time they spend engaging with online learning.

3.3 Research Methodology & Design

The purpose of this research is to ascertain knowledge by asking questions and attaining answers through the application of meticulous procedure and methodology in a logical analysis of the methods applied in this field of study.

It is apparent that there are various methods of assessing technology usage and other technology based activities. Survey methods of research were used in this study as the main objective was to attain an overall view of the use and learner impact of digital technologies within the learning environment. Both qualitative and quantitative research was observed as this collected both opinions and numerical data from the participants through a survey questionnaire.

The design generated an understanding of learners views and opinions using a mixed-method cross-sectional study data gathering questionnaire. Barr et al. (1953) described a questionnaire as a systematic compilation of questions that are submitted to a sampling of the population from which information is desired. This type of mixed-method research can combine aspects of quantitative and qualitative research methods taking advantage of the strengths of both by means of a questionnaire. A mixed-methods approach to data collection has three defining characteristics that set it apart from other strategies for social research: a preference for viewing research problems from a variety of

perspectives; the combination of different types of research within a single project; and the choice of methods based on what works best for tackling a specific problem (Denscombe, 2014).

Data can be described as primary or secondary data where primary is information achieved by means of research and secondary data is information coming from existing sources. The data in this research project is from primary data sources and questionnaires were the survey strategy in this research study. Questionnaires have many advantages but must be carefully designed as this will affect the response rate and reliability and validity of the collected data. The questionnaire method is effective when comparisons have to be made between respondents as all respondents are asked the same questions. In addition, they can also provide easy to collate responses from a large group in a short period of time and are efficient for cross-sectional research studies.

When designing the questionnaire for this research project the following factors were taken into consideration: the design of individual questions must be clear and concise, the layout should be attractive and not cluttered, there should be a clear introduction with an explanation of the purpose of the questionnaire, the questionnaire should be pilot tested and delivery should be carefully planned and administered appropriately.

By way of investigation of the obtained data, the frequency of ICT usage was noted, and tabulated and comparisons were made. Learners' views on their technological preparedness for the pandemic were also explored. The qualitative data provided the factual data that was necessary to support the themes in the form of feelings, opinions, perceptions, and the numerical quantitative data acquired through counting and measuring reinforced the data analysis with statistics.

A phenomenological approach was adopted in this research study. The aim to investigate and perform an in-depth analysis of how learners perceive and experience technology within their learning environments leads well to the phenomenological investigative approach which is the study of how we experience things from the first-person point of view, along with relevant conditions of experience (Kuhn, 1966). It aligns well with the aim of this research to get an in-depth analysis of learners' attitudes and perceptions of their experiences of using ICT. A phenomenological investigation is primarily an attempt to understand empirical matters from the perspective of the participants involved in the research and, as such, is particularly effective at bringing to the fore the experiences and

perceptions of individuals from their perspectives (Ashworth & Greasley, 2009). This synthesis of knowledge is a process of extracting data from the individual research study and interpreting and representing them in a collective form (Campbell et al. 2003).

3.4 Subjects of the Study and Data Collection

Approximately two hundred learners were invited to take the questionnaire survey in May 2020. The duration for data collection for this study was May 2020. In the period of one month, all the entries submitted were archived.

The participants were comparable in demographic characteristics across County Donegal. There were 84 valid responses submitted. Basic learner details were collected for categorisation purposes such as gender, age-range and educational organisation attended. The 84 learners were between 18-65 years old. The learners were asked to provide their current educational organisation or most recent learning environment, including work-based learning to ensure that the responses were from a variety of learning environments across all age groups.

To ensure the data quality, the subjects chosen for this study were currently completing a course of study or had completed a course within the previous six months. The rationale was to set a standard as the participant responses would relate to current or recent behaviours. This will homogenize the findings so patterns can then be categorized according to their themes.

3.4.1 Sampling Procedure

The sample was selected using non-probability sampling as the aim was to produce an exploratory sample rather than a cross-section of the population, these are often used in small-scale research and tend to lend themselves to the use of qualitative data (Denscombe, 2014). Additionally, a convenience sampling technique was applied where samples were selected from the population because they were conveniently available to the researcher. These samples were selected because they were easy to recruit rather than a selection that represents the entire population. Ideally, a sample that represents the entire population would be desirable, but due to time constraints and prevailing conditions, such as the Covid-19 pandemic, convenience sampling was the preferred method due to its speed, cost-effectiveness, and ease of availability of the sample.

3.5 Research Instrument

A questionnaire research instrument was used in the conduct of the research. The primary aim of the questionnaire is to assess learners' access to and use of ICT, perceptions of ICT usage and preferences for using ICT for learning. The questionnaire provided a micro-perspective of learner ICT frequency usage and patterns of ICT, alongside negative and positive attitudes towards technology.

The questionnaire instrument was selected as the data to be collected is largely qualitative, although some quantitative data will also be gathered. Questionnaires are designed to collect discrete data in the structure of numbers or words, which can then be coded and represented as numbers in the form of variable frequencies, averages, and ranges (Blaxter et al. 2010).

Open and closed questions were included in the survey questionnaire to gain a deeper insight into the student experience and strengthen the survey findings. The questionnaire is specially designed to find out the usage levels of technology and uncover the perceptions of learners towards technology in learning. It is also possible to perform an analysis based on a frequency count on usage patterns. Distribution of the questionnaire was performed via Google Form as the period of research study coincided with the Covid-19 pandemic and face-to-face classes had ceased due to a countrywide lockdown.

The questionnaire was divided into four sections: demographic characteristics and ICT Profile, ICT skills and frequency of ICT use, ICT attitudes and perceptions and learning and the pandemic crisis. These sections will assist with categorisation and help with the analysis of learner responses. To the authors' knowledge, no study of learner's usage and attitudes towards ICT using an adapted MTUAS scale has been undertaken in Donegal previously. The use of this instrument on a sample of learners from this region represents a major advance in this research field and could, in the future be used for cross-cultural comparisons.

3.5.1 Adaptation of the MTUAS scale

The full version of the MTUAS scale (Rosen, 2013) is a 60-item assessment intended to evaluate technology, attitudes and perceptions about technology and dependency on technology. The items were developed by creating a selection of possible technology uses for common activities performed on a mobile phone (searching for information, using apps, reading e-mails, checking, reading and sending text messages) and activities on a computer or digital device (downloading and sharing media

files, watching TV shows or movies, searching the Internet for information, playing games on any device and checking Facebook or a social media account). This scale was adapted to suit the requirements of the research study while at the same time observing the importance of the theoretical basis of the scale. The adapted scale is a pared-down version of the original. Due to research limitations, the full scale was not utilised or necessary as this research project focussed on the specific themes of ICT skills, ICT usage (in particular digital and media usage), positive and negative attitudes towards ICT and technological preparedness for the pandemic. The variances between the original scale and the adapted scale were due to the following factors:

- Length of original scale – the original survey questionnaire was too lengthy for this research survey. Due to time constraints and additional stress-related issues due to the pandemic learners are unlikely to engage with a lengthy questionnaire.
- Simplified questions - although all learners were over 18 they were selected from all levels of learning environments (post-primary school, FET, third level and other work-based learning. Thus these learners could be completing a course of study from level 1 to 10 on the National Framework of Qualifications (NFQ). This qualification and educational framework recognises learning from initial to advanced stages. The questions were modified to cater for all learners from all levels including learners with literacy issues.
- Relevance - Some of the questions from the original scale developed in 2013 refer to old technologies and are not relevant now due to advances in technology.
- Pandemic – additional questions regarding technological preparedness were added to the questionnaire.

Semantic, cultural, and statistical issues were taken into consideration when adapting the scale and within these limits, the adapted instrument displayed a good fit for the purpose at hand.

This research selected items from the “Positive Attitudes towards technology” subscale using a 10-item Likert response frequency scale including: never, once a month, several times a month, once a week, several times a week, once a day, several times a day, once an hour, several times and hour, and all the time (Rosen, 2013). These items included send, receive and read e-mails, check personal e-mail, check work/college e-mail, send or receive files via e-mail, send or receive text messages on a mobile phone, make or receive phone calls on a mobile phone, browse the web on a mobile phone, use

apps on a mobile phone, watch TV shows on a device, search the Internet for information on any device, play games on a computer, video console or smartphone, check Facebook or other social media networks and share files such as photos on any device (Rosen, 2013).

Items from the “Dependence on technology subscale” used a 5-item Likert response frequency scale including strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. These items included attitudes towards the importance of finding information online, Internet access, the importance of technology, dependency on technology, and the belief that productivity is increased due to the use of technology. This scale may be used and adapted without getting permission but for clarity, contact was made with Dr Larry Rosen via e-mail before adaptation to receive permission to adapt it from its original form.

3.6 Limitations of the Method and Pilot Study

The questionnaire was designed after a thorough literature review while taking into account recent variations due to the Covid-19 pandemic. A pilot study with 5 participants was conducted in order to test the reliability and validity of the survey instrument. There were two main sections within the questionnaire, the learner demographics and ICT characteristics and attitudes section (competence of ICT, learning preferences, learner attitudes to ICT and learner response to the pandemic).

The questionnaire was piloted on a cohort of learners that were currently undertaking a course of study. Five learners, different from the learners invited to participate in the main questionnaire, volunteered to participate in the pilot study. This assisted with an awareness of the level of difficulty of the questionnaire and access if the respondents were able to understand the questions and check if they were relevant and coherent to the study. It was an opportunity for the researcher to clarify the questions should there be any confusion and also allowed the researcher to become more familiar with the research process. After the pilot a few changes were made to the original questionnaire. Two of the questions were rephrased and plain English was used to aid understanding and clarity. There is always the chance that different learners interpret questions differently and this may affect the overall information provided.

3.7 Reliability and Validity

Reliability and validity are tools of an essentially positivist epistemology (Winter, 2000, p. 7). Joppe (2000) defines reliability as the extent to which results are consistent over time and an accurate representation of the total population under study. Validity in quantitative research determines whether the research truly measures that which it was intended to measure or how truthful the research results are (Joppe 2000). In the context of this research it was important that the survey instrument actually measures adequately all the content that it should with respect to the variables that are within the research questions. Reliability and validity are two distinct components of quantitative research. Reliability relates to whether the result is replicable and validity relates to whether the method of measurement is accurate and if it is really measuring what it intended to measure. However, the concepts of reliability and validity are viewed in a different way by qualitative researchers who strongly consider these perceptions defined in quantitative terms as insufficient and may not fully apply to the qualitative research paradigm (Golafshani, 2003). The question of replicability in the results does not concern them (Glesne & Peshkin, 1992), but precision (Winter, 2000), credibility, and transferability (Hoepfl, 1997) provide the lenses of evaluating the findings of qualitative research. In this context, the two research approaches or perspectives are essentially different paradigms (Kuhn, 1966).

Ensuring content validity is necessary with a measurement tool. Content validity is the extent to which the elements within a measurement tool are relevant and representative of the construct that they will be used to measure (Haynes et al. 1995). This was measured by using the knowledge of subject matter experts. Before conducting the pilot study, a group of subject matter experts (which included tutors, teachers and other researchers) were given the questionnaire instrument tool and asked to provide feedback on the question appropriateness, usefulness and effectiveness. This feedback was used to adapt the measurement tool accordingly.

The MTUAS scale developed by Rosen et al. (2013) was adapted to suit the requirements of Irish learners. The validity of structure and differentiating features were examined and internal reliability coefficients were calculated with Cronbach's alpha coefficient values. The tool is a good fit of the original, albeit a downsized version. The MTUAS Scale is recognised as a valid and reliable measurement tool and the original structure and the Irish adapted structure conform with each other.

3.8 Research Ethics

This research study was conducted in adherence with the Letterkenny Institute of Technology's (LYIT) policies and procedures. The LYIT Ethical Board reviewed and approved the proposals prior to the beginning of research. The researcher has a duty and responsibility to adhere to guidelines that provide the highest ethical standards in accordance with the British Educational Research Association (BERA, 2011) Ethical Guidelines for Educational Research which provide guidelines that uphold ethical values that are committed to integrity and transparency. These guidelines ensure that participants are treated fairly, sensitively, with dignity and freedom from prejudice, in recognition of both their rights and differences arising from age, gender, sexuality, ethnicity, class, nationality, cultural identity, partnership status, faith, disability, political belief or any other significant characteristic (BERA, 2018).

Informed consent is a vital part of the ethical research process with all participants giving informed consent prior to research commencement. Participant consent demands that all participants were informed of what was involved in the research study, why their participation was necessary and what happens to the information they provide. Participants also have the option to remove or withdraw their consent at any time without explanation and their confidentiality and anonymity will be maintained. The data collected for the research project was used exclusively for research purposes. All participants were presented with a Participant Information Sheet (Appendix A) and a Participant Consent Form (Appendix B) prior to completing the questionnaire. The information sheet informed the participant of the title and rationale of the study giving a brief overview on why the participant was invited to complete the research study and contact details for further information. The consent form gave further details of the research study and explained the rights of the participant regarding the data and confidentiality. This ensured that the participant understood fully the implications of partaking in the research study. Responses from all consenting learners were included in the research study and it was confirmed that the participants did not have a dependent or subordinate relationship to the researcher.

Within this project research consideration was given as how to best approach learners and stakeholders and which medium to use. Potential issues within the research project include the importance of acknowledging the small sample as this could potentially cause issues when graphical charts and tables are created for a specific demographic such as age profile, thus potentially making anonymity difficult. Also the tight research time period could cause issues and anonymity could potentially be difficult to maintain. This was acknowledged and was a concern, however, there is an option to restrict access to

the data and research project when submitted as all successful research projects are available in the LYIT library.

3.9 Evaluation – Questionnaire Section A: Demographic Characteristics and ICT Profile

3.9.1 Gender

Sixty females and twenty-four males participated in the research. The majority of the respondents were female (71%) with male the minority (29%). This has the potential to create a gender bias in the research study and caution must be taken at generalisations as study findings may be applied to both sexes. As the researcher was female and the sample method was convenience sampling this could explain the higher number of female respondents.

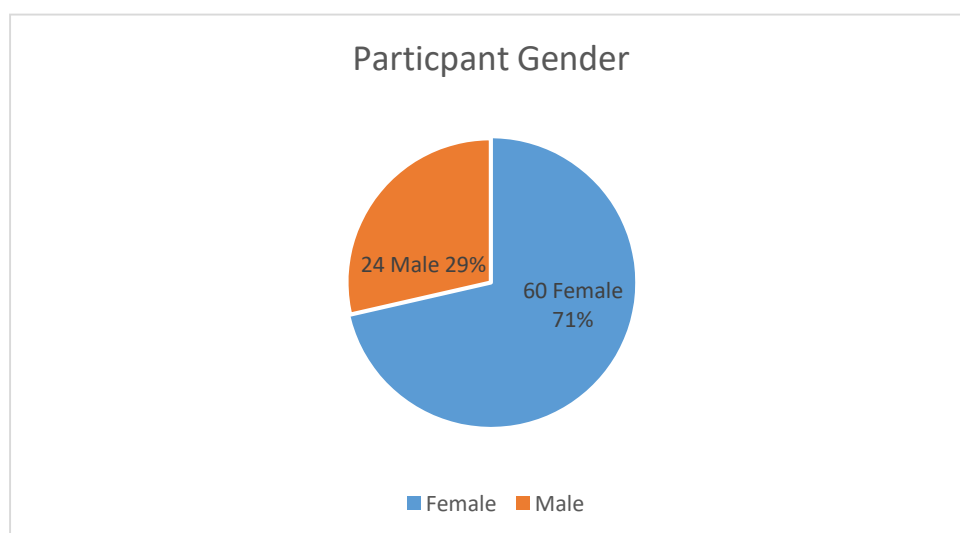


Figure 3.1 Participant Gender

3.9.2 Age distribution of research participants

The age profile of the participants shows that participants aged 46-55 were the majority (31%), followed by those aged 18-25 (26%), followed by those aged 36-45 (19%), followed by those aged 26-35 (16.7%) and those aged 56-65 (7.1%). There were no participants in the 66 and older age band. These results confirm that 61% of participants were aged 18-45.

What is your age?

84 responses

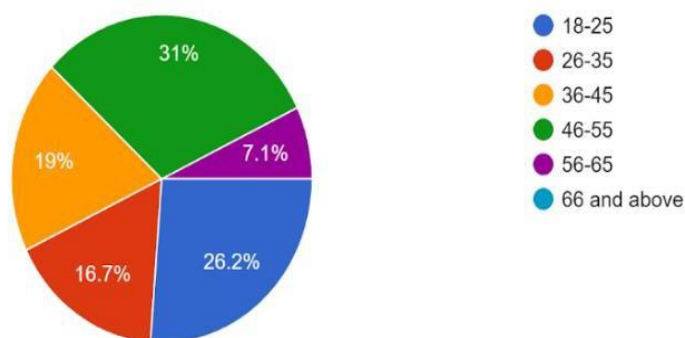


Figure 3.2 Age distribution of Research Participants

3.9.3 Educational Organisation Attended

Participants were asked to select their current or most recent educational organisation they attended. Third level institution was the majority with 50% followed by Further Education and Training (FET) (27%), other (17%) and post-primary education (6%). Third level institutions in Ireland are made up of universities, institutes of technologies and colleges and generally deliver qualification from level 6-10 on the National Framework of Qualifications (NFQ). FET offer education courses to anyone over 16 and includes traineeships, apprenticeships, Post Leaving Cert (PLC), and community, adult and basic education and delivers courses on from levels 1-6 on the NFQ. Post-primary education is composed of secondary schools and community colleges. Other educational organisations include work based learning courses or any learning that does not fit into a specific category. Much of the research conducted in this area is not inclusive of all categories of learning providers however, these results confirm that the study elicited responses from a diverse range of learning environments.



Figure 3.3 Educational Organisation

3.9.4 Digital Devices

Participants were asked what devices they own or use from a list of five options: tablet (iPad, Chromebook), smartphone, laptop, desktop computer or other. The laptop was the most popular device owned or used by participants (83%) followed by the smartphone (81%), then tablet (46%), desktop computer (26%) and other (1%). It is evident that many participants owned more than one device with 68% using or owning two or more devices. A large percentage of learners used or owned both a laptop and a smartphone, these results were expected as they are two of the most common digital devices in use.

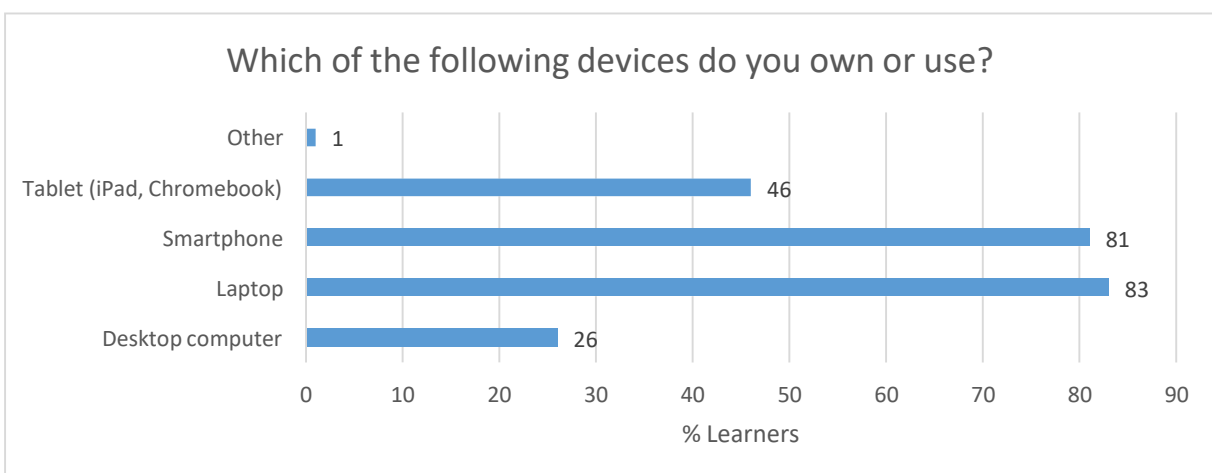


Figure 3.4 Device Usage

3.9.5 Internet access

Participants were asked where they access the Internet from a list of five options; home, work, college, other or do not access. The majority of respondents selected home Internet access (86.9%), then work (54.8%), college (32.1%) and other (13.1%). Just 1% of respondents did not access the Internet at all. It is evident that many participants access the Internet in more than one location. This result was expected as many learners move from college or work to home on a daily basis and require access in both locations.

Where do you access the Internet?

84 responses

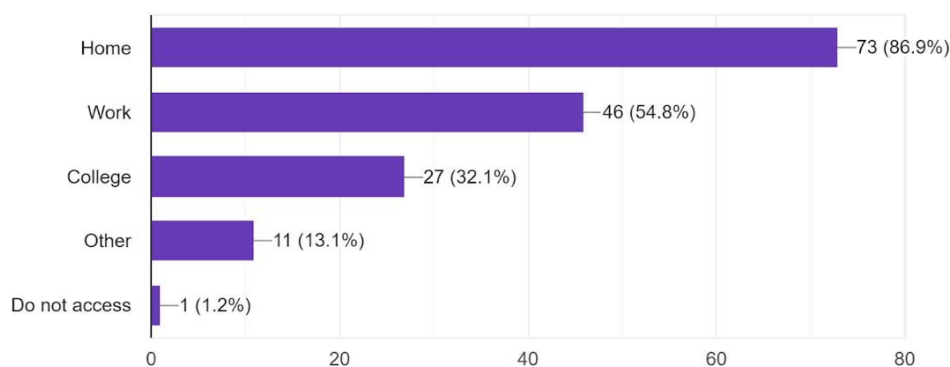


Figure 3.5 Internet Access Location

3.10 Evaluation – Questionnaire Section B: ICT Skills and Frequency of ICT Usage

3.10.1 ICT Skills

This question asked the participants their level of skills in four common computer applications; word processing, spreadsheets, databases and e-mail and Internet. These four applications were selected as they are commonly used in everyday activities, both in learning environments and in the workplace. Proficiency in these four applications is a good indicator of ICT skills and generally a learner that can use these four applications has a good basic knowledge of applications. A Likert 4-point scale checked the skill level of the cohort with the majority of participants selecting fair, good, or very good for word processing, spreadsheets, databases and e-mail and Internet (Figure 3.6 ICT Skills). These findings are positive in that the majority of learners considered themselves to have proficient or very proficient skills in commonly available applications. These results were expected as many of these learners (62%) are from the Millennial generation of learners. Millennials, according to the Pew Research Centre (2020) is anyone born between 1981 and 1996 (ages 24 to 39 in 2020).

Please rate your skill in the following applications?



Figure 3.6 ICT Skills

3.10.2 E-Mail Activities

Participants were asked how often they performed four common e-mail activities: send, receive and read e-mails, check their personal e-mail, check their work/college e-mail and send or receive files via e-mail.

Send, receive and read e-mails.

The majority of respondents selected several times a month (31%), follows by several times a day (19%). There were a broad range of responses for this activity across all frequency levels, suggesting that some learner use email frequently and others just occasionally. This will depend on their preference for using email as a communication tool and also if they are in a workplace they are more likely to use email for communication.

Check your personal e-mail.

The majority of respondents selected several times a month (31%) followed by several times a day (28%). These findings are lower than expected. This could suggest that some learners may not have a personal e-mail and if they do they only access it occasionally. They may use their work e-mail or student e-mail account more frequently.

Check your work/college e-mail.

The majority of respondents selected several times a month (22%), followed closely by several times a day (19%), then once a day (14%) and once a week (10%). These findings are lower than expected suggesting that e-mail is now been superseded by other forms of communication.

Send or receive files via e-mail.

The majority of respondents selected several times a month (28%), followed by once a month (15%), followed by several times a week (14%), then once a week (10%). These findings show low usage rates for sending and receiving files via e-mail suggesting that learners are using other applications to send and receive files.

These activities were measured using a 10-point Likert scale. The findings for all four e-mail frequency tasks are lower than what would be expected considering that e-mail is regarded as the most popular form of communication after texting (Waterford Technologies, 2017). Nevertheless, this could be due to more recent changes in email usage as other forms of communication are becoming more popular. Newer generations prefer social media, instant messaging, and texting to emails according to a Pew Centre study (2012) that found that, while 95% of teens had an active online presence and 81% regularly used social media, just 6% of them sent emails.

These results may be temporarily skewed during the pandemic crisis period as learners have experienced a total immersion in digital and online learning which has increased the usage of other forms of communication software such as Google Meet, Google Classroom and Zoom.

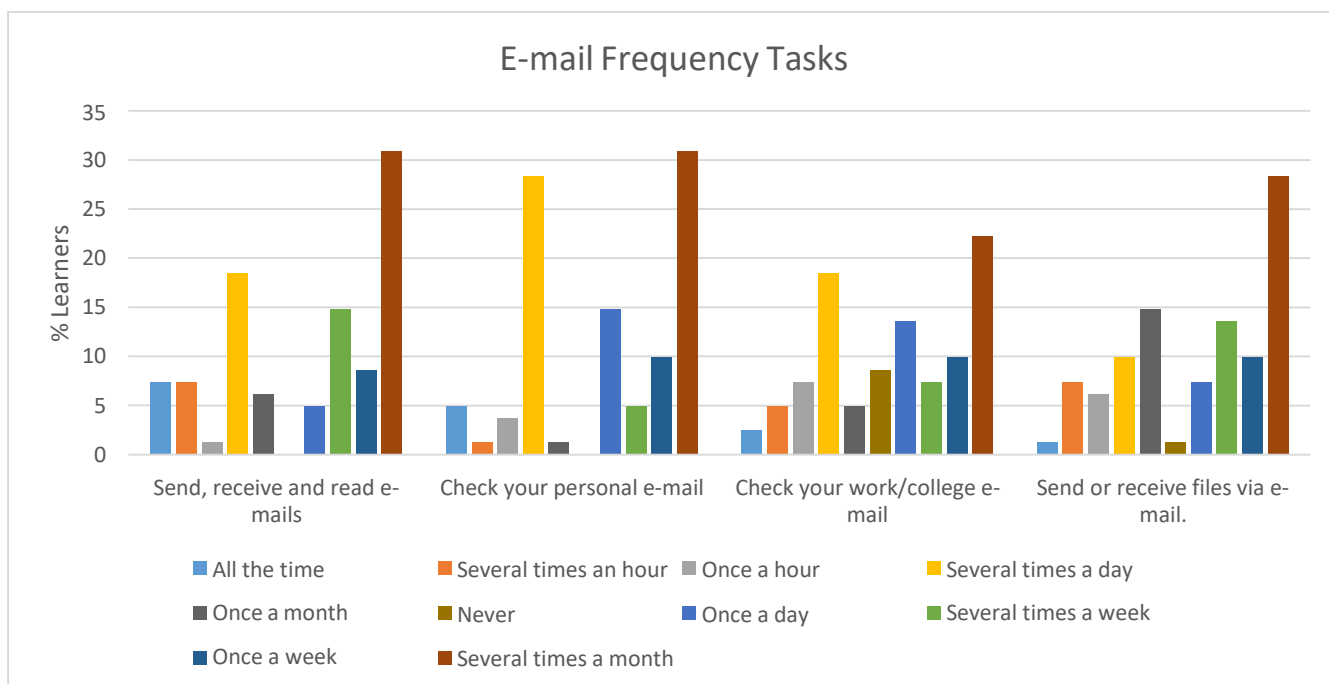


Figure 3.7 E-mail related activities frequency

3.10.3 Mobile Phone Activities

Participants were asked how often they performed four common mobile phone activities; send/receive text messages on a mobile phone, make/receive phone calls on a mobile phone, browse the web on a mobile phone and use apps on a mobile phone.

Send/receive text messages on a mobile phone.

The majority of respondents selected several times a month majority (34%), followed by several times a day (24%), several times a week (11%), then all the time (10%). These results suggest that while many learner use texting to send and receive messages on a mobile phone infrequently a significant proportion of respondents perform this activity all the time (10%) and several times an hour (8%). It is probable that learners use other devices to send and receive text messages as their preferred method of communication.

Make/receive phone calls on a mobile phone.

The majority of respondents selected several times a month (32%) followed by several times a day (23%), then several times a week (16%), and once a month (8%). These results suggest that a large proportion of respondents use the mobile phone for the primary function it was created for infrequently and rarely. This indicated that the phone is used for other activities as its main use.

Browse the web on a mobile phone.

The majority of respondents selected several times a month (30%), followed close by several times a day (29%), then all the time (20%), then once a week (5%). These results show respondents have a very high use or a very low use for using a mobile phone for browsing the web.

Use apps on a mobile phone.

The majority of respondents selected several times a month (33%), followed by all the time (23%), then several times a day (13%), then once a week (9%). These result show either a very high or very low usage pattern at either end of the scale where some learners have a high propensity for using apps on a mobile phone while others rarely use them

These activities were measured on a 10-point Likert scale. The findings for all four mobile smart phone frequency tasks were lower than what would be expected considering that smartphone and texting in particular is regarded as the most popular form of communication (Waterford Technologies, 2017).

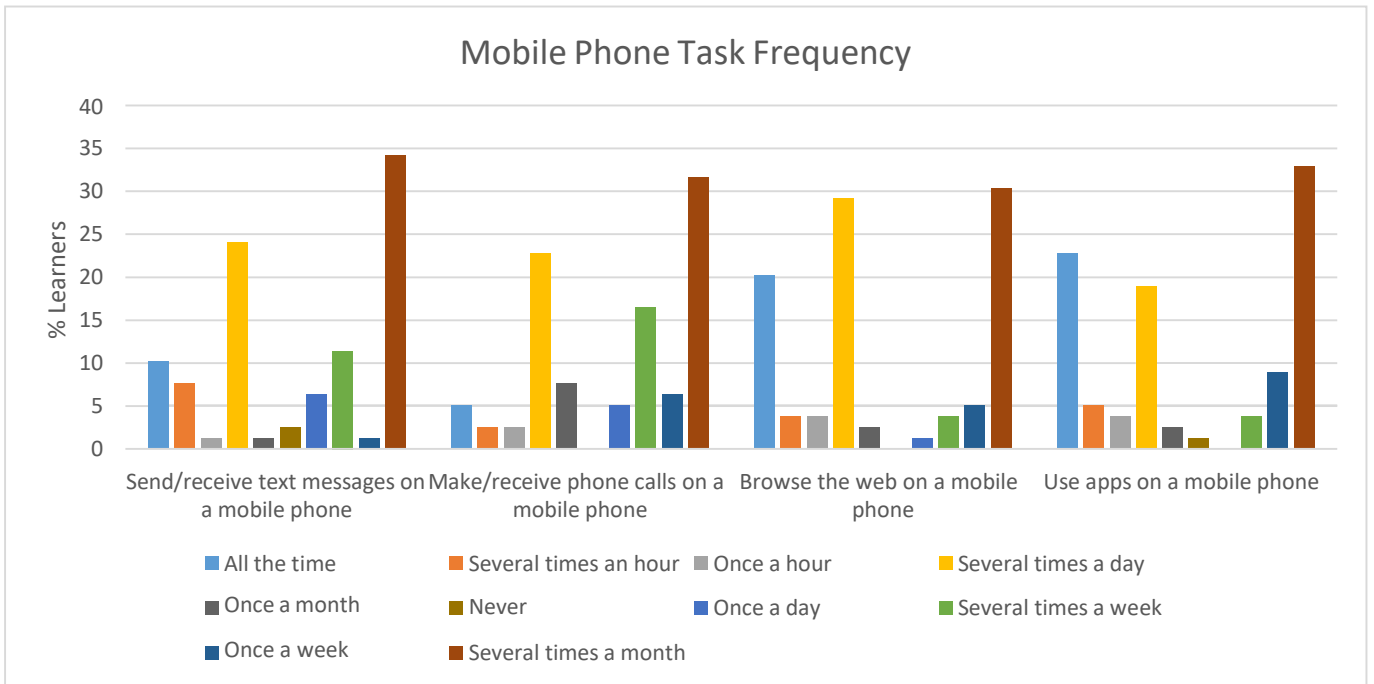


Figure 3.8 Mobile Phone Task Frequency

3.10.4 Digital Media Activities

Participants were asked how often they performed five common digital media activities: watch TV shows, movies etc. on a device, search the Internet for information on any device, play games on a computer, video console or smartphone, check their Facebook page or other social media networks and share media files such as photos.

Watch TV shows, movies etc. on a device.

The majority of respondents selected several times a month (27%), followed by never (18%), then several times a week and once a month (both 12%). The data shows that watching TV shows and movies on a device is an activity of preference for a significant number of learners and many learners are not partial to this activity. It is likely that these learners watch TV shows and movies using the traditional method of a TV set.

Search the Internet for information on any device.

The majority of respondents selected several times a month (34%), followed by several times a day (24%), followed by once a week and once a day (both 10%). These were mixed results, with a significant number searching the Internet on any device several times a month or at the other end of the scale several times a day.

Play games on a computer, video console or smartphone.

The majority of respondents selected never (43%), followed by several times a month (17%), then once a month (12%). This was an expected result as only certain respondents with a selective preference for gaming activities play games on a computer, video console or smartphone.

Check your Facebook page or other social media networks.

The majority of respondents selected several times a month (29%), followed by several times a day (20%), then all the time (13%) and once a day (12%). These results show that while a total of 96% of respondents checked their Facebook page or other social media network the frequency of checking varied dramatically between respondents. This suggests that nearly all respondents have access to and use a social media network.

Share your own media files such as photos.

The majority of respondents selected several times a month (30%), followed by once a month (16%), then once a week (14%) and never (12%). The data shows that this is a popular activity for many learners but there is still a significant cohort that never share their media files. This could be due to the fact that they do not have media files such as photos or they have a concern for their privacy and confidentiality and don't want others to have access to their media files.

Overall, respondents displayed a broad range of frequency choices for digital media activities which suggest that these activities are an individual's personal preference.

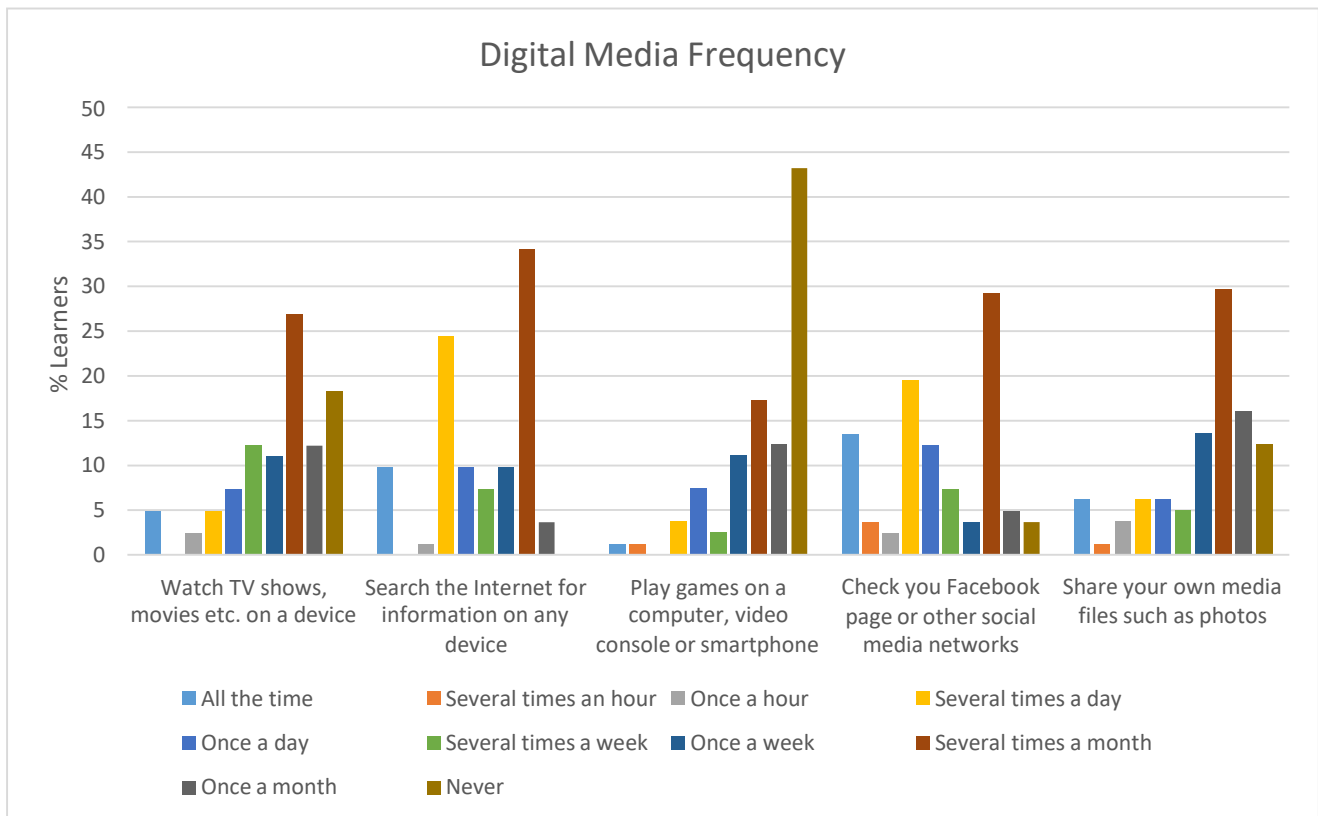


Figure 3.9 Digital Media Frequency

3.11 Evaluation – Questionnaire Section C: ICT Attitudes and Perceptions

3.11.1 Technology use and Attitudes

This section of the questionnaire asked participants about their attitudes and perceptions regarding ICT. Firstly, they were their views asked regarding Internet access and technology dependency. Secondly, they were asked to answer questions regarding technology use in their course and their views on the impact of technology use in learning. Thirdly they were asked their views regarding online learning, factors that may affect online learning and the value of online learning. All questions were rated 5-point Likert scale from strongly agree, agree, neither agree nor disagree, disagree to Strongly disagree

I feel it is important to be able to find information I want online.

The majority of respondents selected strongly agree (61%) while 29% agreed with this statement and 5% selected neither agree nor disagree. This suggests that the majority of learners have a positive attitude towards technology and indicates that it has an important role in their lives.

I feel it is important to be able to access the Internet whenever I want.

The majority of respondents selected agree (64%). This data suggests that the majority of respondents have a strong affiliation with using the Internet but may also suggest a dependent relationship. A significant number (23%) have no strong feelings regarding this statement (23%) selecting neither agree nor disagree.

I am dependent on my technology.

The majority of respondents selected agree (38%) followed closely by strongly agree (37%). These results indicate a high dependence on technology, this could suggest a unhealthy relationship with technology if the dependency is excessive.

I feel that I get more accomplished because of technology.

The majority of respondents selected strongly agree (46%), followed by agree (33%). These results reveal a positive attitude towards technology suggesting that technology is a useful time saving tool that helps increase productivity for a large proportion of learners surveyed. This is supported by the fact that the majority of everyday tasks involve some type of technology use. However, a small percentage (16%) neither agree nor disagree with this statement and feel that technology does not support their productivity.

New technology makes life more complicated.

The majority of respondents selected neither agreed nor disagreed (32%) with this statement, followed by strongly agree (20%) and agree (17%). This is a broad range of results which suggests mixed opinions regarding technology and the impact it has on everyday life. The negative attitude responses are significant, with a total of 37% selecting either strongly agree or agree, suggesting an adverse relationship with technology. Many factors could be an issue causing learners to feel that technology makes their life more complicated such as lack of knowledge, lack of monitoring on social media, General Data Protection Regulations (GDPR), illicit material, technology addiction, impacts of technology on mental health and child welfare issues.

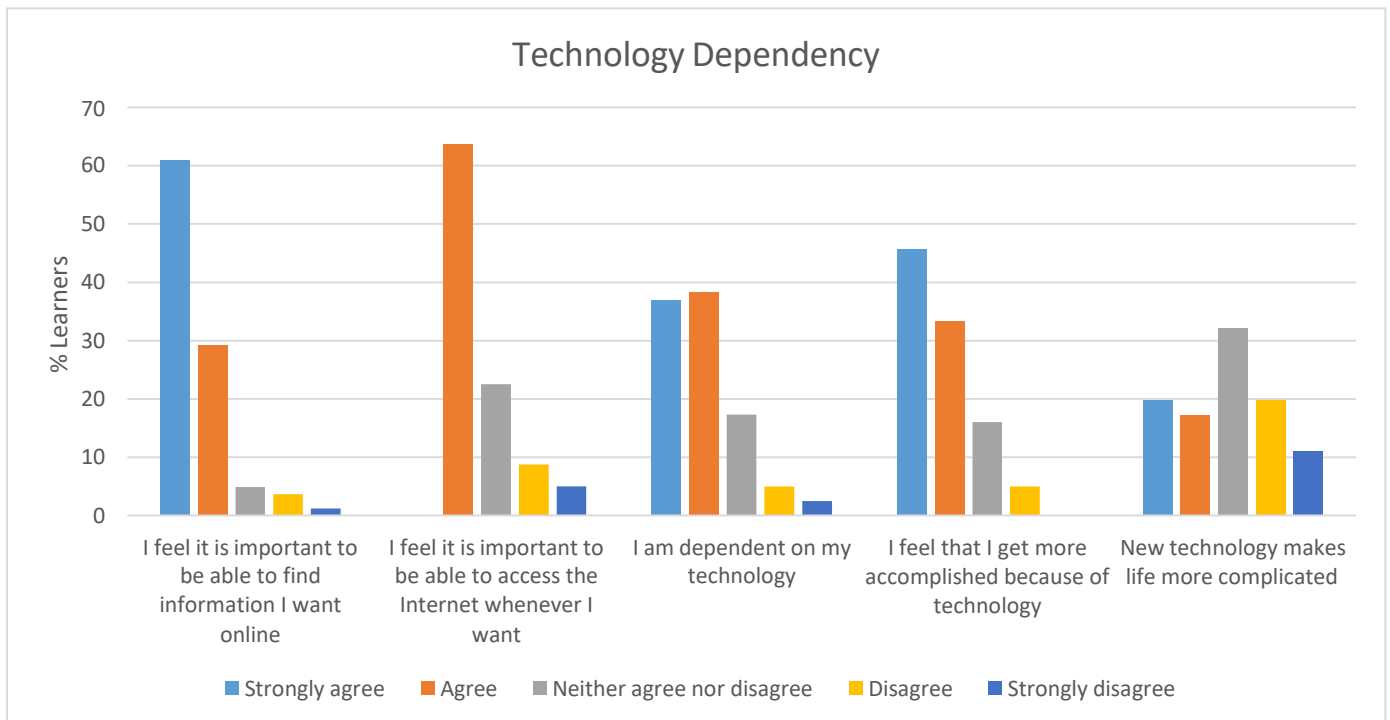


Figure 3.10 Technology Dependency

I get more involved in courses that use technology.

The majority of respondents selected agree (41%) followed closely by neither agree nor disagree (33%). These results suggest that the majority of respondents have a preference for using technology in teaching and learning and feel they engage more if it is used as an augmentation tool. This relates positively with research by the ECAR study (2016) that suggested that learner experiences of technology are shaped by their attitudes toward technology, and their belief that technology used in class will benefit them in their chosen careers. A third of respondents have no preference for technology use within their course of study. The small proportion (12%) of respondents that selected disagree and strongly disagree is significant as it suggests that not all learners have a strong affiliation for technology use in learning and that it doesn't have an impact on their level of participation within their course of study. They may not be motivated by technology use within their course of study.

When I started this course/my last course, I was adequately prepared to use the technology needed in my course.

The majority of respondents selected agree (43%) with 21% selecting strongly agree and 28% selecting neither agree nor disagree. This displays a strong positive relationship with a total of 64% (agree and strongly agree) of learners feeling that they were prepared technologically for their current or previous

course undertaken. These learners are confident with technology use and this correlates positively with the high level of learners that have basic ICT skills.

Technology in class interferes with my ability to concentrate.

The majority of respondents (46%) selected neither agree nor disagree. However, 17% of respondents selected agree and 13% selected strongly agree. This suggests a significant negative attitude towards technology use in the classroom. This may be due to a variety of factors such as a lack of appropriate technology skills when commencing their course of study or the opinion that technology use distracts from learning within the classroom. Research shows that learners that were using basic software applications when they started their course of study and that reported being sufficiently prepared to use technology for educational learning are significantly less likely to be distracted (ECAR, 2016).

In-class use of mobile devices is distracting.

A vast proportion of respondents (62%) selected strongly agree (31%) or agree (31%) suggesting that most learners feel that mobile devices are a distraction within the classroom environment.

I wish my teachers would use and integrate more technology in the classroom.

The majority of respondents (38%) selected neither agree nor disagree suggesting that technological tools are already used within their course of study or the learners have no significant preference for technology use within the classroom. This is followed closely by learners that choose agree (36%), indicating that a significant proportion of learners would like more technology integrated into their course of study.

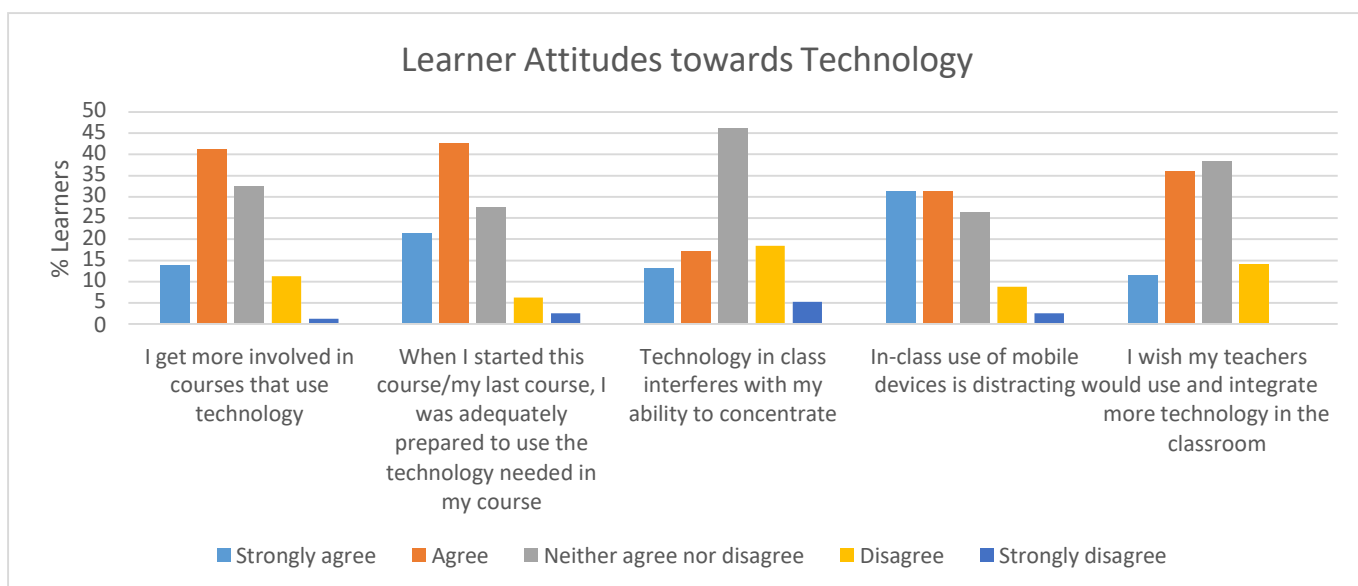


Figure 3.11 Learner Attitudes - Technology

I do not have adequate devices at home to engage effectively in online learning.

The majority of learners disagree (29%) with this statement, followed closely by neither agree nor disagree (25%). These results display a broad range of responses and suggest that a large majority are not affected by a lack of devices in their home environment and feel that they have adequate devices for engaging in learning from home. However, 5% of respondents strongly agree and 18% agree with this statement suggesting that a sizable minority do suffer from a lack of devices for engaging in online learning at home. This could be due to several issues such as cost and the high demand for devices at home due to the pandemic crisis.

My home internet connection is not adequate for engaging in online learning.

The majority of learners selected agree (31%) to this statement, followed closely by disagree (30%). This result was expected as Donegal has a geographically dispersed population but with 89% fast broadband coverage there is always going to be some rural areas that lack broadband capacity or have very poor broadband signals. In addition, the prohibitively high cost of fast broadband in Ireland is a significant issue.

I feel I do not have sufficient training to engage meaningfully in online learning.

The majority of learners (44%) selected neither agree nor disagree with 19% selecting disagree and 19% selecting agree. These are diverse results across the scale suggesting that learners have a variety of ICT skills and prior training before starting their course. It may also suggest that learners do not have or do not realise the skills necessary for online learning.

I lack the self-discipline to engage in online learning.

The majority (38%) of learners selected neither agree nor disagree with this statement, followed by disagree (24%) and agree (22%). Therefore, self-discipline does not seem to be an overriding factor in online learning for the majority of participants. However, a significant proportion of learners feel that self-discipline is a problematic factor when engaging in online learning. This suggests that learners differ in their preferences and motivations and some are more motivated by online learning while others have a preference for face-to-face interaction.

I feel my learning is more meaningful when face-to-face.

The majority of respondents selected agree (42 %) followed by strongly agree (24%) to this statement. This shows a strong consensus for face-to-face learning with most having the view that it

is more meaningful. This result is significant as even though online learning has many benefits such as flexibility and ease of access there is still an overriding preference for face-to-face. A noteworthy minority selected neither agree nor disagree (27%) suggesting that some learners do not have a preference for face-to-face learning.

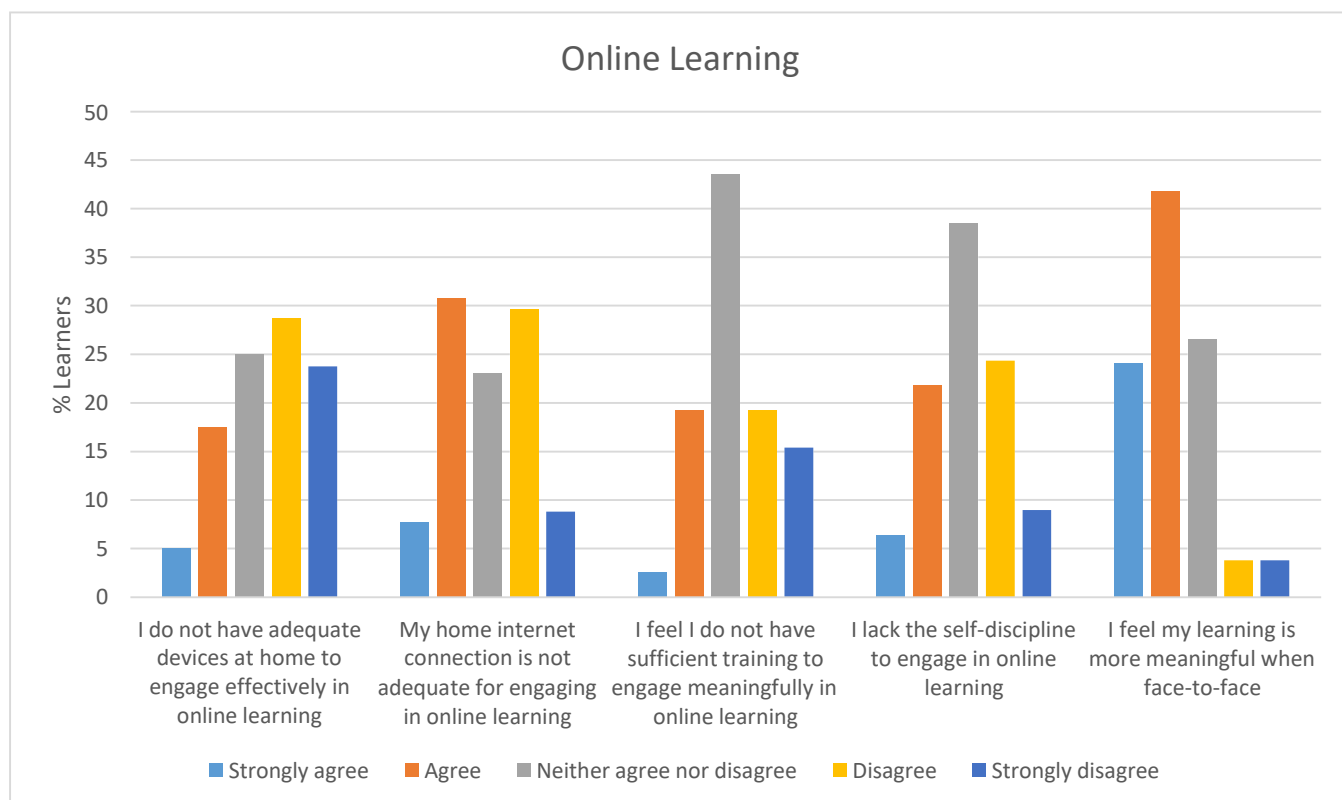


Figure 3.12 Learner Attitudes - Online Learning

3.12 Evaluation – Questionnaire Section D: Learning and the Pandemic

This section of the questionnaire asked participants how their learning was affected by the onset of the Covid-19 pandemic and how prepared they were for online learning. This was measured on a 4-point Likert scale from highly prepared, fairly prepared, somewhat prepared to not at all prepared.

At the time school and college closures were announced due to Covid-19, how prepared did you feel for engaging in online learning?

The majority of respondents (38%) selected somewhat prepared followed closely by not at all prepared (29%). These results show that a high proportion of learners felt that they were not at all prepared for

the shift to online learners caused by the pandemic. A significant number did not feel like they had the necessary skills for engaging in online learning. This lack of preparedness could be related to other factors such as technological skills or resource requirements such as digital devices and work space. Furthermore, a total of 34% of learners selected fairly prepared or highly prepared suggesting that many learners did have the necessary skills and resources for engaging in online learning during the pandemic crisis.

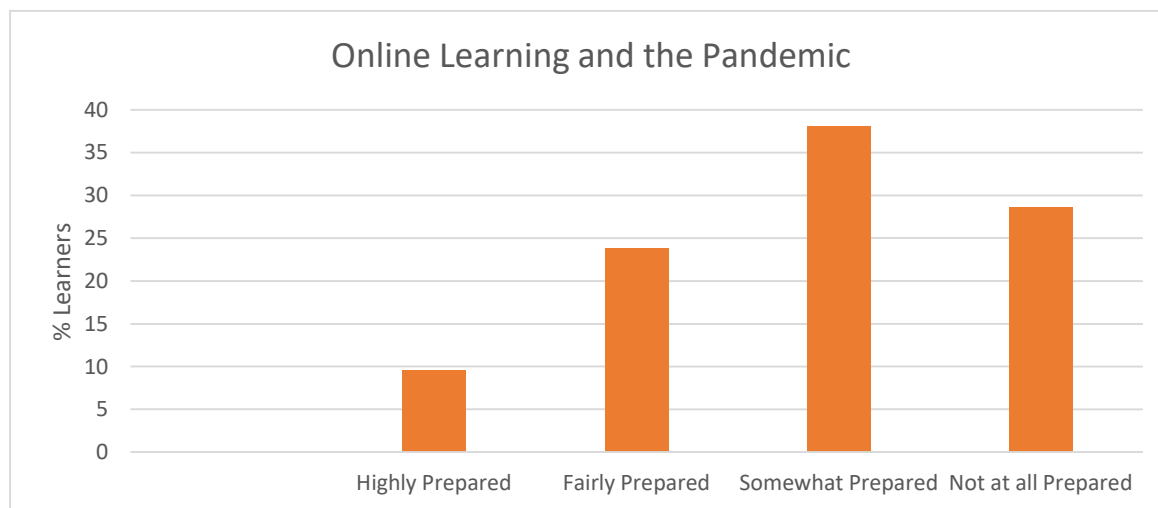


Figure 3.13 Online Learning and the Pandemic

Since the recent school/college/work closures, on average how much time per day do you spend engaged in learning?

This question was measured on a 4-point Likert scale from less than one hour (<1 hour), one to two hours (1-2 hours), three to five hours (3-5 hours) to greater than five hours (>5 hours).

The majority of learners (31%) spend 3-5 hours per day engaged in learning since their school/college/work closed due to the pandemic crisis, followed closely by less than 1 hour (26%), followed by 1-2 hours (25%) and greater than 5 hours (18%).

These results indicate that learners spend a significant amount of time engaging in learning since their educational organisation has closed. A total of 49% of learners spend 3 or more hours engaged in learning every day. This suggests that learners are continuing to engage with their course of study or take on new learning commitments since the crisis commenced. On the other hand, a significant number (26%) of learners are spending less than 1 hour engaged in learning which may signify that obstacles are preventing these learners from engagement such as lack of broadband, poor broadband

connection, lack of facilities, lack of digital devices and external circumstances such as family commitments.

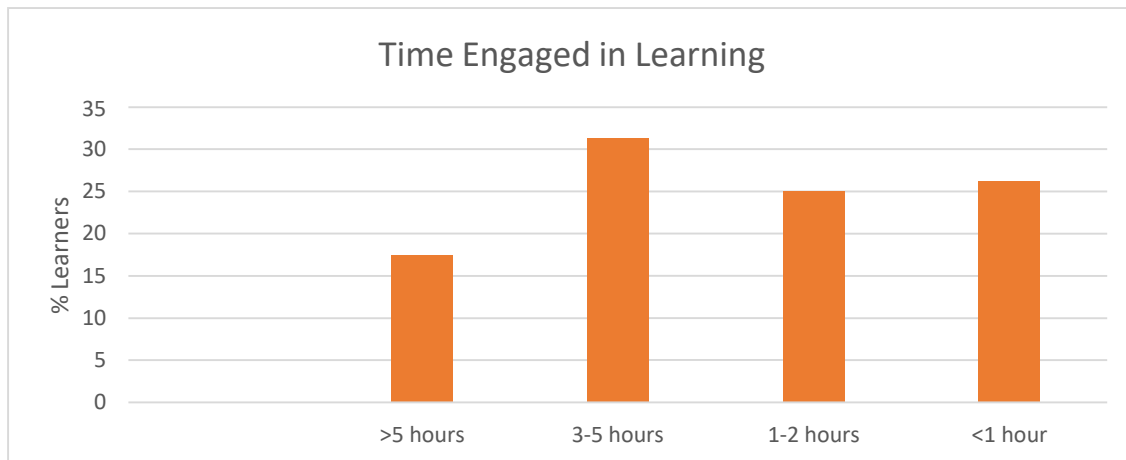


Figure 3.14 Time engaged in Learning since School/College/Work Closures

3.13 Statistical Analysis of Data

Statistical analysis was employed to analyse and interpret the findings of the quantitative data in this research study. Three significant scales were utilised during the study. Measurements for ICT usage frequency were recorded as scores on a 10-point Likert scale, while measures for ICT attitudes and perceptions were recorded as scores based on a 5 point Likert scale. A 4-point Likert scale was used for accessing preparedness for online learning. The Likert scale is the most widely used method for scaling responses in survey research and is ideal for questionnaires. The data generated was coded and analysed using SPSS version 26. Frequency tables and cross-tabulations were used to display the response patterns of participants which included frequency distributions such as mean and standard deviation.

3.13.1 Cronbach Alpha Coefficient

Cronbach's alpha is the most commonly used measure of internal consistency. This coefficient of reliability is most often used when using multiple Likert questions in a survey questionnaire that form a scale and it is necessary to determine if the scale is reliable. The minimum acceptable value for the interpretation of Cronbach's alpha is ca 0.70. If the value is below 0.70 then the internal consistency of the range is regarded as low. The maximum value to be expected is 0.90 and if the value is above 0.90 then it is regarded as redundant or is due to duplication.

3.13.2 Frequency of ICT Usage Data Analysis

A case processing summary was produced (Table 3.1) which showed that of a total of 84 cases there were 82 valid cases and 2 were excluded in the ICT usage data. The listwise indicated that if a value was missing it was deleted completely.

Case Processing Summary			
		N	%
Cases	Valid	82	97.6
	Excluded ^a	2	2.4
	Total	84	100.0
a. Listwise deletion based on all variables in the procedure.			

Table 3.1 Case Processing Summary ICT Usage Data Analysis

The Cronbach's Alpha value for the ICT usage data (13 items) was .923 (Table 3.2). This is a very good reliability coefficient and suggests that the items have a relatively high internal consistency i.e. the set of items in the scale are closely related. Cronbach's alpha reliability is calculated by correlating the score for each item on the scale with the total score for respondents. This is then compared with the variance for all item scores. Table 3.3 displays the item statistics for the ICT usage data. The standard deviation is a measure of variability and the mean is an average of the responses (total sum of the values divided by the number of cases).

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.923	.921	13

Table 3.2 Cronbach's Alpha Reliability Statistics – ICT Usage

Item Statistics			
Please indicate how often you do each of the following activities?	Mean	Std. Deviation	N
Send, receive and read e-mails	4.23	2.359	82
Check your personal e-mail	4.32	2.072	82
Check your work/college e-mail	3.99	2.432	82
Send or receive files via e-mail	3.62	2.281	82
Watch TV shows, movies etc. on a device	2.72	2.348	82
Search the Internet for information on any device	4.18	2.342	82
Play games on a computer, video console or smartphone	1.63	2.022	82
Check you Facebook page or other social media networks	4.49	2.654	82
Share your own media files such as photos	2.95	2.424	82
Send/receive text messages on a mobile phone	4.49	2.515	82
Make/receive phone calls on a mobile phone	3.87	2.136	82
Browse the web on a mobile phone	5.01	2.737	82
Use apps on a mobile phone	4.88	2.937	82

Table 3.3 Item statistics – ICT Usage

The Inter Item Correlation Matrix (Appendix D) shows the correlation of every item in the scale with every other item. These were all positive correlations as all the questions are worded in the same way and go in same direction. This displays a strong relationship between the responses as the figures are close to 1. The results obtained reveal a positive relationship between the items on the scale.

Table 3.4 displays the summary item statistics for all items in the scale and Table 3.5 displays the item total statistics. The item-total statistics show the correlation of each item with all other items combined and this score should be greater than 0.40.

Summary Item Statistics							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.875	1.634	5.012	3.378	3.067	.896	13
Inter-Item Correlations	.473	-.032	.937	.969	-28.869	.052	13

Table 3.4 Summary Item Statistics

Item-Total Statistics					
Please indicate how often you do each of the following activities?	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Send, receive and read e-mail	46.15	446.003	.624	.725	.919
Check your personal e-mail	46.06	438.009	.823	.865	.912
Check your work/college e-mail	46.39	432.982	.739	.813	.914
Send or receive files via e-mail	46.76	447.026	.638	.764	.918
Watch TV shows, movies etc. on a device	47.66	457.512	.505	.527	.923
Search the Internet for information on any device	46.20	438.332	.713	.629	.915
Play games on a computer, video console or smartphone	48.74	491.921	.198	.316	.931
Check you Facebook page or other social media networks	45.89	422.445	.772	.764	.913
Share your own media files such as photos	47.43	465.655	.403	.451	.927
Send/receive text messages on a mobile phone	45.89	424.766	.797	.797	.912
Make/receive phone calls on a mobile phone	46.51	443.932	.725	.680	.915
Browse the web on a mobile phone	45.37	410.630	.862	.922	.909
Use apps on a mobile phone	45.50	407.685	.821	.912	.911

Table 3.5 Item Total Statistics

Overall the total item correlation reveals a positive, high total-item correlation. This indicates that the items illustrate similar behaviour and that the test's internal consistency is high. The data analysis found that all items were significant and can be said to measure the same behaviour.

3.14 Themes

There are two emerging themes from the research data: ICT skills, attitudes and perceptions and the impact of the pandemic crisis on learning.

3.14.1 ICT Skills, Attitudes and Perceptions

This investigative research study concludes that learners surveyed had a high level of positive attitudes towards ICT for teaching and learning purposes with learners' attitudes towards using ICT generally favourable. The research found that the perceived usefulness and frequency of use of ICT in teaching and learning were found to be significantly and positively correlated with attitudes towards ICT. This suggests that engagement with ICT is high when the learner viewed ICT as useful and easy to use. It is important that this positive attitude towards the use of ICT among learners is developed and maintained so that educators can keep up with technologies and integrate them into learning courses, regardless of teaching mode.

On the other hand, this research did show that some learner responses displayed indifference towards ICT use in teaching and learning. There could be multitude of factors that may support or hinder their usage such as ICT skills, Internet connectivity, technical issues and general software usability. The research results show that learners' willingness and enthusiasm for the use of ICT in learning and attitudes towards online learning are not homogenous as there are a broad range of results across the scale regarding preferences for online learning. It is apparent that the characteristics of digital natives do not apply to all learners as learners come from diverse backgrounds and age groups. Generalisations on a generational basis are not accurate as learners have different preferences, skills, attitudes and learning styles.

It is evident that technology can aid access to education for everyone, help bridge learning divides, support and develop staff in education and learning environments and enhance the quality of learning (Sharpe, 2013). However, it is apparent from this research study that learning needs and learning styles of learners are not homogeneous. This advocates the requirement of learner accommodation on courses of study to cater for the diverse needs of learners.

3.14.3 Impact of the Pandemic Crisis

The coronavirus pandemic has prompted distance learning for all education providers. Organisations are now planning for the future at all levels, where classes are adapted quickly to online learning. This mass transition will in the future encourage providers to expand their online course offerings.

This research study indicated that the pandemic crisis had a substantial impact on learning and that the majority of learners felt that they were not prepared for the transition to online learning caused by the pandemic crisis. Nevertheless, learners still engaged in online learning and nearly half of those surveyed spent 3 or more hours engaged in learning every day.

However further research is required to explore the impacts of this transition on learners such as the loss of face-to-face, social and interactive learning. This research shows that there is a distinct divide between learners with adequate resources for online learning. It is apparent that those learners without the necessary infrastructure and resources may miss out on learning opportunities.

Chapter Four: Conclusion and Recommendations

4.1 Conclusion

This final chapter of the thesis presents conclusions and recommendations about the findings of this research. It summarizes the key findings raised from the questionnaire and subsequent analysis.

This research study adopted a mixed-method approach to investigate digital and media usage patterns of learners and their attitudes towards using technology in learning, along with preparedness for Covid-19 pandemic. This research study has given an account of the widespread use of technology within learning environments and endeavours to fill in the gaps in knowledge relating to attitudes and perceptions of ICT in learning and the perceived effectiveness of these technologies from a learner perspective.

The analysis of the results indicated that the questionnaire developed was effective in gathering the required information. The Cronbach Alpha coefficient was positive in this respect and supports the questionnaire reliability. The research data indicated that most learners felt they had proficient ICT skills as they rated their skills as good or very good. It is apparent from the survey responses that there was an overall lack of preparedness technologically for the pandemic crisis for the majority of learners.

While it was evident that many learners have a positive relationship with technology and regard it as a useful tool for learning, the research data indicated that a significant number of learners had a high level of dependency on technology. Further research is necessary to ascertain the extent of this dependency and the potential impacts it may have.

Overall this research identifies that learners have a high suitability attitudinal perception towards ICT for learning purposes. Furthermore, it is evident that learners are highly and positively motivated by the use of ICT and have a positive attitude towards its use in teaching and learning. The results of this research study may have implications for future planning within educational institutions or any organisation involved in teaching and learning.

4.2 Limitations

One of the identified limitations is the relatively small sample size which may oversimplify the results. The research could have benefited with a larger sample size. Due to current conditions and lack of time, this was not possible. If the participant size was larger the research would have gained from a larger knowledge base and size of data from which richer data could be gained.

The use of convenience sampling as a selection process may have led to a biased sample group as these learners were selected as they were conveniently available to the researcher.

The online data collecting technique was an additional limitation. The use of a Google online form was not the initial proposed plan but was applied due to pandemic crisis restrictions. The online method may have influenced the respondents' responses and it is conceivable that respondents may have become impatient with the online questionnaire instrument and the time required to complete it.

4.3 Suggestions for Further Research

There are several recommendations to be made on the findings of this research and could be an aid to further research in this field. Additional research is necessary regarding the motives of learners and their inclination to use ICT for learning purposes. Factors such as communication, engagement, efficiency, and collaboration could be further explored. Adverse factors such as poor broadband connectivity, lack of digital resources, technical issues and lack of ICT skills also require further exploration.

The research study could be extended and include a comparison with previous groups of learners from different regions within Ireland. The research could be repeated at a later stage to ascertain how learner attitudes and perceptions regarding preparedness for the pandemic crisis change over time.

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Appendix A Participant Information Sheet

TITLE OF THE STUDY

An investigation into learner usage patterns, attitudes and perceptions of Information and Communication Technology (ICT) and technological preparedness for the Covid-19 pandemic.

You are invited to take part in a research study. In advance of deciding if you would like to take part you need to understand why the research is being done and what it involves for you. Please read the following information carefully and feel free to ask any questions if anything you read is not clear or if you require more information. Please take your time to decide whether or not you would like to take part in the research.

WHO I AM AND WHAT THIS STUDY IS ABOUT

My name is Antoinette O'Keeney and I work as XXXXXX. I am completing a Masters in Learning and Teaching (MALT) at Letterkenny Institute of Technology. I am undertaking a research study to investigate the use of digital and media technologies within learning environments.

WHAT WILL TAKING PART INVOLVE?

If you choose to take part in this study you will have to complete a questionnaire at the start and end of your course. This anonymous questionnaire will take approximately 10 minutes to complete.

WHY HAVE YOU BEEN INVITED TO TAKE PART?

You have been invited to take part as you are completing/have completed a course of study.

DO YOU HAVE TO TAKE PART?

Participation in this research study is completely voluntary and you have the right to refuse participation, refuse any question and withdraw at any time without any consequence whatsoever.

WHAT ARE THE POSSIBLE RISKS AND BENEFITS OF TAKING PART?

The data from this research study may be useful for future planning within educational organisations. I do not anticipate any risks to the participants as a result of participating in this research study.

WILL TAKING PART BE CONFIDENTIAL?

The confidentiality and anonymity of the participant will be protected at all times. The anonymised questionnaires may be retained as part of the research process.

WHAT WILL HAPPEN TO THE RESULTS OF THE STUDY?

The final research study will be submitted for the MALT dissertation.

WHO SHOULD YOU CONTACT FOR FURTHER INFORMATION?

Antoinette O'Keeney (Researcher) – XXXXXX

Dr Louise Duggan (Research Supervisor) – XXXXXX

Thank you

Appendix B Research Participant Consent Form

Title of Project:

A Phenomenological Investigation of Learner Usage Patterns, Attitudes and Perceptions of Information and Communication Technology (ICT) and Technological Preparedness for the Covid-19 Pandemic Crisis

Name of Chief Investigator: Antoinette O’Keeney

Name of Investigators: Antoinette O’Keeney

I, _____ agree to take part in the above study and consent to my data being used for the purpose of this research study as outlined in the information sheet.

- I confirm that I have been given and have read and understood the information sheet for the above study and have asked and received answers to any questions raised.
- I understand that I will have to complete a questionnaire.
- I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without my rights being affected in any way.
- I understand that the researchers will hold all collected data securely.
- If I choose to withdraw from the study, there will be no adverse consequences
- I am aware that I can view all research and transcripts that have taken place concerning my involvement.
- All information will be confidential and used only for the purposes of the research study
- I understand that codes will be used to protect my anonymity and confidentiality.

I agree to take part in the above study and consent to my data being used for the purpose of this research study as outlined in the information sheet.

Signature of participant: _____ Date: _____

Investigator’s signature: _____ Date: _____

Appendix C Survey Questionnaire

Student Technology Use Survey

My name is Antoinette O'Keeney and I am completing a Masters in Learning and Teaching (MALT) at Letterkenny Institute of Technology in County Donegal. I am undertaking a research study to investigate the use of digital and media technologies within teaching and learning environments.

Please take a moment to complete this survey. Your answers are completely anonymous and no personal questions that could identify a respondent are asked. The survey will take about 5 minutes to complete. Thank you for your participation.

* Required

Informed Consent

1. Do you consent to complete this questionnaire?

Mark only one oval.

- Yes Skip to question 3
 No Skip to section 6 (Participation Declined)

2. Are you over 18?

Mark only one oval.

- Yes Skip to question 3
 No Skip to section 6 (Participation Declined)

Skip to question 3

Student Details

3. What is your age?

Mark only one oval.

- 18-25
 26-35
 36-45
 46-55
 56-65
 66 and above

4. Are you

Mark only one oval.

- Male
- Female
- Non binary/Other
- Prefer not to say

5. What educational organisation do you attend or what is the most recent organisation you attended?

Mark only one oval.

- Secondary School
- Further Education and Training
- Third Level
- Other (Online, Blended, Work based learning etc)

6. Which of the following devices do you own or use?

Check all that apply.

- Desktop computer
- Laptop
- Smartphone
- Tablet device (e.g. iPad, Chromebook)

Other: _____

7. Where do you access the Internet?

Check all that apply.

- Home
- Work
- College
- Other
- Do not access

8. Please rate your skill in the following applications? *

Mark only one oval per row.

	Poor	Fair	Good	Very Good
Word Processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spreadsheets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Databases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E-mail and internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Skip to question 9

Technology Use

9. Please indicate how often you do each of the following activities?

Mark only one oval per row.

	Never	Once a month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once a hour	Several times an hour	All the time
Send, receive and read e-mails.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Check your personal e-mail.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Check your work/college e-mail.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Send or receive files via e-mail.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. Please indicate how often you do each of the following activities?

Mark only one oval per row.

	Never	Once a month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
Send/receive text messages on a mobile phone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Make/receive phone calls on a mobile phone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Browse the web on a mobile phone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use apps on a mobile phone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

11. Please indicate how often you do each of the following activities?

Mark only one oval per row.

	Never	Once a month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour	All the time
Watch TV shows, movies etc. on a device.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Search the Internet for information on any device.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Play games on a computer, video console or smartphone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Check you Facebook page or other social media networks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Share your own media files such as photos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Please rate the following statements about technology use.

Mark only one oval per row.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I feel it is important to be able to find information I want online.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel it is important to be able to access the Internet whenever I want.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am dependent on my technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that I get more accomplished because of technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New technology makes life more complicated.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. Please indicate to what extent you agree with the following statements.

Mark only one oval per row.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I get more involved in courses that use technology.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I started this course/my last course, I was adequately prepared to use the technology needed in my course.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technology in class interferes with my ability to concentrate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In-class use of mobile devices is distracting.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish my teachers would use and integrate more technology in the classroom.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Please indicate to what extent you agree with the following statements.

Mark only one oval per row.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I do not have adequate devices at home to engage effectively in online learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My home internet connection is not adequate for engaging in online learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel I do not have sufficient training to engage meaningfully in online learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I lack the self-discipline to engage in online learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel my learning is more meaningful when face-to-face.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Technology use during the pandemic

15. At the time school and college closures were announced due to Covid-19, how prepared did you feel for engaging in online learning?

Check all that apply.

- Not at all Prepared
- Somewhat Prepared
- Fairly Prepared
- Highly Prepared

16. Since the recent school/college/work closures, on average how much time per day do you spend engaged in learning?

Check all that apply.

- <1 hour
- 1-2 hours
- 3-5 hours
- >5 hours

Participation
Declined

You're elected not to participate, or you are under the age of consent for participation, you can click submit or simply close your browser.

Appendix D Inter-Item Correlation Matrix

	Send, receive and read e-mails	Check your personal e-mail	Check your work/college e-mail	Send or receive files via e-mail	Watch TV shows, movies etc. on a device	Search the Internet for information on any device	Play games on a computer, video console or smartphone	Check you Facebook page or other social media networks	Share your own media files such as photos	Send/receive text messages on a mobile phone	Make/receive phone calls on a mobile phone	Browse the web on a mobile phone	Use apps on a mobile phone
Send, receive and read e-mails	1.000	0.793	0.704	0.707	0.257	0.403	0.116	0.372	0.108	0.595	0.528	0.495	0.407
Check your personal e-mail	0.793	1.000	0.861	0.747	0.348	0.565	0.102	0.571	0.244	0.714	0.696	0.709	0.643
Check your work/college e-mail	0.704	0.861	1.000	0.814	0.246	0.473	0.125	0.470	0.278	0.639	0.660	0.605	0.529
Send or receive files via e-mail	0.707	0.747	0.814	1.000	0.118	0.369	0.117	0.351	0.376	0.556	0.593	0.473	0.376
Watch TV shows, movies etc. on a device	0.257	0.348	0.246	0.118	1.000	0.512	0.355	0.625	0.130	0.343	0.285	0.536	0.602
Search the Internet for information on any device	0.403	0.565	0.473	0.369	0.512	1.000	0.179	0.657	0.280	0.590	0.622	0.731	0.684

Play games on a computer, video console or smartphone	0.116	0.102	0.125	0.117	0.355	0.179	1.000	0.291	0.170	-0.032	0.134	0.079	0.159
Check you Facebook page or other social media networks	0.372	0.571	0.470	0.351	0.625	0.657	0.291	1.000	0.484	0.620	0.473	0.777	0.817
Share your own media files such as photos	0.108	0.244	0.278	0.376	0.130	0.280	0.170	0.484	1.000	0.401	0.285	0.382	0.395
Send/receive text messages on a mobile phone	0.595	0.714	0.639	0.556	0.343	0.590	-0.032	0.620	0.401	1.000	0.729	0.811	0.750
Make/receive phone calls on a mobile phone	0.528	0.696	0.660	0.593	0.285	0.622	0.134	0.473	0.285	0.729	1.000	0.638	0.578
Browse the web on a mobile phone	0.495	0.709	0.605	0.473	0.536	0.731	0.079	0.777	0.382	0.811	0.638	1.000	0.937
Use apps on a mobile phone	0.407	0.643	0.529	0.376	0.602	0.684	0.159	0.817	0.395	0.750	0.578	0.937	1.000

List of Abbreviations

ETB Education and Training Board

FET Further Education and Training

GDPR General Data Protection Regulation

ICT Information and Communication Technology

MTUAS Media and Technology Usage and Attitudes Scale

NFQ National Framework Qualifications

PLC Post Leaving Certificate

QQI Quality and Qualifications Ireland